

THE EFFECTS OF THE GLOBAL WAR ON TERRORISM  
ON ARMY AVIATION TRANSFORMATION

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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

## ABSTRACT

### THE EFFECTS OF THE GLOBAL WAR ON TERRORISM ON ARMY AVIATION TRANSFORMATION, by MAJ Judah Lyons, 76 pages

Over the last eight years, combat operations in support of the Global War on Terrorism (GWOT) have put a tremendous strain on the US Army's aviation fleet. In February 2004, the Army canceled the cornerstone of Army Aviation Transformation, the \$48 billion RAH-66 Comanche Program. In October 2008, the contract for the ARH-70 "Arapaho" was also canceled. With the cancelation of two helicopter projects in four years, some would argue that the GWOT negatively affected Army Aviation Transformation. On the other hand, the Global War on Terrorism had a positive impact on Army Aviation Transformation. The GWOT provided a sense of urgency; no longer could Army Aviation afford to wait for decades for Transformation. The GWOT forced Army Aviation leaders to reevaluate Transformation priorities and vision for the future.

The GWOT was a catalyst that caused many challenges and changes to Army Aviation Transformation, which ultimately resulted in a more balanced Transformation across the entire aviation force. Rather than focusing solely on a large conventional threat, the transition to a multi-functional Combat Aviation Brigade provided the capability required to conduct full spectrum operations, across the entire spectrum of conflict. However, the question remains, what additional Transformation is required to meet the threats of the 21<sup>st</sup> Century? The recommendations proposed in this thesis could be used to modify and update Army Aviation Transformation efforts and force structure development to further strengthen the future of Army Aviation.

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## TABLE OF CONTENTS

	Page
MASTER OF MILITARY ART AND SCIENCE THESIS APPROVAL PAGE .....	iii
ABSTRACT .....	iv
ACKNOWLEDGMENTS .....	v
TABLE OF CONTENTS .....	vi
ACRONYMS .....	vii
ILLUSTRATIONS .....	x
CHAPTER 1 INTRODUCTION .....	1
Assumptions.....	4
Limitations .....	5
Delimitations.....	5
CHAPTER 2 LITERATURE REVIEW .....	6
CHAPTER 3 RESEARCH METHODOLOGY .....	13
CHAPTER 4 ANALYSIS .....	15
Background: Army Aviation Transformation Priorities 1995-2004.....	15
Army Aviation Transformation Priorities 2005-2009 .....	31
The Future of Army Aviation 2010-2020 and beyond .....	37
CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS .....	42
Conclusions.....	42
Recommendations.....	56
Summary.....	57
GLOSSARY .....	59
REFERENCE LIST .....	62
INITIAL DISTRIBUTION LIST .....	66

## ACRONYMS

A2C2S	Army Airborne Command and Control System
ABCS	Army Battle Command Systems
AFATDS	Advance Field Artillery Tactical Data System
AC	Active Component, full time active duty Army
AH-1	“Cobra” Vietnam era attack helicopter
AH-64A	“Apache” attack helicopter
AH-64D	“Longbow Apache” AH-64 equipped with millimeter-wave Fire Control Radar (attack helicopter)
AOE	Army of Excellence
ASAS	All Source Analysis intelligence system
ARI	Aviation Restructure Initiative
ARNG	Army National Guard
ARH	Armed Reconnaissance Helicopter
ARH-70	“Arapaho” armed reconnaissance helicopter
AVCATT-A	Aviation Reconfigurable Manned Simulator
BAE	Brigade Aviation Element
BCT	Brigade Combat Team
C2	Command and Control
C-23	“Sherpa” small fixed wing cargo aircraft
C-27J	“Spartan” Joint Cargo Aircraft
C3	Command, Control, and Communications
CAAS	Common Avionics Architecture System “glass cockpit” digital flight instruments
CAB	Combat Aviation Brigade

CBM	Conditions Based Maintenance
CBO	Congressional Budget Office
CCA	Close Combat Attack
CH-47	“Chinook” heavy lift, tandem rotor cargo helicopter
COTS	Commercial Off the Shelf
CRS	Congressional Research Service
CTR	Continuous Technology Refreshment
FM	Frequency Modulation radio
FBCB2	Force XXI Battle Command Brigade and Below
FCR	Fire Control Radar
FCS	Future Combat Systems
GWOT	Global War on Terrorism
IERW	Initial Entry Rotary Wing flight training
JCA	Joint Cargo Aircraft C-27J “Spartan”
JHL	Joint Heavy Lift rotorcraft
JMR	Joint Multi-Role rotorcraft
LUH	Light Utility Helicopter
L2I	Lessons Learned Integration
MEDEVAC	Medical Evacuation
NATO	North Atlantic Treaty Organization
OH-58A/C	“Kiowa” scout/observation helicopter
OH-58D	“Kiowa Warrior” or “KW”, armed scout/reconnaissance helicopter
OPFOR	Opposing Forces
OPTEMPO	Operational Tempo
RDT&E	Research, Development, Testing, and Evaluation



RAH-66	“Comanche” advanced, stealthy armed reconnaissance helicopter
RC	Reserve Component, also US Army Reserve USAR
SLEP	Service Life Extension Program
TF	Task Force
TOC	Tactical Operations Center
TTP	Tactics, Techniques, and Procedures
UH-1	“Huey” Vietnam era utility helicopter
UH-60	“Blackhawk” utility helicopter
UH-72A	“Lakota” LUH light utility helicopter
UAV	Unmanned Aerial Vehicle
UAS	Unmanned Aerial System
UHF	Ultra-High Frequency radio

## ILLUSTRATIONS

	Page
Figure 1. Heavy, Medium, and Light Combat Aviation Brigade Organization.....	29

## CHAPTER 1

### INTRODUCTION

“In October 1999, then Chief of Staff of the Army (CSA) General Eric Shinseki introduced the Army’s transformation strategy which was intended to convert all of the Army’s divisions (called Legacy Forces) into new organizations called the Objective Force [now known as the Future Force according to the 2008 Army Force Modernization Strategy]. General Shinseki’s intent was to make the Army lighter, more modular, and--most importantly-- more deployable. General Shinseki’s deployment goals were to deploy a brigade in four days, a division in five days, and five divisions in 30 days. As part of the Army Transformation, the Army adopted the Future Combat System[s] (FCS) as the major acquisition program designed to equip the Objective Force” (Feickert 2008, 2). “The Future Combat System[s] (FCS) [are] the U.S. Army’s multiyear, multibillion dollar program at the heart of the Army’s transformation efforts” (Feickert 2008, 1).

General Shinseki’s Transformation called for a highly responsive, capabilities-based “Objective Force” with the ability to meet a full range of potential future threats and challenges, rather than a threat-based Cold War Army focused only on a large conventional threat. The United States General Accounting Report 01-311 identified the requirements for the “Objective Force” as outlined by General Shinseki. “This [Objective] force includes advanced command, control, communications, computers, intelligence, surveillance, and reconnaissance capabilities; future reconnaissance, attack, and lift aircraft; and revolutionary weapon systems--called Future Combat Systems--that are expected to be as lethal and survivable as the current heavy weapon systems and light

enough to be transported in a C-130-type aircraft” (United States General Accounting Office 2001a, 4).

General Shinseki’s successor, General Peter J. Schoomaker further refined General Shinseki’s vision, not as a single 20 plus year plan to reach the “Objective Force” but as a continuous, ongoing Transformation process. US Army Field Manual FM-1 *The Army* defines Transformation as “the process by which the current force is becoming the future force. It [transformation] occurs as the Army incorporates new capabilities into its force structure and trains Soldiers to use them. The future force is what the Army continuously seeks to become. It will be strategically responsive and joint interdependent. It will be capable of precision maneuver and able to dominate adversaries and situations across the range of military operations envisioned in the future security environment. The future force will be lighter, more lethal and agile, and optimized for versatility” (Department of the Army 2005, 4-3). In August 2003, General Schoomaker redesignated the “Objective Force” as the “Future Force,” a change that reflected a shift in the Army’s Transformation emphasis. “Rather than stress fielding an ideal objective unit almost a decade in the future and attempting to reshape the entire Army force structure, the goal of the future force is more process-oriented and open-ended, emphasizing fielding future capabilities as soon as they are available with less concern over what the final state of the force might look like” (Carafano 2004b).

As the Army Transformed to the “Future Force,” it became readily apparent that Army Aviation had to transform as well, in order to support the capabilities, organization, and materiel requirements of this new Brigade Combat Team (BCT) based “Future Force.” In the 1990s, the existing Aviation materiel structure included a mixture of

Vietnam era technology such as the UH-1 Iroquois “Huey” and AH-1 Cobra, as well as modernized helicopters such as the UH-60 Blackhawk and AH-64 Apache helicopters. This organizational structure was ill suited for multi-functional, full spectrum operations role. The Army Aviation Modernization Plan, forwarded to Congress in April 2000, realigned the modernization priorities for Army Aviation and nested the Aviation Modernization Strategy with the Army’s Modernization Strategy. The Army Aviation Modernization Plan 2000 identified the Aviation vision for the materiel and organizational requirements better suited to support the full spectrum operational requirements of the “Future Force.”

The Cold War era vision for the Army in the late 1980s and 1990s was based on a large conventional threat, such as the Soviet Union, and did not match the reality of today’s threat environment. The challenge is to fight and win the current war, while simultaneously continuing to prepare, transform, and develop capabilities for the next war. A decade after General Shinseki began the Army’s Transformation and seven years into the Global War on Terrorism (GWOT), what impact has the GWOT had on U.S. Army Aviation Transformation and what additional Transformation is required to meet the threats of the 21st century?

Some would argue that the Global War on Terrorism negatively affected Army Aviation Transformation efforts. For example, the cancelation of the RAH-66 Comanche program was considered a step backwards and that the GWOT has decreased our ability to fight a conventional war. Even the current Chief of Staff of the Army, General George W. Casey Jr., has expressed concerns that the Army is “out of balance” and the demands of the GWOT are outpacing readiness of soldiers and equipment. Additionally,

equipment is being used repeatedly in harsh environments and is wearing out more rapidly than originally scheduled. Conversely, others argue that the Global War on Terrorism had a positive impact on Army Aviation Transformation. The GWOT provided a sense of urgency to Army Aviation Transformation efforts. No longer could Army Aviation afford to wait for decades for Transformation. The GWOT forced Army Aviation leaders to reevaluate Transformation priorities and vision for the future. Simultaneously, the GWOT created seasoned, experienced aviators capable of conducting a wide range of missions under the most challenging conditions.

This research seeks to understand the effects of the GWOT on Army Aviation Transformation, understand current capabilities and limitations, and to identify interim capabilities and limitations that bridge the potential gap between current and future capabilities of U.S. Army Aviation. What effects has the Global War on Terrorism had on U.S. Army Aviation Transformation, and what additional Transformation is required to meet the threats of the 21st Century? The recommendations proposed in this thesis could be used to modify and update Army Aviation Transformation efforts and force structure development that directly affects the future of Army Aviation.

### Assumptions

The 2008 Army Strategy describes the Army's view of the future as "an era of *persistent conflict*, a period of protracted confrontation among state, non-state and individual actors who increasingly use violence to achieve their political and ideological ends" (Department of the Army 2008c, 1). Over the next several decades, this era of persistent conflict will continue with an increased frequency and intensity of conflict across the globe with unconventional threats, such as state and non-state sponsored

radical ideological terrorists, and conventional near-peer threats such as Russia and China. Recent history has shown an exponential increase in the Army's operational tempo. The Army's operational tempo in the 21st Century will require a balanced aviation force that can conduct full spectrum operations, across the entire spectrum of conflict.

### Limitations

This thesis is limited in scope to U.S. Army Aviation Transformation based on a narrow review of Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities (DOTMLPF) analysis, with a concentration primarily on the Organization, Training, and Materiel aspects. This is not intended to be a historical analysis; however, a certain amount of historical data must be included. The most recent data and research included in this thesis is dated no later than March 31st, 2009.

### Delimitations

This thesis will not examine, in depth, other U.S. Army ground-based Future Combat Systems, nor will it examine similar sister service programs such as the Marine Corps CH-53K heavy lift helicopter and MV-22 Osprey (tilt-rotor aircraft), or U.S. Air Force programs such as the CSAR-X helicopter, F-22 Raptor, or F-35 Joint Strike Fighter. However, parallel conclusions drawn from this thesis may be applicable to other Future Combat Systems, or the Army Transformation and Force Modernization Strategy in general.

## CHAPTER 2

### LITERATURE REVIEW

From 1983 to 2004, the RAH-66 Comanche was the cornerstone of the U.S. Army Aviation's vision for the next generation armed scout reconnaissance helicopter. The Comanche was envisioned to be able to stealthily penetrate a complex air defense network, strike deep into heavily defended enemy territory, and digitally provide reconnaissance and targeting information back to the more heavily armed AH-64 Apache attack helicopters.

Although it has been a high Army priority, a number of factors have complicated the RAH-66 Comanche program. Since its inception, the program has been restructured several times--postponing the initial operational capability (IOC) and increasing overall program costs. . . . Originally, the Army envisioned developing and procuring 5,023 Comanches . . . [but] Budget constraints and force structure modifications caused significant modifications to the Comanche program. First . . . [the] procurement objective [was] reduced to 1,292 armed reconnaissance helicopters. Second, the FY 1993 budget deferred a production decision until 2006 and trimmed the number of [RAH-66] prototypes from six to three. Third, in December 1994 DoD [Department of Defense] trimmed \$2 billion from the RAH-66 program and dropped another prototype, going from three to two. Fourth, in 1995, the Army restructured the program to add 6 "experimental operational capability" helicopters within the reduced budget limits. (Bolkcom 2003, 1-2)

In October 1999, Chief of Staff of the Army General Shinseki unveiled his plan for the Army's Transformation to the 21st Century "Objective Force" that was lighter, faster, more lethal and survivable than the current "Legacy Force." Correspondingly, Army Aviation would need to transform to a future "Aviation Objective Force" as well. Despite cost overruns, changes in project objectives, reductions in the total number of aircraft to be produced, unmet performance goals, and budget problems, the RAH-66 Comanche Program remained the primary focus for Army Aviation Transformation and



entered the Engineering and Manufacturing Development phase in June 2000. “With a projected total acquisition cost of about \$48 billion, Comanche [was] the Army’s largest aviation acquisition program. In June 2000, the Comanche program awarded a six-year engineering and manufacturing development contract to Boeing-Sikorsky” (United States General Accounting Office 2001b, 1).

Even after the terrorist attacks of September 11, 2001 and the resultant Global War on Terrorism, and the wars in Afghanistan and Iraq, the Comanche continued to be the top priority for U.S. Army Aviation Transformation to replace the aging OH-58D Kiowa Warrior (scout-reconnaissance helicopter). The Vietnam era AH-1 Cobra (attack helicopter) had already been phased out and replaced by the AH-64 Apache (attack helicopter). Critics of the Comanche Program argued that in today’s threat environment there is no need for a highly sophisticated, very low observable “stealthy” armed reconnaissance helicopter. Critics of the Comanche argued that “Comanche’s capabilities and mission requirements were developed in response to a Cold War threat environment that no longer exists” (Bolkcom 2003, 3). Dr. James Carafano, a leading military historian and defense analysis with the Heritage Foundation, supported the cancelation of Comanche, writing that “A program like Comanche, originally proposed in the 1980s, made sense when we needed helicopters that could fight their way through the thick of Soviet air defenses. That is not the situation the Army faces today. The Army already has a fleet of capable combat and support helicopters, as well as more joint (Army, Navy, Marine, and Air Force) assets, with which to fight future enemies far less fearsome than the Warsaw Pact” (Carafano 2004a).

In February 2004, the U.S. Army announced that the \$48 billion Comanche Program was canceled and the remaining \$14.6 billion would be reallocated to meet current operational requirements. “Comanche cancellation will allow US Army to invest approximately \$14.6 billion currently allocated for 121 Comanche helicopters (FY 2004-2011) in modernization of 1,400 aircraft (70% of current rotary-winged fleet), purchase 800 new aircraft, and accelerate the Unmanned Aerial Vehicle (UAV) program. The US Army intends to extend service life of its aircraft fleet beyond 2020. The new aircraft to be procured could be latest models of AH-64, UH-60, and CH-47 helicopters” (US Army Kills Comanche 2004).

In February 2004, Senator Joseph Lieberman (I-CT), Chairman of the Senate Armed Service’s Airland Subcommittee on Army Transformation, quickly attacked the Army’s decision to cancel the Comanche program just days after the Army announced plans to cancel the program. Senator Lieberman argued that the cancellation of the Comanche, “could reduce the Army’s future capability, and pledged to press the Army for a full explanation. . . . If the Army’s decision to cancel Comanche was based on budgetary reasons, rather than military ones, it may save money, but it could also cost us dearly by jeopardizing the long-term transformation of the Army. The Army has vigorously argued that the future was its highest priority, and that it absolutely had to have Comanche to make that future work. I supported those arguments, and fought to fund the program over the years. But now the Army has reversed its position 180 degrees. I am going to need a clear and compelling explanation of why that change happened so rapidly, how transformation is affected, and what the Army plans to make up for the shortfall” (Sawicki 2004). Connecticut Senator Chris Dodd, and Connecticut

State Representatives Nancy Johnson, Christopher Shays, Rosa DeLauro, John Larson, and Rob Simmons joined Senator Lieberman in voicing their concerns over the cancellation of the Comanche and sent a letter to then Acting Army Secretary Les Brownlee. Senator Arlen Specter (R-PA) and Representative Bob Brady (D-PA) also signed the letter. “We are also concerned that the nation will lose critical military capability and delay Army’s transformation with the loss of Comanche. We contend that canceling the RAH-66, especially at this stage of its program development, is a decision that will have negative impacts on the Army's future force structure, the nation's taxpayers and the workers of our states” (Larson 2004).

One of the major manufacturers of military helicopters, Sikorsky Aircraft is headquartered in Stratford, Connecticut. Partnered with Sikorsky for the Comanche program was the Chicago, Illinois based, Boeing Rotorcraft which manufactures the AH-64 Apache, the CH-47 Chinook, and the Bell-Boeing MV-22 Osprey (USMC Tilt-rotor aircraft) and has manufacturing facilities in Arizona and Pennsylvania. Despite concerns over the cancelation of the Comanche program, “Army officials said the new strategy for Army aviation [transformation] would probably alleviate any burdens placed on the Comanche manufacturers -- and means even more business over the longer term -- because the firms will be in line for new work, including more Black Hawks [and more CH-47F Chinooks and AH-64D Apache Longbows manufactured by Boeing], now manufactured by Sikorsky” (Bender 2004).

Army Aviation planners did have plans for the \$14.6 billion dollars freed up from the cancellation of the Comanche program. Army Aviation transformation efforts were reoriented to upgrade the existing helicopter fleet meet the current operational

requirements and to meet near term future operational requirements. “From the reinvestment of Comanche dollars the Army has selected a Light Utility Helicopter [LUH], Armed Reconnaissance Helicopter [ARH], Extended Range Multi-Purpose Unmanned Aircraft System [Sky Warrior UAS] and the Joint Cargo Aircraft [JCA]. It has delivered the UH-60M and CH-47F and established programs of record for the AH-64D Longbow Block III and the Small Unmanned Air Vehicle” (Department of the Army 2008a, 34). In 2005, the Army awarded Bell Helicopter the contract to build the Armed Reconnaissance Helicopter (ARH). The ARH-70 “Arapaho” project was part of the divestment of the \$14.6 billion from the canceled RAH-66 Comanche program to upgrade and improve the existing helicopter fleet. On 17 October, 2008, four years after the \$39 billion RAH-66 Comanche project was canceled, the contract originally awarded to Bell Helicopter in 2005 for the ARH-70 was also canceled. The ARH-70 Arapaho was scheduled to be an interim replacement for the OH-58D scout reconnaissance helicopter. The ARH-70 was expected to be a rapid, easy fielding due to the use of “Commercial Off the Shelf” (COTS) technology and to upgrade a current model civilian helicopter (Bell 407) to meet the U.S. Army’s requirements. However, the ARH-70 project was plagued with cost overruns and had been under congressional scrutiny. “The development cost of the ARH nearly tripled from the initially estimated \$359 million while the procurement cost jumped from \$8.5 million to \$14.5 million per helicopter--a 70 percent increase. Additionally, the Army was projecting that it would be receiving the new batch of helicopters four years late--in 2013 rather than 2009” (Tiron 2008). Unlike the canceled Comanche program, this cancelation is only for the contract with Bell Helicopter, the ARH program is still a top priority and the project will be re-let for bidding, which may

take up to a year, or longer. Lieutenant General James D. Thurman, Army director of operations, said “the war-fighting capability for a manned, armed, reconnaissance helicopter is crucial to supporting our ground combat commanders and remains a critical requirement for the Army. This decision does not, in any way, diminish the imperative for this capability. Our operational tempo, attrition, and losses of six [OH-58D] aircraft per year underscore the need to fill this requirement as quickly as possible” (US Army Cancels ARH-70 Programme [UK] 2008).

The LUH-72 Lakota (another post-Comanche cancellation funded program) is a successful example that was rapidly fielded using COTS from an existing civilian helicopter. The LUH-72 is a modified Eurocopter EC145 design. The LUH-72 began fielding to units in 2006 and is intended for use in non-hostile environments for domestic missions such as; MEDEVAC, counter-drug, and homeland security missions. In Fiscal Year (FY) 2008, the Army began upgrades to the UH-60M, CH-47F, the Sky Warrior Unmanned Aircraft System (UAS) completed critical design review, and an improved version of the AH-64D Longbow (Block III) celebrated its first flight, with plans to begin Low Rate Initial Production in April 2010.

The next chapter describes the research methodology used to evaluate the Army Aviation Transformation priorities in five distinct milestone periods, focusing on priority of funding, and Organizational, Materiel, and Training aspects of the DOTMLPF analysis; U.S. Army Aviation Transformation priorities pre-September 11th, 2001 (1995-2001), U.S. Army Aviation Transformation priorities post-September 11th, 2001 (2001-2004), U.S. Army Aviation Transformation priorities post-Comanche cancelation (2004-

2008), Current U.S. Army Aviation Transformation priorities (2008-2009), and U.S. Army Aviation Transformation priorities for the future (2009-2020).

## CHAPTER 3

### RESEARCH METHODOLOGY

This chapter identifies the methodology used to evaluate Army Aviation Transformation priorities based on a review of the published unclassified Army Modernization Plans between 2000-2008, Congressional Research Service (CRS) Reports, information papers published by the Congressional Budget Office (CBO), along with public news sources in order to compare the Army Aviation Transformation priorities of funding along with the Organizational, Materiel, and Training aspects of the DOTMLPF analysis in five distinct milestone periods. The five milestone periods are; U.S. Army Aviation Transformation priorities pre-September 11th, 2001 (1995-2001), U.S. Army Aviation Transformation priorities post-September 11th, 2001 (2001-2004), U.S. Army Aviation Transformation priorities post-Comanche cancelation (2004-2008), Current U.S. Army Aviation Transformation priorities (2008-2009), and U.S. Army Aviation Transformation priorities for the future (2009-2020). The first step is identifying what the transformation priorities were prior to the GWOT in order to understand how they have changed and evolved. Next, identify what effects the GWOT had on Army Aviation Transformation priorities and what effects the GWOT will have on future Army Aviation Transformation priorities.

In order to analyze these priorities, this question is broken down into four subcategories:

How did the GWOT affect the transformation priorities for attack/reconnaissance capabilities?

How did the GWOT affect the transformation priorities for utility/cargo capabilities?

How did the GWOT affect the transformation priorities for the modernization and transformation across the entire aviation force to include the Active, Reserve, and National Guard components?

How did the GWOT affect the transformation priorities for the capability of a balanced aviation force structure to defeat threats of the contemporary operational environment, but also prepare, transform, and develop capabilities to defeat the threats of the foreseeable future?

The next chapter is divided into three parts, background and Army Aviation Transformation priorities 1995-2004, Army Aviation Transformation priorities from 2004-2009, and Army Aviation Transformation priorities for the future 2010-2020 and beyond.



## CHAPTER 4

### ANALYSIS

#### Background: Army Aviation Transformation Priorities 1995-2004

In the late 1980's and early 1990's US Army Aviation consisted of approximately 7,000 helicopters, with a mixture of Vietnam Era helicopters such as the UH-1 Huey, AH-1 Cobra, and OH-58 A/C Kiowa along with newer, more modern helicopters such as the UH-60 Blackhawk, CH-47D Chinook, OH-58D Kiowa Warrior, and AH-64 Apache. This mix of seven different helicopters in a task organization that had a mixture of different helicopters in each aviation battalion was known as the "Army of Excellence" (AOE). During this time, the Army had two attack helicopters (AH-1 Cobra and AH-64 Apache), two utility helicopters (UH-1 Huey and UH-60 Blackhawk), and two vastly different scout reconnaissance helicopters (OH-58A/C Kiowa and OH-58D Kiowa Warrior). Although the OH-58A/C and OH-58D share very similar nomenclature and airframe, the powertrain, rotor system, and avionics are very different. The CH-47 fleet had been upgraded in the late 1980's to the CH-47D. Under the AOE organization, for example, a Heavy Attack Battalion had 18 AH-64 Apaches, 13 OH-58A/C Kiowas, and 3 UH-60 Blackhawks, while a Light Attack Battalion had 21 AH-1 Cobras, 13 OH-58A/C Kiowas, and 3 UH-1 Hueys. A General Support Aviation Battalion had 12 OH-58A/C Kiowas and 24 UH-60 Blackhawks (or 32 UH-1 Hueys). Some Reserve Component Units had both Vietnam era helicopters and modern helicopters in the same unit. Unfortunately, this hodgepodge of different helicopters created a capabilities gap between the units equipped with newer helicopters and the units equipped with older

helicopters, since the older helicopters flew slower, carried less weight, and lacked modern communications and navigation equipment. This also created a huge strain on logistics, training, and equipping the aviation fleet, as it required more maintainers, more instructor pilots, and a complicated supply system to provide repair parts for seven different helicopters. In 1995, the Army announced a five year modernization plan known as the Aviation Restructure Initiative (ARI) to streamline the aviation fleet, retire all Vietnam Era helicopters, reduce the number of airframes from seven to four, and task organize battalions into pure “Attack” (AH-64), “Reconnaissance” (OH-58D), “Utility” (UH-60), and “Cargo” (CH-47). The ARI was more of a modernization plan rather than a transformation plan. Since the ARI began before General Shinseki’s 1999 Army Transformation plan, initial Aviation Transformation priorities were not nested with the Army’s Transformation plan.

In the spring of 1999, Task Force (TF) Hawk deployed to Albania in support of a NATO operation in the Balkans called Operation Allied Force. TF Hawk was task organized based on two AH-64 Attack Helicopter Battalions, but with only half of the aircraft (24 AH-64 versus 48 AH-64), rounded out by approximately another twenty support helicopters (UH-60’s and CH-47’s) to provide command and control (C2), resupply, MEDEVAC, and Downed Aircraft Recovery Team (DART). It became clear that even the small deployment of two Attack Helicopter Battalions could not be accomplished solely with organic assets. Aviation units inherently require a huge network of support personnel and logistics for fuel and repair parts. Along with the aviation assets, TF Hawk also deployed with a Multiple Launch Rocket System (MLRS) Field Artillery Battalion with counter battery radar and associated support to provide

Suppression of Enemy Air Defense (SEAD) fires in support of the proposed deep strike attack helicopter missions.

The deployment was plagued by operational challenges and a fatal accident during a training mission that claimed the lives of two aviators and the loss of two AH-64 helicopters. Initially, TF Hawk planned to deploy to Macedonia, not Albania. The lack of infrastructure in Albania created a huge logistical challenge, since there was no sea access and a limited road network. Although the helicopters were able to self deploy from Germany, TF Hawk required a huge number of USAF airlift sorties into an airfield that was too small and ill suited for the number of personnel, equipment, and aircraft that TF Hawk required. The challenges faced by TF Hawk are often cited as a failure of Army Aviation to rapidly deploy with combat ready aircrews, and that once TF Hawk did deploy, aviation assets were not employed effectively (initially there were no ground forces to support). Although TF Hawk was never actually employed in combat operations, General Richard A. Cody (then Brigadier General and Deputy Commander for TF Hawk) stood by the deployment of TF Hawk. “Task Force Hawk accomplished all of its assigned missions, the soldiers participating in this operation performed magnificently, and had the Task Force been given the go ahead to conduct strikes against the Serb forces, I believe they would have been extremely lethal and effective. The second point I'd like to make, and I want to be clear about this, is that we are not broken. In fact Task Force Hawk performed superbly in some of the toughest conditions I've seen in 27 years” (Cody 1999). However, he did acknowledge that like any military operation, there were some valuable lessons learned, and recommendations for improvements were sent to the Chief of Staff of the Army, General Eric Shinseki. The Rand report,

*Disjointed War: Military Operations in Kosovo, 1999* identified that “The Army needs to develop more expeditionary options at force levels lower than corps or full division. Task Force Hawk exemplifies the kind of modularity the Army may need in order to be most relevant in future operations. Smaller, more responsive, and more flexible force options must be part of the Army's overall inventory” (Nardulli 2002). The US Army’s increased involvement in stability and support operations like Operation Allied Force along with the vision for transformation to the “Future Force” forged the impetus for Army Aviation transformation. The existing aviation force structure was not well suited for these civil stability and support operations, and the lack of long range communications hindered command and control.

As the Army Force Modernization Plan 2001 noted, “Since Operation Desert Storm, [Army] aviation’s modernization focus was on the dual requirement to attack large fires/maneuver centric targets and air assault light forces. The Aviation Restructure Initiative drove aviation to pure fleet organizations with limited capability to task organize for multifunctional operations. It became apparent early on that, as the Army transformed, aviation too must evolve” (Department of the Army 2001, A-26). The subsequent analysis of these issues by TF Hawk and The Army Aviation Readiness and Sustainment Task Force, combined with the Army Modernization Strategy, demanded that modernizing Army Aviation address the requirements to:

Fight across the spectrum of a new operational environment.

Sustain warfighting capabilities in the Legacy Force.

The increasing range of CINC [Commander in Chief, now known a Combatant Commander] requirements, from engagement to warfighting.

The need to divest legacy systems no longer contributing to the Army's warfighting capability and focus resources to meet the requirements of transformation to the Interim and Objective Forces. (Department of the Army 2001, A-26)

The Army Aviation Modernization Plan, forwarded to Congress in April 2000 and published in the 2001 Army Modernization Plan, began to shift Army Aviation Transformation priorities to better align with the Army Modernization Plan. The Army Aviation Modernization Plan 2000 identified the Aviation vision for the materiel, training, and organizational requirements that would be better suited to support the full spectrum operational requirements of the "Future Force." "To address these shortcomings, aviation will transform to a structure designed around the multifunctional battalion. This multifunctional battalion is designed with a balanced mixture of attack, reconnaissance, and utility aircraft and augmented with more robust staffs and logistical support" (Department of the Army 2001, A-27). This multifunctional battalion concept was envisioned to take several years to accomplish, with a reduction in total number of aircraft (retire legacy AH-1, OH-58C, and UH-1 aircraft by the end of FY 2007) and the inactivation of four Corps light utility helicopter battalions and two attack helicopter battalions.

The retirement of legacy aircraft was essential to addressing three major issues with transformation; task organization, training, and sustaining the warfighting capability of the "Legacy Force" as it transformed. Retirement of the legacy aircraft set the conditions to reorganize aviation units with advanced aircraft, which reduced the training and logistical challenges of training and equipping the fleet. Additionally, Army Aviation had to restructure the Initial Entry Rotary Wing (IERW) training "flight school." The existing IERW training plan did not graduate aviators with an advance

aircraft qualification (UH-60, AH-64, or CH-47). In order to become qualified on these advanced aircraft, aviators had to complete the Aircraft Qualification Course (AQC) designed to teach them the specifics of the aircraft to which they were assigned. Unfortunately, the AQC was really only an initial introduction with a minimum number of flight hours, and the onus of the training burden to get aviators fully mission qualified to Readiness Level 1 (RL1) fell on the instructor pilots at operational units. Once a new aviator arrived at the operational unit, it could take six months to a year to get them proficient and qualified to RL1. With the retirement the OH-58A/C and UH-1, which had provided the bulk of the training aircraft for IERW, Flight School XXI required additional 51 TH-67 primary training aircraft (not initially funded) as well as additional advanced aircraft (45 UH-60s, 11 OH-58Ds, 13 AH-64s, and 16 CH-47s) to accomplish the Flight School XXI concept. To fill this training requirement, as operational units were reorganized and received new aircraft, mid-life cycle aircraft were transferred to Fort Rucker to fill the training aircraft requirements. It would take several years for Flight School XXI to be fully funded and operational and during the interim, some aviators would be trained under the existing IERW and AQC plan. As more Legacy aircraft were retired and new aircraft became available for training, more aviators were trained under Flight School XXI. Flight School XXI would begin training aviators earlier in their “go to war” aircraft which increased pilot proficiency and reduced the amount of time required to become RL1 at the unit level almost in half. The Aviation Modernization Plan 2000 assumed risk to accomplish the transformation to the multi-functional battalion with a reduction in resourcing in the both the Active Component (AC) and Reserve Component (RC). This reduced level of resourcing would be required

until a sufficient number RAH-66 Comanche and UH-60 aircraft could be procured to allow fielding to full requirements.

As the Army's first digitized division, the 4th Infantry Division "Force XXI" was the testbed for the Force XXI Battle Command Brigade and Below (FBCB2) Blue Force Tracker (BFT). FBCB2 digitally provides the commander with real time situational awareness and battle tracking capability. The "Force XXI experimentation on the Legacy Force culminated with the Division Capstone Exercise (DCX). . . . [The DCX was conducted at the National Training Center in April 2001 to] demonstrate and assess the 4th ID's Force XXI Heavy and Aviation Brigades' ability to contribute decisively to III Corps' land campaign counteroffensive capability" (Department of the Army 2002, 26-27). However, the FBCB2 system was rather large and designed for mechanized ground forces and vehicles. Aviation forces lagged behind in the digital information capabilities of their ground counterparts, and the Comanche was envisioned as the digital "quarterback" to synchronize and link AH-64D Longbow and ground forces together. The RAH-66 Comanche remained the "centerpiece of the Army's Aviation Modernization Plan and the first [aviation] Objective Force platform to be fielded. . . . Comanche's ability to develop and share the "common operating picture" and orchestrate lethal, non-lethal, precision, direct and indirect fires is critical to the integration and synchronization of air-ground team operations of the objective force" (Department of the Army 2002, 45-A-19).

On September 7, 2001, the Army announced plans to accelerate the retirement of Vietnam Era aircraft and increase recapitalization of remaining helicopters in the fleet, move modern helicopters sooner into the Reserve Component, and speed up procurement

of the Comanche over the next three years. By the end of 2004, “The Army's [2001] plan will reduce the total number of [legacy] aircraft by more than 400 in the active force and by more than 600 in the reserve forces. . . . The plan significantly modernizes U.S. Army National Guard and U.S. Army Reserve aviation by moving some 240 [advanced] aircraft from active component units to reserve component units. . . the revised plan focuses lift assets in reserve forces units and attack assets in active units” (PAO 2001). The 2001 plan also envisioned a reduction in the number of AH-64's in an Attack Helicopter Battalion from 24 to 18 by 2002. “The [2001] plan also requires the development of options for the best crew manning-to-aircraft ratio for each type of aircraft to maximize war fighting potential. Manning at greater than a one-to-one crew-to-aircraft ratio in selected units will allow units to maintain a higher operational tempo (OPTEMPO) for longer periods of time” (PAO 2001). Little did they know that just a few days later, the terrorist attacks of September 11th, 2001 would lead to combat operations that would increase the challenges of implementing the peacetime transformation plan. The resultant combat operations in Afghanistan made aviation planners reconsider the 2001 plan, and implement an interim transformation plan in 2002.

The urgent need to address the steadily deteriorating condition of the aviation fleet and accelerate reserve component modernization, coupled with fiscal realities have forced a deferral in converting aviation units to the multifunction battalion structure documented in the *2001 Army Modernization Plan*. The planned conversion has been superseded by a more affordable and timely restructure plan. This interim aviation force is the bridge to an objective aviation structure. The interim transformation plan: Restructures and standardizes attack and lift formations across the force (divisional attack battalions to 18 aircraft, Corps attack battalions to 21 aircraft, Cargo companies to 14 aircraft, [and] reduces [the] number of utility companies) (Department of the Army 2002, A-17)

In order to better integrate aviation into the ground commander's digital common operating picture, the Army began development of a smaller FBCB2 kit that could be



installed in the aircraft and the digital Army Airborne Command and Control System (A2C2S), providing near real time situational awareness, secure long range digital communication, and the ability for a ground commander to have an airborne Tactical Operations Center (TOC) with a C2 on the move capability. The A2C2S console integrated a suite of secure Frequency Modulation (FM), Ultra High Frequency (UHF), and High Frequency (HF) long and short range radios, and secure digital data links to support the digital Army Battle Command Systems (ABCS) such as FBCB2, Maneuver Control System (MCS), All Source Analysis (ASAS) intelligence analysis, Advanced Field Artillery Tactical Data System (AFATDS), and UAV video image feed. This airborne Tactical Command Post provides the ground commander (or aviation commander) the ability to battle track and C2 on the move. Even in non-A2C2S equipped aircraft, the addition of the ARC-220 HF radio gave aviation the long range communication ability that had hindered aviation operations in Balkans.

By 2002, the need for a collective combined arms training simulator lead to the development of a training simulator known as Aviation Reconfigurable Manned Simulator (AVCATT-A), located at Fort Rucker, Alabama. The AVCATT-A could be integrated with the ground training simulator Close Combat Tactical Trainer XXI, located at Fort Knox, Kentucky. “The AVCATT-A system is a dynamic, alternative instructional means to train and rehearse, through networked simulation, in a collective and combined arms simulated battlefield environment” (Department of the Army 2002, C-22). The AVCATT-A is often used as part of the final pre-deployment validation for aviation units slated to deploy to combat operations. These simulators allowed for collective unit

training in a controlled environment without the expense of a training rotation like those at the National Training Center or Joint Readiness Training Center.

Fielding the RAH-66 Comanche remained the highest priority for Aviation Transformation. Aviation planners continued to focus on future capabilities to support the FCS equipped “Future Force.” In addition to the Comanche, aviation planners envisioned a Future Transport Rotorcraft (later known as Joint Heavy Lift rotorcraft (JHL)) that could fly further and carry heavier payloads than the CH-47, but the JHL did not get the priority and funding that the Comanche did. “The Army will continue to examine the best means to achieve the vertical envelopment capability required to rapidly project Future Combat System[s] equipped forces across difficult or distant geographic locations. An Air Maneuver & Transport [also referred to as Future Transport Rotorcraft and now known as the Joint Heavy Lift Rotorcraft] represents one solution should an organic Army system be required. Regardless, the CH-47F is expected to remain the Army’s heavy lift helicopter until at least the 2020-25 timeframe” (Department of the Army 2002, A-18). Unlike the UH-60 and AH-64, the CH-47D lacked the avionics required to support FBCB2, however the CH-47F would be able to support FBCB2. The CH-47F began limited production in 2003, but would not begin fielding until 2007, approximately 100 of the new CH-47F are to be manufactured from upgraded CH-47D airframes, using the Service Life Extension Program (SLEP). SLEP is a key enabler in the modernization of the aviation force, which recapitalizes airframes nearing the end of their service life, and restores them to like new zero hour condition at significant savings over building a brand new helicopter, extending the service life approximately another twenty to twenty-five years.

As combat operations in Afghanistan and Iraq increased the demands on the operational requirements of Army Aviation, the 2003 Army Modernization Plan acknowledged the challenges of continuing Transformation while simultaneously fighting the GWOT, “[the]continuing Global War on Terrorism strongly reinforces the need to transform U.S. Armed Forces, and for the Army in particular this conflict provides even stronger emphasis on the critical importance of the ongoing Army Transformation process. . . . The Army has continued to make difficult decisions to maintain its commitment to accelerating Transformation. While the Army has invested sufficient resources to maintain its essential warfighting readiness and a decisive-win capability, it has likewise assumed greater risk in the near term to achieve enhanced capabilities and readiness in the future. . . . The Army has continued its efforts to accept greater risk in the current force in order to accelerate Transformation to the Objective Force. To accomplish this, modernization efforts have been significantly restricted to selected units and capabilities. Only two divisions in III Corps, some XVIII Airborne Corps units, the SBCTs [Stryker Brigade Combat Team], and a limited number of other units, including SOF [Special Operations Forces] units, will receive upgrades and enhanced capabilities. RC [Reserve Component] units are receiving virtually no modernization as a result of this curtailment” (Department of the Army 2003, 55).

In 2003, priorities for Aviation Transformation, as published in the 2003 Army Modernization Plan included:

- Posture aviation for transition to the Objective [Future] Force concept.
- Accelerate divestiture of approximately 1,000 legacy aircraft (UH-1 and OH-58A/C).

- Accelerate modernization across the AC [Active Component] and RC [Reserve Component].
- Restructure and standardize attack and lift formations across the force (divisional attack battalions to 18 aircraft, RAS [Regimental Aviation Squadron] to 9 [AH-64] aircraft, corps attack battalions to 21 aircraft, cargo companies to 14 aircraft).
- Adjust stationing and alignment of RC units to mitigate near-term risk associated with reducing AC lift assets.
- Maximize training technologies to maintain crew proficiency.
- Invest in initiatives to improve aircraft reliability/maintainability.
- Continue emphasis on fielding Comanche. (Department of the Army 2003, D46-47)

Originally envisioned in the 1995 Aviation Restructure Initiative, the retirement of Legacy aircraft to reorganize and modernize the aviation fleet remained a constant priority, yet it would take twice as long as originally envisioned -- ten years versus the planned five years. “A primary objective of Aviation Transformation is divestiture of legacy systems to prepare for Objective Force systems. The Army has completed divestiture of its older attack airframe (AH-1) and will complete divestiture of its older utility airframe (UH-1) in combat deployable units by 2004” (Department of the Army 2003, B-7). A small number of UH-1 aircraft remained in the Army National Guard and Opposing Forces (OPFOR) Aviation detachment at the National Training Center. Eventually these airframes would be replaced by the LUH that began fielding in 2006. The retirement of Legacy aircraft was the first step in modernizing the aviation fleet, not by developing new technologically advanced helicopters, but by standardizing the aviation fleet across the Army and using the existing helicopters to the fullest extent.

In February 2004, the U.S. Army announced that the \$48 billion Comanche project was canceled, and the remaining \$14.6 billion would be reallocated to meet

current operational requirements. From March 2003- April 2004 the Army flew 258,995 flight hours solely in support of Operation Iraqi Freedom, the increased Operational Tempo (OPTEMPO) supporting combat operations in the harsh desert environment of Iraq and Afghanistan put a tremendous strain on the aviation fleet. The OPTEMPO of a single year of combat operations in Iraq and Afghanistan was three to four times higher than a year of peacetime flying hours typically used to calculate yearly operating costs and life cycle replacements. In addition to the increased wear and tear on the aircraft, accidents and combat losses took their toll on the number of aircraft in the fleet. This was the first time since the 1995 Aviation Restructure Initiative and the 2000 Army Aviation Modernization Strategy that the retirement of Legacy aircraft and the Comanche were no longer the top priorities for aviation transformation. The retirement of Legacy AH-1, UH-1, and OH-58A/C aircraft and reorganization envisioned under Aviation Restructure Initiative took more than ten years to complete, and now Army Aviation needed to continue to reorganize to meet the needs of the Brigade Combat Team (BCT) that had developed from General Shinseki's Transformation vision.

In 2004, the aviation brigade force structure finally began to be aligned with the maneuver BCTs, the new Combat Aviation Brigade (CAB) was designed to better support the maneuver BCTs with a multifunctional aviation brigade. The new CAB design contained a robust Attack/Reconnaissance capability, with two Attack Reconnaissance Battalions with a total of 48 AH-64D (24 per battalion) in a Heavy CAB or 24 AH-64 and 30 OH-58D/ARH in a Medium CAB or 60 OH-58D/ARH (30 per battalion) in a Light CAB. Each CAB also had a General Support Aviation Battalion (GSAB) with eight UH-60 (4-UH-60 and 4-A2C2s equipped EUH-60) command and

control helicopters, a Heavy Helicopter Company with 12 CH-47 Chinooks, an Assault Helicopter Battalion with 30 UH-60s, and a Air Ambulance Medical Company with 12 HH-60 medical evacuation aircraft. The new CAB task-organization also included a self-sustaining Aircraft Support Battalion (ASB), and a Class IV Unmanned Aerial System (UAS) Company. (see figure 1 on the following page) Some CABs may also include a Fixed Wing Battalion and/or Security and Support Battalion (ARNG in support of Homeland Security missions). Previously, the CH-47D had been task organized at the Corps level, now each CAB would have internal heavy lift helicopter capability. Also, this was the first time that Air Ambulance Medical Company medical evacuation (MEDEVAC) helicopters were task organized under the aviation brigade. Previously they had been task organized under the Medical Service Corps at the Corps level.

With the successes of UAVs such as Raven, Shadow, and Hunter in the combat environment in Afghanistan and Iraq, the integration of smaller UAVs and newer Unmanned Aerial Systems (UAS) envisioned by the Future Combat Systems could become reality. Under the previous structure, UAVs were tasked organized under the Military Intelligence Brigades, now UAV/UAS would be task organized in the new Combat Aviation Brigade. Additionally, Aviation Branch also assumed duty as the proponent agency for UAV/UAS.

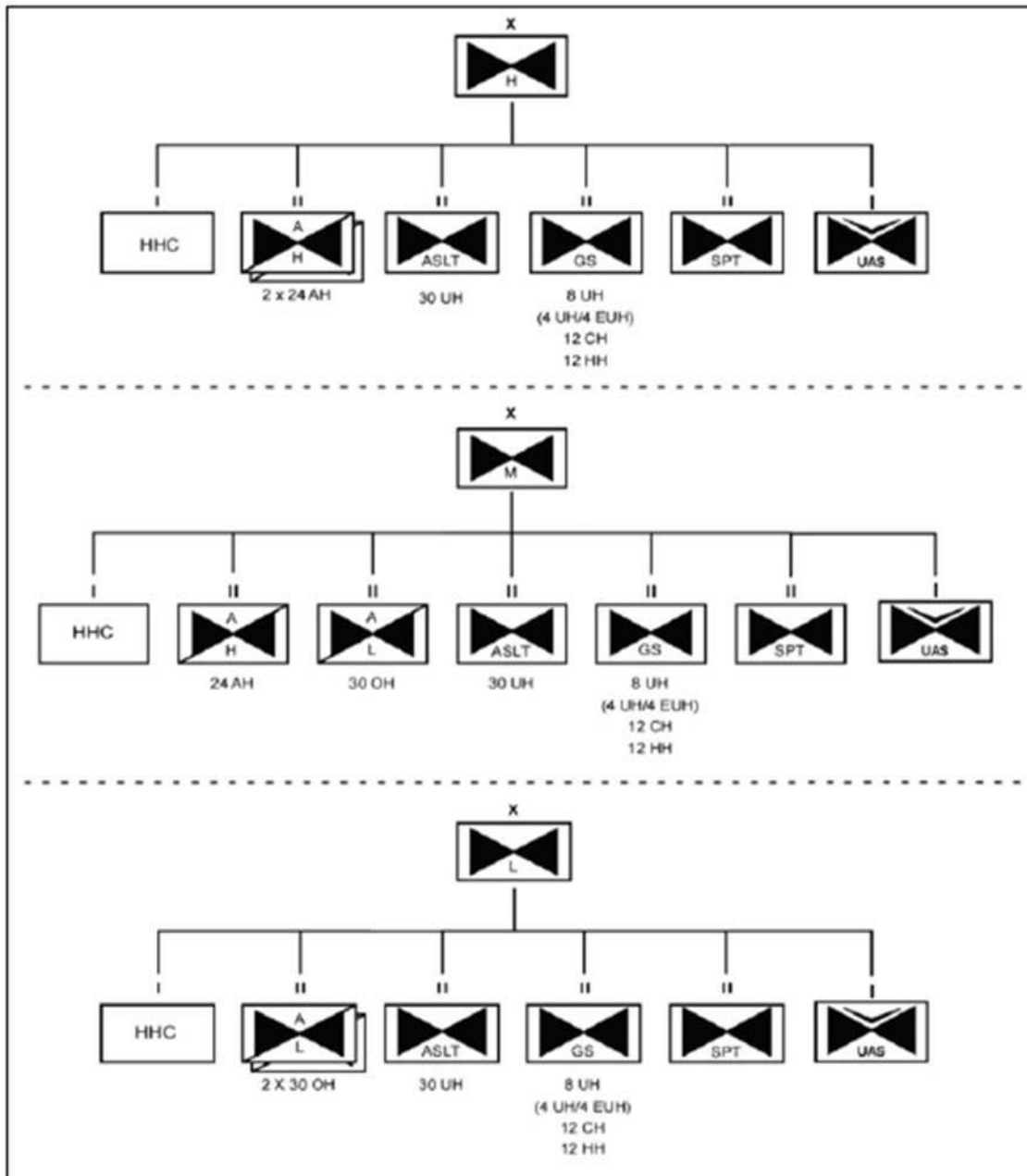


Figure 1. Heavy, Medium, and Light Combat Aviation Brigade Organization  
 Source: Department of the Army, Field Manual (FM) 3-04.111, Aviation Brigades (Washington, DC: Department of the Army, December 2007), 1-5.

Following the cancellation of the Comanche Program in 2004, priorities for Army Aviation Transformation, as outlined in the 2004 Army Modernization Plan, were:

- Fielding FCS Classes I through IV UAVS, ER/MP [Extended Range/Multi-Purpose UAV Sky Warrior UAS] and Small Unit UAVS
- Ensuring digital interoperability for effective joint/combined force operations
- Fielding effective, affordable systems that enhance aviation survivability and improve soldier stamina [such as improved aircraft Inlet Barrier Filters (IBF) for dusty environments and Air Warrior microclimate cooling vests that improve crew endurance in hot desert temperatures and/or in Mission Oriented Protective Posture MOPP]
- Improving aircraft operational readiness [made possible with a reduction in older, more maintenance intensive aircraft, and an increase in newer more reliable aircraft]
- Developing the Joint Common Missile to replace the Hellfire (HF) air-to-ground missile system and developing a lower cost, lighter-weight system for use against less heavily armored targets
- Replacing obsolete air traffic services equipment and maintaining compliance with future airspace usage requirements
- Digitizing Aviation Logistics and modernizing aviation ground support equipment
- Developing the technologies to ensure fielding of unmanned systems, interoperability of manned/unmanned aircraft, and Next Generation/Future System development
- Leveraging technology to reduce costs, extend aircraft service life and improve training Army Aviation will transform into a modular, capabilities-based maneuver arm with a reduced logistics tail optimized for the joint fight. The current Army Aviation modernization plans are being reviewed and adjusted to ensure joint interoperability, modularity, deployability, and affordability. (Department of the Army 2004, D-11-12)

Until 2004, Aviation planners had continued to attempt to juggle the demands of the current operational requirements of the GWOT, while remaining committed to the long-term transformation priorities developed before the variable of a long protracted war had entered the transformation equation. The cancelation of the Comanche Program in 2004 marked a turning point in Army Aviation Transformation. There was a clear change in priorities for Aviation Transformation, rather than acquiring just a few high-



tech helicopters, the Army would be able to fully modernize its entire fleet (to include Reserve and National Guard), which in turn would ultimately provide a wider full spectrum capability.

#### Army Aviation Transformation Priorities 2005-2009

By 2005, the Army had put the \$14.6 billion freed up from Comanche to good use, with plans for a Light Utility Helicopter (LUH) to replace the OH-58A/C and UH-1, an Armed Reconnaissance Helicopter (ARH) to replace the OH-58D, Joint Cargo Aircraft (JCA) to replace the aging C-23 Sherpa fixed wing cargo aircraft, fielding upgraded utility (UH-60M) and cargo helicopters (CH-47F), and the fielding of AH-64D Longbow Apache across the entire Army, to include the Reserve and National Guard. The AH-64D Longbow is a specially equipped AH-64 with a Millimeter Wave Fire Control Radar that can digitally transmit targeting data to other AH-64s, and can engage targets with either the traditional Hellfire air-to-ground missile, or an improved radar guided Longbow Hellfire missile. Under previous modernization plans, due to budget constraints, the AH-64D Longbow would have only been partially fielded. Only about one third to one half of the AH-64s would be AH-64D Longbow, with the balance of the AH-64 fleet remaining AH-64A. Now, the entire fleet of AH-64s would be the Longbow version.

Aviation Transformations priorities, as outlined in the 2005 Army Modernization Plan, now focused on a balanced approach across the entire aviation force.

- Accelerates AC and RC aviation modernization efforts
- Aligns aviation structure and resources to comply with Future Force requirements [Combat Aviation Brigade]

- Accelerates divestiture of nonmodernized [Legacy] aircraft (AH-1, UH-1, OH-58D and OH-58A/C)
- Restructures and standardizes attack and lift formations across the force [Combat Aviation Brigade]
- Adjusts RC stationing and alignment to mitigate near-term risk of reduced AC lift assets
- Leverages new training technologies to maintain crew proficiency
- Invests in improvements for aircraft reliability/maintainability
- Procures new UH-60Ms to accelerate fielding of utility aircraft to the Army National Guard (ARNG)
- Procures Light Utility Helicopters (LUHs) to divest aging UH-1s and OH-58A/Cs primarily found in the ARNG
- Converts an additional 96 AH-64As found in the ARNG to AH-64Ds [Longbow]
- Procures Armed Reconnaissance Helicopters (ARHs) to divest the OH-58[D]KWs
- Procures the [Joint Cargo Aircraft (JCA)] to replace an aging fixed-wing fleet (Department of the Army 2005a, D-10)

In 2005, the Army awarded Bell Helicopter the contract to build the Armed Reconnaissance Helicopter (ARH). The ARH-70 Arapaho program was part of the divestment of the \$14.6 billion from the canceled RAH-66 Comanche program to upgrade and improve the existing helicopter fleet. The ARH-70 Arapaho was scheduled to be an interim replacement for the OH-58D scout helicopter. The ARH-70 was expected to be a rapid, easy fielding due to the use of “Commercial Off The Shelf” (COTS) technology and upgrade a current model civilian helicopter (Bell 407) to meet the U.S. Army’s requirements, and integrate some of the technology, such as the engine and avionics, developed for the Comanche into the ARH. In February 2004, the Aviation Focus Group identified the need for “368 ARH aircraft to replace the existing OH-58D

fleet. The requirement has since grown to 512 aircraft” (Department of the Army 2007, 75). The LUH-72 Lakota began fielding in 2006 and is intended primarily for use by the National Training Center and National Guard in non-hostile environments for domestic missions such as; MEDEVAC, counter-drug, and homeland security missions. “The Army intends to procure and field 322 Lakotas from FY06-15; [the] estimated cost of the LUH program is \$5 billion” (Department of the Army 2007, 75). An additional benefit of fielding the LUH-72 allowed for more UH-60s to remain in the operational deployable fleet, maximizing the number of UH-60s available to support current operational requirements. Another successful post-Comanche cancelation funded program is the JCA. The JCA is a joint effort between the US Army and US Air Force to develop a medium lift intratheater fixed wing cargo aircraft that is smaller than the Air Force C-130 but larger than the Army’s C-23 “Sherpa.” In June 2007, the Army awarded a \$2.04 billion contract with L-3 Communications Integrated Systems to build the approximately 75 C-27J “Spartan” to replace the C-23 “Sherpa.” The Air Force is expected to buy an additional 75 C-27Js. The C-27J is expected to help alleviate the intratheater cargo lift requirements currently being conducted by the CH-47, C-23, and C-130, however the JCA does not have the cargo capacity to transport the heavily armored FCS vehicles envisioned to transport the FCS equipped BCT.

In addition to reorganizing into Combat Aviation Brigades, integrating aviation into the maneuver BCTs included the addition of a Brigade Aviation Element (BAE) in each BCT. In April 2006, the Army published Training Circular (TC) 1-400 *Brigade Aviation Element Handbook* detailing the organization, missions, and fundamentals of integrating the BAE into the maneuver BCTs. Other than the 101st Airborne Division,

which had integrated aviation planning cells with each maneuver brigade, typically the aviation liaison with supported maneuver units was often ad hoc on an “as needed basis” and was not standardized throughout the Army. The BAE firmly established a habitual relationship between the aviation brigade and the BCT as an MTOE authorized position. The BAE assists the BCT commander with integrating aviation assets with the ground maneuver. Each BAE has a Brigade Aviation Officer (Major), a Brigade Aviation Element Plans Officer (Captain), a Tactical Operations Officer (Aviation Warrant Officer), an Aviation Operation NCO, and Aviation Operations Specialist.

Updated doctrine is a critical part of the successful implementation and utilization of new equipment and technology. In 2007, Army Aviation updated and published new doctrine manuals for the Aviation Brigade; FM 3-04.111, *Aviation Brigades* (previous edition published in 2003), FM 3-04.126, *Attack Reconnaissance Helicopter Operations* (previous edition published in 2003), and FM 3.04.113, *Utility and Cargo Helicopter Operations* (previous edition published in 1997). These new doctrine manuals incorporated lessons learned and Tactics Techniques and Procedures (TTPs) gleaned from the previous five years of combat operations. Holistically, aviation doctrine has not changed dramatically; some terminology has been updated to reflect new capabilities and technologies, but air assault, reconnaissance, security, aerial command and control (C2), MEDEVAC, CASEVAC, and Personnel Recovery remain the primary missions for the Combat Aviation Brigade. What has dramatically changed is the operational task organization, the retirement of legacy aircraft, and the modernization and recapitalization of existing airframes.

On 17 October 2008, four years after the \$39 billion dollar RAH-66 Comanche project was canceled, the contract with Bell Helicopter for the ARH-70 was also canceled. The ARH-70 project was plagued with cost overruns and had been under congressional scrutiny. The research and development costs of the ARH had nearly tripled, while the projected cost per helicopter had increased to \$14.5 million, almost twice that of the originally projected \$8.5 million per aircraft, and the estimated delivery date had been delayed until 2013. Secretary of the Army Pete Geren defended the decision to cancel the contract with Bell Helicopter, saying that, “The cost and schedule that were the focus of the decision to award the contract to Bell Helicopter are no longer valid. We have a duty to the Army and the taxpayer to move ahead with an alternative course of action to meet this critical capability for our soldiers at the best price as soon as possible” (Gourdley 2009, 40). Unlike the canceled Comanche program, this cancellation is only for the contract with Bell Helicopter, the ARH program is still a top priority and the project will be re-let for bidding, which will add several years to the procurement cycle. On October 7, 2008, just days before the Bell contract was canceled, a Boeing Rotorcraft press release announced the availability of its AH-6 light attack-reconnaissance helicopter, which has been used for many years by Special Operations Aviation. Lieutenant General James D. Thurman, Army director of operations, said “the war-fighting capability for a manned, armed, reconnaissance helicopter . . . remains a critical requirement for the Army. . . . To this end we will rapidly pursue a revalidation of the particular characteristics needed for this capability so that we can restart the process of acquiring a manned, armed reconnaissance helicopter” (Gourdley 2009, 40). At the Association of the United States Army Aviation Symposium in January 2009, Major

General James O. Barclay III, Chief of Aviation Branch and the Commanding General for the US Army Aviation Center for Excellence (USAACE), reaffirmed the commitment to a manned armed reconnaissance helicopter, “We are going to get an armed reconnaissance helicopter,” Major General Barclay said (Murphy 2009).

The increased OPTEMPO in support of the GWOT in the harsh desert environments of Afghanistan and Iraq has put a tremendous strain on the aviation fleet. From 2003-2009, Army Aviation flew 2.8 million flight hours in support of Operation Iraqi Freedom and Operation Enduring Freedom, roughly four times the amount of flight hours that would be flown during the same time period in peacetime. During the last seven years of combat operations, Army Aviation lost 130 aircraft due to accidents and 41 aircraft were lost as a result of enemy action. The replacement cost for those 171 aircraft is \$2.8 billion.<sup>1</sup> The average the engineered design service life of most Army aircraft is approximately 9,000 flight hours over a 20-25 year period, which is less than 400 flight hours per year. For example the engineered design service life for the UH-60 is 8,000 flight hours and the AH-64 is 10,000 flight hours. Historically, as aircraft begin to meet or exceed the designed service life, Operational and Support costs increase as the Operational Readiness rates decrease. Surprisingly, despite the huge increase in OPTEMPO and flight hours, an aggressive maintenance RESET program, improvements in daily maintenance procedures, and a move towards predictive Conditions Based Maintenance (CBM) have increased the operational readiness rate and availability of aircraft to support combat operations. Aircraft such as the UH-60M and CH-47F have

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<sup>1</sup>Flying hour data and aircraft losses are from a Power Point presentation given by Colonel Warren E. Phipps Jr., Deputy Commanding General US Army Aviation Center for Excellence, presented to CGSC aviation majors in February 2009.

additional sensors that monitor the condition of various aircraft components. Based on the data from these sensors, CBM analyzes the data and replaces components as they wear out based on usage, rather than the rather timely and expensive practice of replacing components based on a set schedule. Despite the improvements in maintenance and operational readiness rates, the high OPTEMPO will continue to be a factor that must be considered as aircraft will meet or exceed their engineered design service life at a much faster pace.

The current force structure consists of a total of about 3,500 helicopters, approximately half the number of helicopters in the fleet 15 years ago. In Fiscal Year (FY) 2008, the Army began upgrades to the UH-60M and CH-47F, the Sky Warrior Unmanned Aircraft System (UAS) completed critical design review, and an improved version of the AH-64D Longbow (Block III) celebrated its first flight. To date, the Sky Warrior, Apache Longbow Block III, and C27J JCA programs remain on schedule and on budget.

#### The Future of Army Aviation 2010-2020 and beyond

What do the next ten to twenty years look like for Army Aviation? The Chief of Aviation Branch and the Commanding General for the US Army Aviation Center for Excellence, Major General Barclay sees two missions for Army Aviation; support the current Army Force Generation (ARFORGEN) and continue to prepare future capabilities for the long term future. “Army Aviation remains the most requested combat asset for ground commanders . . . it’s clear we will continue to be in demand into the foreseeable future . . . today’s demands - on personnel, equipment, and systems -- will only become more complex. That’s why the US Army Aviation Center of Excellence

(USAACE) team is currently reviewing every aspect of Army Aviation to ensure that we are properly staffed, trained, and equipped to exceed every future requirement” (Barclay 2009). Major General Barclay also emphasized the importance of always improving the capabilities of the branch, “We simply cannot afford to retain legacy systems, procedures and structures merely because they have existed for decades and are familiar” (Barclay 2009, 29).

In addition to ensuring that Army Aviation has the correct balance of staffing and equipment, Lessons Learned Integration (L2I) is a vital part of continuing education after initial training. L2I “fuses experiences and best practices of our deployed formations with current doctrine and the emerging technology, acquisitions and analysis of the branch. This is the means by which aviation formations and training development forces manage and integrate vital information into current and future operations, systems and aircraft development, and the classroom. Future training enhancements are not only tied to the L2I program, but to fielding new, complex airframes and systems” (Barclay 2009, 30). Additionally, Major General Barclay acknowledged the added capabilities and value that UAS bring to the fight. “The continually emerging capabilities of UAS provide a significant capability to commanders at all levels to obtain and maintain accurate situational awareness, rapidly gain situational understanding and bring to bear the right application of forces at the right time to win the fight” (Barclay 2009, 32). The proliferation and integration of UAS into Army Aviation does not in any way diminish the need for manned aerial flights. UAS are a huge combat multiplier by providing flexible, long range, real time reconnaissance and intelligence. However, the proliferation of smaller short range UAS, such as the Raven and the Class I and IV UAS



under development by FCS, present a challenge in managing and deconflicting airspace. The FCS Class I UAS is a small, portable UAS (about the size of a small trashcan), while the FCS Class IV UAS is a small unmanned helicopter. The BAE and the new Military Occupation Specialty 15W/E (UAS Operator) will be critical in the synchronization and successful employment of manned and unmanned aerial flight in the current and future battlespace.

The next five to ten years will be critical for the future of Army Aviation. The successful completion of upgrades to the entire fleet of UH-60M, CH-47F, AH-64D (Block III), and LUH-72 have already begun. The development and fielding of Sky Warrior UAS, and the JCA are also well underway. The challenges of the fielding the ARH are still under consideration, and while fielding the ARH remains a top priority, the reality is that until a satisfactory solution is fielded, the aging OH-58D (which was expected to be retired in 2009) will remain as the Army's armed light reconnaissance helicopter. In the interim, until a satisfactory replacement is acquired, the Army will upgrade the existing OH-58D fleet under the "Life Support 2020" plan that would upgrade the avionics, reliability, and survivability of the OH-58D and allow it to remain in service until the ARH can be fielded. Additionally, the Army will expedite the conversion of two more Attack Reconnaissance Battalions in the Army National Guard from AH-64A to the AH-64D Longbow. The successful completion of these programs will allow Army Aviation to support current operational requirements in the GWOT, and will set the conditions for a balanced aviation force capable of exceeding the operational requirements in the future.

Another part of the long term future of Army Aviation is the development of the JHL. The JHL concept is a large tilt-rotor aircraft similar to the MV-22 Osprey, but larger, (approximately the size of a C-130), and is envisioned as a heavy lift rotorcraft with vertical takeoff and landing capability to transport FCS equipped BCTs and provide intra-theater lift capability that currently exceed the max gross weight and range limitations of the CH-47F into areas that cannot support fixed wing cargo transports. Potentially, the JHL would provide the forced entry capability for the FCS equipped BCT directly into hostile areas where traditional intermediate staging bases and fixed wing cargo aircraft support are not available. Its development will be closely tied to the development of the FCS ground combat systems and is not expected to be fielded until after 2020. Even further on the horizon is the Joint Multi-Role rotorcraft (JMR) the projected replacement for the AH-64D between 2020 and 2030, and could potentially replace the UH-60 and LUH-72 as well. Major General Barclay's focus on the future of Army Aviation is that, we take steps now to ensure the success of the future of Army Aviation, "Given [the] myriad [of] ongoing efforts across the aviation community, it is critical that we maintain a long term planning window that will allow us to better position ourselves for upcoming efforts in a coordinated manner. In presenting Army Aviation as an integral part of the future modular force, we must have a clear vision of our objectives, roles and responsibilities in order to effectively compete for and receive the resources necessary to take the branch into the next 25 years. Our success demands reevaluating our training institution and properly introducing new technology to the field when and where required" (Barclay 2009, 32). This incremental approach, developing and implementing new technology as it becomes available, along with the integration of L2I

in the training and development of future capabilities, will help ensure that the future aviation force we have is the force that we need.

The next chapter will discuss conclusions reached by the author about the effects of the Global War on Terrorism on Army Aviation Transformation. Additionally, the next chapter will discuss possible recommendations for changes and improvements for future Army Aviation Transformation priorities.

## CHAPTER 5

### CONCLUSIONS AND RECOMMENDATIONS

#### Conclusions

During the course of researching and analyzing the effects that the Global War on Terrorism had on Army Aviation Transformation, five main conclusions became clear. The first is that transformation is an ongoing, evolving process that is never truly complete and takes many years to achieve results. The challenges and reality of transforming Army Aviation, even under ideal peacetime conditions, has proven to take longer and be more expensive than originally planned. The additional challenges of modernizing and transforming to the “Future Force” while engaged in sustained combat operations for the last seven years make the progress that has been made even more phenomenal. The second conclusion is that Army Aviation Transformation priorities were not initially aligned with the Army’s Modernization Strategy. While this initial misalignment was not a direct result of the GWOT, it took a few course corrections to get aligned with the Army’s Transformation priorities. The uncertainty of late 2001 and early 2002 caused several revisions to the 2000 Army Aviation Modernization Plan, but by 2004, the Aviation Transformation priorities were better aligned and nested with the Army’s Modernization Strategy. The third conclusion is that while it would appear on the surface that the cancelation of the RAH-66 Comanche program was a step backwards in Transformation efforts, the cancelation was actually good for Army Aviation Transformation. Canceling Comanche allowed for a balanced Transformation effort across the entire fleet, which will ultimately provide a balanced, sustainable, full spectrum capable aviation force across the entire Army. The fourth conclusion is that the

current Aviation Transformation plan has now factored in the higher OPTEMPO and impact of the GWOT, as well as the need for continuous incremental improvement to ensure that Army Aviation retains the full spectrum capability required to defeat the future conventional and unconventional threats. Finally, the Combat Aviation Brigade standardized aviation brigades across the entire aviation force into a balanced, modular, capable, lethal, and sustainable aviation force structure capable of meeting current and future full spectrum aviation requirements to support the maneuver BCTs.

Initially, Army Aviation transformation efforts were not nested with the Army Transformation efforts. Army Aviation had already begun its own modernization plan with the ARI in 1995, four years before General Shinseki announced the Army's Transformation plan in 1999. The ARI did accomplish several critical requirements for Army Aviation to transform to the "Future Force." Its primary objectives to retire Legacy aircraft and streamline the logistical and training requirements by reducing the fleet from seven different aircraft down to four was vital to the success of future transformation efforts. Even under ideal conditions, the retirement of Legacy aircraft would take more than twice as long as originally scheduled. Unfortunately, the "fleet pure" battalion task organization developed under the ARI was designed to counter a large conventional threat and was ill suited for the expeditionary, multi-functional, full spectrum operations role that Army Aviation would soon be tasked to accomplish.

The lessons learned from TF Hawk coupled with General Shinseki's Army Transformation vision did lead to the 2000 Army Aviation Modernization Plan that was better nested and aligned with the Army's Transformation efforts, but it was not until 2004, after the cancelation of the Comanche Program, that Army Aviation was truly

integrated into the Army's Transformation plan. The 2000 Army Aviation Modernization Plan envisioned a reduction in the total number of aircraft and the reorganization to a multi-functional aviation battalion that was capable of attack, reconnaissance, and utility operations by FY07. However, these multifunctional battalions were still organized to support Division and Corps level units, not the maneuver BCTs envisioned under the Army Transformation Plan. Additionally, these multifunctional aviation battalions would have lacked the necessary combat power to execute large scale attack or air assault operations due to the smaller number of available aircraft. Under the 2000 Army Aviation Modernization plan, Army Aviation would be short 330 UH-60s and 99 AH-64s to meet the projected force structure required to complete the transition to the "Future Force."

However, those plans were reevaluated following the terrorist attacks of September 11th, 2001. By 2002, the revised interim transformation plan accelerated the retirement of Legacy aircraft, accelerated the reserve component modernization, and increased funding to upgrade the aging UH-60As and procure additional UH-60Ls. Aviation Transformation priorities would continue to evolve as the realities of fighting the GWOT while trying to transform forced Aviation planners to balance the current operational needs of the Army with transformation priorities for the future. The increased OPTEMPO and combat losses introduced a new variable into the transformation equation that had not been considered in previous peacetime transformation plans. It is nearly impossible to execute a peacetime transformation plan when combat operations are expending resources faster than anticipated.

How did the GWOT affect the transformation priorities for attack/reconnaissance capabilities? From 1995-2004, Army Aviation modernization and transformation efforts were focused to two major priorities, the retirement of Legacy aircraft and the development and fielding of the RAH-66 Comanche. The December 1995 Congressional Budget Office (CBO) Study's analysis of the 1995 ARI plan estimated that it would cost approximately \$36 billion dollars over a 30 year period to develop and field the approximately 1,292 RAH-66 Comanche helicopters and upgrade approximately 700 AH-64A helicopters to the AH-64D Longbow, while only spending \$0.4 billion on the CH-47 and UH-60. The ARI did not forecast purchasing any new aircraft (other than the Comanche and 60 UH-60s budgeted for purchase in 1996) until well after 2010! However, by the time that Comanche was expected to be fully fielded in 2020-2025, the AH-64s, UH-60s and CH-47s would be nearing the end of their service life. There was some concern over the Army's rather lengthy plan to fund expensive, sophisticated technology on the attack/reconnaissance fleet at the expense of neglecting the utility and cargo fleet. The combination of Comanche armed reconnaissance helicopters with the AH-64D Longbow would be a truly formidable foe in the Fulda Gap. Unfortunately, that is not the most likely threat that we face today. There are no sophisticated integrated enemy air defense network, no endless armored columns to destroy, just an elusive enemy that hides in the shadows with Improvised Explosive Devices, Rocket Propelled Grenades, and AK-47s. However, we must continue the fight to defeat the most likely threat of state and non-state actors in this era of persistent conflict, as well as maintain the capability to fight and win a large conventional war against a near peer competitor. Although it is a less likely scenario, the author contends that countries such as China,

Russia, North Korea, and Iran still potentially present a large conventional military threat to the peace and security of the United States.

The cancelation of Comanche was ultimately a good decision for Army Aviation Transformation. With \$48 billion and 20 years of research, testing, and development invested, it had to be a tough decision, but it was the right decision. Had the Comanche Program not been canceled, it is likely that Army Aviation Transformation would have continued slowly along the same unbalanced path toward a large conventional based threat aviation force. With the cancelation of Comanche, there was a clear shift in priorities for Aviation Transformation. Rather than acquiring a relatively small number of technologically advanced helicopters, the Army will have increased attack and reconnaissance capabilities for three reasons. The first reason is, the Army could now afford to fully modernize its entire fleet of AH-64s to the AH-64D Longbow (to include Reserve and National Guard), and develop and procure approximately 600 improved AH-64D Longbow Block IIIs. Second, there is still a need for a replacement for the OH-58D. The ARH program is expected to rapidly develop and field a reasonably priced Armed Reconnaissance Helicopter to replace the OH-58D with a more reliable, safer, and more capable helicopter. While the ARH may not provide the exponential increase in capabilities over the OH-58D that the Comanche was expected to, the ARH should provide a substantial increase over the current capabilities of the OH-58D. Finally, the additional reconnaissance capability of UAS such as Shadow, Hunter, Raven, and Sky Warrior could arguably provide the highest return on investment (biggest bang for the buck) increase in reconnaissance capability per dollar spent. The combination of the



increased number of AH-64D, ARH, and UAS provide a full spectrum of attack and reconnaissance capability across the entire aviation force.

How did the GWOT affect the transformation priorities for utility/cargo capabilities? Initially under the ARI, there was little priority given to upgrading the utility and cargo capabilities. Both the UH-60L and CH-47D had fairly recently been upgraded and were expected to have an additional 20 plus years of service life remaining. The projected increase in utility capability was expected to be gained through the retirement of the UH-1 “Huey” and the subsequent reorganization that would replace UH-1s with a fewer number of UH-60s. The 2000 Army Aviation Modernization Plan assumed risk in reduced resourcing for utility helicopters (330 fewer UH-60s than required to meet projected Future Force procurement objective) in order to maximize funding for an increased attack and reconnaissance capability with the AH-64D and Comanche. After September 11th, 2001, and the subsequent reevaluation of current operational needs of the Army, additional funding was designated to upgrade some 900 UH-60As (some of which had been in service since 1979), and procure additional UH-60L to meet the projected Future Force procurement objective of 1,680 UH-60L by FY 2012. Upgrades to the UH-60 fleet are critical to the sustainability of the utility fleet. From 2003 to 2009, UH-60s flew more flight hours (841,263 flight hours) in support of Operation Enduring Freedom and Operation Iraqi Freedom than any other aircraft. Following the cancelation of Comanche, additional funding was now available to maintain the current fleet of UH-60Ls, purchase approximately 1,200 new UH-60Ms, begin the recapitalization of CH-47D airframes to be modified and upgraded to the CH-47F over the next 10 years, and begin fielding the LUH-72 in 2006. Unlike the CH-47F

which will be a combination of new and rebuild airframes, the UH-60M will be all new construction. Both the UH-60M and CH-47F will be able to carry more weight over longer range than the current UH-60L and CH-47D due to powertrain and rotor blade improvements. Additionally, both the UH-60M and CH-47F will have new Common Avionics Architecture System (CAAS) “glass cockpits” with digital flight instruments with an integrated digital mapping and data transfer system that will increase the aviator’s situational awareness and reduce pilot workload. To date, Boeing has delivered 48 CH-47Fs to the fleet, some of which have already been deployed in support of combat operations. Fielding the LUH-72 to National Guard units and the National Training Center accelerated the retirement of UH-1 and OH-58A/C aircraft, and has reduced the need for UH-60s, allowing more UH-60s to be available to support current operational requirements. Fielding the UH-60M and CH-47F will effectively reset service life of the utility and cargo helicopter fleet and will allow them to continue to serve well after 2030. These improvements to the cargo and utility fleet will allow for the sustainment of current operational requirements as well as extend the future capabilities of the utility and cargo fleet.

How did the GWOT affect the transformation priorities for the modernization and transformation across the entire aviation force to include the Active, Reserve, and National Guard components? Prior to 2002-2004, the typical transformation and modernization plan for the Reserve and National Guard component involved fielding new aircraft to the Active Component, while the Reserve and National Guard received the “hand-me-downs.” When the Active Component got new UH-60Ls, the Guard and Reserve got the old UH-60As. When the Active Component got new AH-64Ds, the

Reserve and National Guard got the old AH-64As. While not the best or newest equipment, it did allow them to retire Legacy aircraft and gain similar equipment to what the Active duty units had. That was a fine system, and assumed an acceptable level of risk, as long as the Reserve and National Guard were not mobilized and deployed on a regular basis. As the Guard and Reserve units became more involved in the GWOT, these units were expected to be able to replace and work alongside their active duty counterparts. Often, these older Guard and Reserve aircraft had fewer, older radios and navigation equipment, or in the hot desert environment lacked the engine performance necessary to carry heavy loads. Following the cancellation of the Comanche program, the Army was better able to allocate the funding of improvements over the entire aviation fleet. The AH-64D is being fielded to the entire Army, not just the Active duty component, although a few National Guard units may only have 18 AH-64Ds versus the full allocation of 24. Although multiple deployments have put additional strain on the Reserve and National Guard, it has also brought to the forefront the need for additional funding and resources to support the modernization of the entire aviation force. As long as the Reserve and National Guard Components are expected to fight alongside the Active component, they should be resourced appropriately for the missions that they are expected to perform.

How did the GWOT affect the transformation priorities for the capability of a balanced aviation force structure to defeat threats of the contemporary operational environment, but also prepare, transform, and develop capabilities to defeat the threats of the foreseeable future? Clearly there was an imbalance in the Aviation Transformation priorities between 1995 and 2004. The retirement of Legacy aircraft was, of course, a

paramount requirement that had to be completed in order to allow for the organizational and material aspects of the transformation to be completed. The retirement of Legacy aircraft further reduced the requirements to train, sustain, and maintain the fleet. Yet, although it was a priority that had to be completed in order to transform, it still took more than ten years to accomplish. One of the contributing factors was that there were not enough advanced aircraft to replace the Legacy aircraft. Why? Because fielding the Comanche was the priority, even though the Army lacked over 300 UH-60s and nearly 100 AH-64s required to complete the transition. Aviation planners assumed risk with a planned reduction in organizational force structure and reduced funding for the utility and cargo helicopter programs, and reduced modernization of the Reserve Component. This lopsided approach to transformation was only allowable because there was no real operational strain on the aviation force. Sustained combat operations in Afghanistan and Iraq would soon change that. As the demand for aviation assets increased, the consequences of neglecting the remainder of the aviation force required a shift in priorities. No longer could Army Aviation afford to wait decades for transformation. This shift in priorities took a more holistic approach, modernizing the entire aviation fleet (to include the Reserve and National Guard Components), and finally task-organized Combat Aviation Brigades to support the primary maneuver element of the Army, the Brigade Combat Team. It is fairly certain that the CAB concept would have been implemented in some form with or without the GWOT. However, without the cancelation of the Comanche, the CAB would have faced the same challenges with a reduced attack, reconnaissance, and utility capability until a sufficient number of Comanches had been produced. It is impressive that the reorganization to the CAB was

completed in only four years, while supporting sustained combat operation in support of the GWOT, whereas the ARI reorganization took more than ten years to complete. The CAB standardized aviation brigades across the entire aviation force into a balanced, modular, capable, lethal, and sustainable aviation force structure capable of meeting current and future full spectrum aviation requirements. In 2008, the Army Posture Statement announced that it had converted eleven Active Duty and eight Reserve Component CABs, integrated BAEs into the every maneuver BCT, converted four Aviation Classification Repair Activity Depots (AVCRAD) to Theater Aviation Sustainment Maintenance Groups (TASM-G), and fully integrated the Flight School XXI for all IERW students. Flight School XXI is a proven success, providing better quality aviators that are combat ready, fully trained, and able to deploy in as little as 90 days after graduating from flight training. The integration of the Brigade Aviation Elements (BAE) into the maneuver BCTs has, quite possibly, been one of the key organizational changes to come out of Aviation Transformation efforts. The addition of the BAE to the BCT is a tremendous combat multiplier for the synchronization and integration of manned and unmanned aviation assets in the planning and execution with ground forces. The additional reconnaissance capabilities provided by the proliferation of UAS have tremendously increased the situational awareness and situational understanding of commanders at all levels, without putting expensive aircraft and aviators in harm's way. However, the integration of UAS present a huge airspace command and control challenge. The BAEs are critical to the successful integration and deconfliction of airspace with manned and unmanned aviation assets.

Rather than waiting years for a few technologically advanced helicopters to be fielded, that in reality would only marginally increase the reconnaissance capability of the aviation force (primarily due to the initial low number of Comanches that would be fielded), the Army was able to revamp its entire fleet, providing a more balanced, capable aviation fighting force. This incremental, balanced approach to fielding new technology as it becomes available along with improvements to existing airframes, will ensure the continued advancement of aviation capabilities. It took almost a decade to get a sustainable, balanced Aviation Transformation plan that would set the conditions for the future of Army Aviation Transformation well over the next twenty years.

There still remain many challenges to overcome in the next five, ten, and twenty years. The need for a manned armed reconnaissance helicopter to replace the OH-58D remains a top priority. To date, the UH-60M, CH-47F, AH-64D Block III, C-27J Joint Cargo Aircraft, and Sky Warrior UAS programs are on time and on budget. However, the long-term future plans for Aviation Transformation are less codified. The Joint Heavy Lift rotorcraft, FCS Class IV UAS, and the Joint Multi-Role rotorcraft will be closely tied to the future developments of the FCS program, which has recently come under the scrutiny of President Obama's administration, including Secretary of Defense Robert Gates. During a press conference on 6 April 2009, Secretary Gates announced plans to significantly restructure the FCS program. He recommended that the Army retain the incremental technology "spin outs" of the FCS program, but that the vehicle portion of the FCS program be canceled. "Because the vehicle part of the FCS program is currently estimated to cost over \$87 billion, I believe we must have more confidence in the program strategy, requirements and maturity of the technologies before proceeding

further. . . . Accordingly, I will recommend that we cancel the vehicle component of the current FCS program, re-evaluate the requirements, technology and approach -- and then re-launch the Army's vehicle modernization program, including a competitive bidding process" (Garamone 2009). Since the JHL is envisioned to support the FCS equipped BCT, the decisions made concerning the FCS will affect the design parameters and requirements of what the Future Aviation Force will be required to support.

The Army's operational tempo in the 21st Century will require a balanced force that can conduct full spectrum operations, across the entire spectrum of conflict. Over the last ten years, Army Aviation Transformation Plans have been changed and updated as the threat and operational requirements have changed. The current Aviation Transformation priorities are well balanced and are projected to retain and improve the overmatch capability to defeat the current unconventional asymmetric warfare threat as well as larger more conventional threats in the future. Continuous Technology Refreshment (CTR) is part of this balanced incremental approach for fielding improved technology as it becomes available. CTR is a program that continuously upgrades existing systems with improved technology as the components are being repaired or replaced. CTR will be a key enabler as the aviation fleet continues to transform as it fights. The current upgrades to the AH-64D Longbow Block III, UH-60M, CH-47F, and the development and fielding of the ARH, JCA, and Sky Warrior UAS along with the organizational Combat Aviation Brigade structure will provide a capable, modular, deployable, lethal, sustainable aviation force for the next 20 years.

The need for a manned armed reconnaissance helicopter to replace the OH-58D is the only remaining unfulfilled requirement that will need to be immediately addressed.

The ARH program is aggressively pursuing the available options to ensure that this requirement is met with an affordable solution that provides reliable, capable replacement for the OH-58D. Ideally, this would be complete in the next five years, as the “Life Support 2020” modifications to the OH-58D fleet are only a temporary solution.

The development and implementation of the Combat Aviation Brigade and the integration of the Brigade Aviation Element are two of the most important changes to come out of recent transformation efforts. The CAB standardized aviation brigades across the entire aviation force into a balanced, modular, capable, lethal, and sustainable aviation force structure capable of meeting current and future full spectrum aviation requirements, while the BAE enhances combined arms aviation integration and support of the maneuver Brigade Combat Team. The structure and organization of the CAB has been combat tested and proven to be able to support the maneuver BCTs. These highly experienced, combat proven aviators are capable of conducting a wide range of missions under the most challenging conditions. A well balanced Transformation across the entire aviation fleet will continue to provide the full spectrum capability required to defeat any foreseeable conventional or unconventional threat in the future. The inherent flexibility of Army Aviation allows for the capability to support stability operations as well as the capability to defeat a large conventional threat. This balanced, incremental change, across the entire aviation force will provide a stable, sustainable Transformation to the Future Force, as small adjustments are made along the way to ensure that the Future Force we end up with is the force with the right capabilities, at the right place, at the right time, against whatever threat there might be.



After 2030, the JHL and JMR are the projected long term future aircraft for the Army. With the future of the FCS vehicles under revision, the need for a JHL, and the key performance parameters remain in question. The 2007 Congressional Budget Office report *Modernizing the Army's Rotary-Wing Aviation Fleet* estimates that the current Army Aviation Transformation plan would cost \$12 billion for research, development, testing, and evaluation (RDT&E) and \$68 billion for procurement costs to field the LUH, ARH, UH-60M, CH-47F, AH-64D Longbow Block III, JHL and JMR. That is an average of \$3.3 billion a year through 2030, \$1.1 billion more a year than the historical average \$2.2 million per year spent between 1986 and 2005. The CBO report estimates that the JHL would cost \$166 million each, with a total cost of \$30 billion for RDT&E and procurement costs. The JMR is projected to replace the AH-64D, LUH, and UH-60M sometime after 2020. The JMR is estimated to cost \$24 million each with a total cost of \$4.4 billion for RDT&E and procurement.

The CBO report offered four alternative courses of action to the Army's current Transformation Plan. Alternative 1: Cut procurement and spread reductions across all programs. Alternative 2: Forgo Joint Heavy Lift Rotorcraft. Alternative 3: Reduce Attack/Reconnaissance Modernization. Alternative 4: Accelerate Joint Heavy Lift and Reduce Attack/Reconnaissance Modernization. Of these alternative courses of action, the cancelation of the JHL is the most likely. All other alternatives would result in a decreased future capability with a reduction in the existing capabilities of the aviation force. The CBO report did not include RDT&E and procurement costs of the UAS or JCA as a part of its data and recommendations. A course of action not considered in the

CBO report was a modification of the current plan (to include UAS and JCA RDT&E and procurement) and the cancellation or reduction of both the JHL and JMR. .

### Recommendations

The funding and procurement of the ARH, UH-60M, CH-47F, AH-64D Longbow Block III, LUH, JCA and UAS (to include Sky Warrior and FCS Class IV UAS) across the entire Army must continue. The JHL program should be heavily reviewed in light of the recent changes recommended by Secretary Gates to the FCS program. Unfortunately, the aerodynamic properties of traditional rotary-winged aircraft that allow it have multi-directional vertical take-off and landing capability also limit the range, weight carrying capability, and top speed to about 200 miles per hour. The tilt-rotor aircraft is a possible solution to increase the top speed, and increase the operational range, but it will still have a limited cargo carrying capacity. Based on the projected high weight of the armored FCS vehicles it is expected to be able to transport, acquiring sufficient numbers of the JHL to effectively transport the FCS BCT must be taken into consideration as well. Is the ability to airlift heavy FCS vehicles (whose future development is in question) with organic rotary wing assets a capability worth an additional \$1.2 billion a year? The capability to transport and support the FCS equipped BCT via intratheater Army Aviation assets will most likely be a requirement in the future at some point, however until the future of the FCS vehicles can be determined, the design requirements and key performance parameters of the JHL must be reviewed to ensure that it will be able to support the FCS equipped BCT.

The JMR is a flawed concept in and of itself. By necessity, each aviation mission requires specialized training, equipment, and certain performance parameters. For

example, a cargo or utility helicopter must have a large cargo area, powerful engines, and large rotor blades to be able to carry passengers and heavy loads, while an attack or reconnaissance helicopter must be able to quietly detect, track, target, and destroy the enemy, while presenting the smallest silhouette possible to the enemy. A helicopter such as the JMR would be the jack of all trades and master of none. The AH-64D, UH-60M, and LUH-72 are all vastly different aircraft with different missions, and to attempt to replace them with a single multi-role aircraft would be foolhardy, at best. At some point in the future, there will be a requirement to replace the AH-64D, UH-60M, and LUH-72 with newer more advanced aircraft. The author recommends that at least two future rotorcraft be developed to replace the AH-64D, UH-60M and LUH-72. Perhaps a Joint Attack and Reconnaissance Rotorcraft and a Joint Utility Rotorcraft are in order? In another 20 years, when the bidding for the JMR contract begins, perhaps Boeing-Sikorsky will dust off the RAH-66 Comanche prototypes, get back to the drawing board, and the Comanche will fly again.

### Summary

Army Aviation Transformation has come a long way in the last decade. The Global War on Terrorism was a catalyst that caused many challenges and changes to the transformation of Army Aviation. The realities of trying to continue a peacetime Transformation plan while engaged in sustained long term combat operations forced Aviation planners to reevaluate Army Aviation Transformation priorities. The cancelation of the Comanche Program allowed for a balanced Transformation across the entire Aviation force. Rather than focusing solely on a large conventional threat, the transition to a multi-functional Combat Aviation Brigade provided (and will continue to

provide) the capability required to conduct full spectrum operations, across the entire spectrum of conflict. Despite developmental setbacks and an increased OPTEMPO that threatens to stretch the US Army to the breaking point, Army Aviation, as a branch, has risen to the occasion and emerged better trained, better equipped, combat proven, and ready to meet any challenge or potential foe that the future holds.

## GLOSSARY

Army Transformation . FM-1 *The Army* defines Transformation as; “Transformation describes the process by which the current force is becoming the future force. It [transformation] occurs as the Army incorporates new capabilities into its force structure and trains Soldiers to use them. The future force is what the Army continuously seeks to become. It will be strategically responsive and joint interdependent. It will be capable of precision maneuver and able to dominate adversaries and situations across the range of military operations envisioned in the future security environment. The future force will be lighter, more lethal and agile, and optimized for versatility” (Department of the Army 2005b, 4-3).

DOTMLPF. Acronym for Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities. FM-1 *The Army* defines DOTMLPF as; “DOTMLPF is a problem-solving construct for assessing current capabilities and managing change” (Department of the Army 2005b, 4-4).

Full Spectrum Operations. FM 3-0 *Operations* defines Full Spectrum Operations as; “The Army’s operational concept: Army forces combine offensive, defensive, and stability or civil support operations simultaneously” (Department of the Army 2008d, 3-1).

Full Spectrum of Conflict. FM 3-0 *Operations* defines the full spectrum of conflict as; “The spectrum of conflict is the backdrop for Army operations. It places levels of violence on an ascending scale marked by graduated steps. The spectrum of conflict spans from stable peace to general war. It includes intermediate levels of unstable peace and insurgency” (Department of the Army 2008d, 2-1).

Future Combat Systems. As part of the Army Transformation, the Army adopted the Future Combat System (FCS) as a major acquisition program to equip the Objective Force. CRS Report RL32888 defines FCS as; “The Future Combat System (FCS) is the U.S. Army’s multiyear, multibillion dollar program at the heart of the Army’s transformation efforts” (Feickert 2008, 1).

Interim Force. The Brigade Combat Team concept designed to fill a capability gap between the Legacy Force and Objective Force

Legacy Force. The post cold war Army structure (pre-1999) with traditional “heavy” armored forces and “light” infantry forces. For Aviation forces the term “Army of Excellence” was often used.

Objective Force. The Objective Force (later know as the Future Force) is the vision for the future 21st Century Army that is lighter, more deployable, more mobile, more lethal, and more survivable than the Legacy Force

AH-1	“Cobra” Vietnam era single engine attack helicopter
AH-64A	“Apache” advanced dual engine attack helicopter, replaced the AH-1
AH-64D	“Longbow Apache” is a specially equipped AH-64 with millimeter-wave Fire Control Radar (attack helicopter) Longbow Block III is an improved version of the AH-64D currently being developed
ARH-70	“Arapaho” armed reconnaissance helicopter designed by Bell Helicopter as the interim replacement for the OH-58D
BCT	Brigade Combat Team, replaced the Division as the primary maneuver element of ground combat forces as a result of General Shinseki’s Transformation vision
C-23	“Sherpa” small fixed wing cargo aircraft
C-27J	“Spartan” Joint Cargo Aircraft fixed wing intratheater cargo aircraft, replacement for C-23 “Sherpa”
CAAS	Common Avionics Architecture System “glass cockpit” digital flight instruments with an integrated digital mapping and data transfer system that increases the aviator’s situational awareness and reduces pilot workload
CCA	Close Combat Attack- similar to USAF fixed wing Close Air Support, but is conducted by attack helicopters in support of ground troops
CH-47	“Chinook” heavy lift, twin engine, tandem rotor cargo helicopter
COTS	Commercial Off the Shelf, the use of existing commercial products to rapidly meet military requirements
IERW	Initial Entry Rotary Wing flight training, “flight school”, located at Ft. Rucker, AL
JCA	Joint Cargo Aircraft C-27J “Spartan” multi-engine fixed wing cargo airplane, smaller than a C-130, but larger than the C-23 Sherpa. Developed as a joint effort between the US Army and US Air Force to provide improved intratheater cargo lift capability
JHL	Joint Heavy Lift rotorcraft, future heavy lift rotorcraft envisioned to support the FCS equipped BCT
JMR	Joint Multi-Role rotorcraft, future rotorcraft envisioned to replace the AH-64D, and possibly UH-60M and LUH
LUH	Light Utility Helicopter, designed to replace OH-58A/C and UH-1 in National Guard units

L2I	Lessons Learned Integration, rapidly integrated lessons learned and TTPs from currently deployed forces with current doctrine
OH-58A/C	“Kiowa” unarmed single engine scout-observation helicopter
OH-58D	“Kiowa Warrior” or “KW,” armed single engine scout-reconnaissance helicopter
RAH-66	“Comanche” advanced, stealthy armed reconnaissance helicopter, the cornerstone of Army Aviation Transformation until 2004.
RC	Reserve Component, also US Army Reserve USAR, part time duty
SLEP	Service life extension program- recapitalizes airframes nearing the end of their service life, and restores them to zero hour like new condition at significant savings over building a brand new helicopter, and extending the service life approximately another twenty to twenty-five years
UH-1	Iroquois “Huey” Viet Nam era single engine utility helicopter
UH-60	“Blackhawk” advanced dual engine utility helicopter, replaced the UH-1 as the primary utility helicopter
UH-72A	“Lakota” LUH light utility helicopter, began fielding in 2006

## REFERENCE LIST

- Barclay, James O. III. 2009. "Aviation update: Army aviation at a glance." *ARMY Magazine* 59, no. 1 (January): 28-32.
- Bender, Bryan. 2004. "US Army terminates Comanche copter." (February 24). <http://www.helis.com/news/2004/h66cancel2.htm> (accessed September 15, 2008).
- Boeing News Release. 2008a. "Boeing announces new rotorcraft program: AH-6." (October 7). [http://www.boeing.com/news/releases/2008/q4/081007b\\_nr.html](http://www.boeing.com/news/releases/2008/q4/081007b_nr.html) (accessed October 22, 2008).
- . 2008b. "Boeing, U.S. Army celebrate 1st flight of AH-64D Apache block III helicopter." (July 11). [http://www.boeing.com/defense-space/rotorcraft/news/2008/q3/080711b\\_nr.html](http://www.boeing.com/defense-space/rotorcraft/news/2008/q3/080711b_nr.html) (accessed October 26, 2008).
- Bolkcom, Christopher. 2003. Report for Congress RS20522, *Army aviation: The RAH-66 Comanche*. Washington, DC: Congressional Research Service.
- Carafano, Dr. James Jay. 2004a. "Killing Comanche: All the right moves." *The Heritage Foundation*. (February 25). <http://www.heritage.org/Research/NationalSecurity/wm433.cfm> (accessed September 4, 2008).
- . 2004b. "The Army goes rolling along: New service transformation agenda suggests promise and problems." *The Heritage Foundation*. (February 23). <http://www.heritage.org/Research/HomelandSecurity/bg1729.cfm> (accessed September 10, 2008).
- . 2008. "Preparing the military for defeat." *The Heritage Foundation*. (August 26). <http://www.heritage.org/Press/Commentary/ed082608a.cfm> (accessed September 10, 2008).
- CBO. 1995. "An Analysis of U.S. Army Helicopter Programs." *Congressional Budget Office*. (December 1995). <http://www.cbo.gov/ftpdocs/0xx/doc12/Helicopt.pdf> (accessed October 12, 2008).
- . 2007. "Modernizing the Army's rotary-wing aviation fleet." *Congressional Budget Office*. (November 30). <http://www.cbo.gov/ftpdocs/88xx/doc8865/11-30-Helicopters.pdf> (accessed October 18, 2008).
- Cody, Richard A. 1999. Statement by Brigadier General Richard A. Cody assistant division commander, 4th Infantry Division on Task Force Hawk. (July 1). <http://armedservices.house.gov/comdocs/testimony/106thcongress/99-07-01cody.htm> (accessed December 8, 2008).



- Department of the Army. 2001. *Army modernization plan 2001*. Washington DC: Office of the Deputy Chief of Staff for Programs.
- . 2002. *2002 Army modernization plan*. Washington DC: Office of the Deputy Chief of Staff for Programs, February.
- . 2003. *2003 Army modernization plan*. Washington DC: Deputy Chief of Staff, G-8, February.
- . 2004. *2004 Army modernization plan*. Washington DC: The Army G-8, June.
- . 2005a. *2005 Army modernization plan*. Washington DC: Office of the Deputy Chief of Staff, G-8, February.
- . 2005b. Field Manual (FM) 1, *The army*. Washington DC: Department of the Army, June.
- . 2006. *2006 Army modernization plan*. Washington DC: Deputy Chief of Staff, G-8, March.
- . 2007a. *2007 Army modernization plan*. Washington DC: Office of the Deputy Chief of Staff, G-8, March.
- . 2007b. Field Manual (FM) 3-04.111, *Aviation brigades*. Washington DC: Department of the Army, December.
- . 2008a. *2008 Army modernization strategy*. Washington DC: Office of the Deputy Chief of Staff, G-8, July.
- . 2008b. The 2008 Army posture statement-information papers-restructuring Army aviation. *Information Papers*. (June 27). [http://www.army.mil/aps/08/information\\_papers/transform/Restructuring\\_Army\\_Aviation.html](http://www.army.mil/aps/08/information_papers/transform/Restructuring_Army_Aviation.html); (accessed October 26, 2008).
- . 2008c. *The army strategy*. Washington DC: Office of Deputy Chief of Staff, G-3/5/7.
- . 2008d. Field Manual (FM) 3-0, *Operations*. Washington DC: Department of the Army, February.
- Feickert, Andrew. 2008. The army's future combat systems (FCS) background and issues for Congress RL32888. Congressional Research Service Report for Congress, Washington DC: Congressional Research Service.
- Garamone, Jim. 2009. FCS\_vehicles on DoD budget chopping block. *Fort Leavenworth Lamp*. (April 9). [http://www.ftleavenworthlamp.com/articles/2009/04/09/dod\\_news/dod1.txt](http://www.ftleavenworthlamp.com/articles/2009/04/09/dod_news/dod1.txt) (accessed April 12, 2009).

- Gourdley, Scott R. 2009. Army aviation: Balancing equipment challenges to support warfighters today and tomorrow. *ARMY Magazine*, 59, no. 1 (January): 34-40.
- Larson, John B. 2004. The on line office of Congressman John B. Larson, serving Connecticut's First Congressional District. (February 25). [http://www.larson.house.gov/index.php?option=com\\_content&task=view&id=318&Itemid=95](http://www.larson.house.gov/index.php?option=com_content&task=view&id=318&Itemid=95) (accessed September 4, 2008).
- Murphy, Peter F. Jr. 2009. Reports from AUSA Aviation Symposium, January 2009. *Association of the United States Army*. (January 8) [http://www.ausa.org/news/latestnews/NewsArchive\\_2008/Pages/ReportsfromAUSAAviationSymposiumJanuary2009.aspx](http://www.ausa.org/news/latestnews/NewsArchive_2008/Pages/ReportsfromAUSAAviationSymposiumJanuary2009.aspx) (accessed February 17, 2009).
- Nardulli, Bruce L., Walter L. Perry, Bruce Pirnie, John Gordon IV, and John G. McGinn. 2002. *Disjointed war: Military operations in Kosovo, 1999*. Santa Monica, CA: Rand. [http://www.rand.org/pubs/monograph\\_reports/MR1406/](http://www.rand.org/pubs/monograph_reports/MR1406/) (accessed October 17, 2008).
- PAO, US Army. 2001. Army accelerates aviation transformation. *US Army Public Affairs*. (September 7) [http://www4.army.mil/OCPA/read.php?story\\_id\\_key=1425](http://www4.army.mil/OCPA/read.php?story_id_key=1425) (accessed September 23, 2008).
- Phipps, Warren E. Jr. 2009. CGSC Student Share Point Aviation Library. *AVN Branch Update 28JAN09*. (February 6). <https://partis.leavenworth.army.mil/sites/student/Aviation%20Library%20%20FOUO/Forms/AllItems.aspx?RootFolder=%2fsites%2fstudent%2fAviation%20Library%20%20FOUO%2fBranch%20Day%20%28Feb%2009%29&FolderCTID=&View=%7b133279BC%2d5537%2d4199%2d815A%2d70DC0FEA18F> (accessed February 17, 2009).
- Sawicki, Rob. 2004. Senator Joe Lieberman: news release. Joe Lieberman Unites States Senator. (March 11). <http://lieberman.senate.gov/newsroom/release.cfm?id=219120&&> (accessed September 04, 2008).
- Saxton, Jim. 2008. The Hill's Congress Blog. Army shouldn't 'save' FCS at all costs; this time, Congress must fully fund It. (April 28). <http://blog.thehill.com/2008/04/28/army-shouldnt-save-fcs-at-all-costs-this-time-congress-must-fully-fund-it-rep-jim-saxton> (accessed September 10, 2008).
- Tiron, Roxana. 2008. The Hill's Congress Blog. Army: At least a year to complete ARH contract. (October 17). <http://thehill.com/leading-the-news/army-at-least-a-year-to-re-compete-arh-contract-2008-10-17.html> (accessed October 18, 2008).
- United States General Accounting Office. 2001a. Defense Acquisition Army Transformation Faces Weapons System Challenges GAO-01-311. Washington DC: United States General Accounting Office, May.

———. 2001b. Comanche program objectives need to be revised to more achievable levels GAO-01-450. Washington DC: United States General Accounting Office, June.

US Army Cancels ARH-70 Programme [UK]. (October 17, 2008). <http://defence-data.com/current/page41209.htm> (accessed October 18, 2008).

US Army Kills Comanche. (February 23, 2004). [http://www.deagel.com/news/US-Army-Kills-Comanche\\_n000000221.aspx](http://www.deagel.com/news/US-Army-Kills-Comanche_n000000221.aspx) (accessed September 10, 2008).

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