May 12, 2003

Acquisition

Acquisition Management of the RAH-66 Comanche
(D-2003-087)

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Acronyms

CAIG	Cost Analysis Improvement Group
EMD	Engineering and Manufacturing Development
IPT	Integrated Product Team
RCOA	Restructure Course of Action

INSPECTOR GENERAL
DEPARTMENT OF DEFENSE
400 ARMY NAVY DRIVE
ARLINGTON, VIRGINIA 22202–4704

May 12, 2003

MEMORANDUM FOR AUDITOR GENERAL, DEPARTMENT OF THE ARMY

SUBJECT: Report on Acquisition Management of the RAH-66 Comanche (Report No. D-2003-087

We are providing this report for your information and use. Although no comments were required, the Comanche Project Office provided suggestions for minor changes to the final report. Those suggestions were considered in preparing this report. Comments to the final report are not required.

We appreciate the courtesies extended to the staff. Questions should be directed to Mr. Charles M. Santoni at (703) 604-9051 (DSN 664-9051) or Mr. Sean Mitchell at (703) 604-9034 (DSN 664-9034). See Appendix N for the report distribution. The team members are listed inside the back cover.

Thomas F. Gimble
for David K. Steensma
Deputy Assistant Inspector General
for Auditing

Office of the Inspector General of the Department of Defense

Report No. D-2003-087 **May 12, 2003**
(Project No. D2002AL-0150)

Acquisition Management of the RAH-66 Comanche

Executive Summary

Who Should Read This Report and Why? Army, DoD, and other officials interested in the actions taken by the Army to restructure the RAH-66 Comanche Helicopter Program should read this report. The report discusses the action the Army took to restructure, reorganize, and improve the program and reduce the level of program risk.

Background. Historically, the Comanche Program has experienced funding problems, changing requirements, and technology issues that resulted in restructuring actions. In September 2001, the Army reported a baseline breach, requiring a fifth program restructure. On October 17, 2002, the Under Secretary of Defense for Acquisition, Technology, and Logistics approved a Restructured Course of Action. According to an independent cost estimate, an additional $4.0 billion (then-year dollars)* will be required to complete the Engineering and Manufacturing Development Phase of the Comanche Program acquisition.

Results. The Army took constructive actions to improve management, oversight, and performance of the Comanche Program acquisition. The Army restructure provided additional funding for the Engineering and Manufacturing Development Phase, incorporated the Block acquisition strategy, extended the schedule for Comanche aircraft development, and added all component qualification testing. The Comanche Project Office and the Contractor Program Office initiated action to reorganize and streamline the program management structure and integrated product teams, which minimized duplication of effort and improved communication, accountability, and authority. In addition, studies to improve the efficiency of the production lines were conducted.

Constructive actions have been taken to restructure, reorganize, and improve the program and to reduce the level of program risk. However, continued emphasis is needed to ensure that technical and system integration issues will not arise that could result in future breaches of program cost, schedule, and performance measures. We did not test management controls because data related to program performance after the Restructure Course of Action did not exist at the time fieldwork was conducted.

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* Then-year dollars are dollars that include the effects of inflation and/or escalation and or reflect the price levels expected to prevail during the year at issue. FY 2000 was the base-year used to calculate then-year dollar amounts in this report.

Management Comments. Although no comments were required, the Comanche Project Office provided suggestions for minor changes to the final report. Those suggestions were considered in preparing this report.

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Background

The RAH-66 Comanche helicopter (Comanche) is the Army's future armed reconnaissance helicopter, designed to operate with a minimal logistical burden while serving as the eyes of the commander in the 21st century battle space. As a member of the Objective Force[1] air-ground task force, Comanche units will conduct the following operations: reconnaissance, mobile strike, close combat with ground forces, support of divisional air assaults, and on-site command and control of air-ground maneuver teams. One-third of the Comanche helicopters will be equipped with fire control radar similar to the Longbow fire control radar installed on the AH-64D Apache helicopter. The system will provide battlefield capability in day, night, and adverse weather operations.

According to the history provided by the Comanche Project Office, the Comanche Program had its inception in June 1983 as an effort to build a family of high technology, low cost, light aircraft to replace the Army's aging fleet of reconnaissance and attack helicopters. Historically, the Comanche has experienced funding problems, changing requirements, and technology issues and has been restructured five times since its inception. The history provided by personnel in the Comanche Project Office stated that the fifth restructure occurred as a result of a baseline breach that was reported by the Comanche Project Office on September 2, 2001. In response, the Army reorganized the program structure, rebaselined costs, extended schedule targets, and established a new management structure. The Army's Restructure Course of Action (RCOA) for the Comanche Program was reviewed by the Defense Acquisition Board on October 7, 2002, and approved by the Under Secretary of Defense for Acquisition, Technology, and Logistics on October 17, 2002. See Appendix B for more detailed information of the history of the Comanche Program.

The Comanche Project Manager, under the Army Program Executive Officer for Aviation, Huntsville, Alabama, manages the design and development of the Comanche Program. The contractor for the Comanche is the Boeing Sikorsky RAH-66 Comanche Team. Comanche is the Army's largest aviation acquisition program with a projected total acquisition cost of about $39.3 billion (then-year dollars).[2] Of the $39.3 billion, $12.2 billion is for Research, Development, Test, and Evaluation and $27.0 billion is for procurement. Based on data contained in

[1] The Objective Force is a term that encompasses a complete transformation of the U.S. Army. The Objective Force will include more than just new combat systems. It will also include a new organization, new training techniques, and a new way of conducting warfare.

[2] All dollar amounts in this report are based on then-year dollars except where noted. Then-year dollars are dollars that include the effects of inflation or escalation and/or reflect the price levels expected to prevail during the year at issue. FY 2000 was the base-year used to calculate then-year dollar amounts in this report.

the Comanche Selected Acquisition Report, and additional data provided by the Comanche Project Office, we calculate that as of October 2002, the Comanche Project Office has spent $6.0 billion in Research, Development, Test, and Evaluation funds. The CAIG-estimated cost to complete the Engineering and Manufacturing Development Phase is approximately $6.2 billion from FY 2003 through completion. Current Army plans call for the acquisition of 650 Comanche helicopters (4 funded with Research, Development, Test, and Evaluation funds) through FY 2019, with a low rate initial production quantity of up to 73 aircraft. The CAIG-estimated cost of the 646 Comanche helicopters to be purchased using Procurement funds is approximately $27.0 billion. Appendix C provides details on the acquisition program baseline costs.

According to the Comanche Project Office, after almost 3 years of managing the Comanche Program, the current Comanche Project Manager is scheduled to leave in 2003, and the Army has selected the new Comanche Project Manager. Since 1991, the average tenure of a Comanche Project Manager has been 3 years. See Appendix D for the management tenure of the Comanche Program.

Objectives

The overall audit objective was to evaluate the acquisition management of the RAH-66 Comanche. Specifically, we reviewed the action taken to restructure the Comanche acquisition and improve the management and oversight of the Comanche Project Office. We did not test management controls because data related to program performance after RCOA did not exist at the time fieldwork was conducted. See Appendix A for a discussion of the audit scope and methodology and prior audit coverage related to the objectives.

RAH-66 Comanche Restructure Course of Action

On October 17, 2002, the Under Secretary of Defense for Acquisition, Technology, and Logistics approved a Restructure Course of Action (RCOA) for the RAH-66 Comanche Helicopter (Comanche) Program. RCOA provided an additional $4.0 billion in funding for Engineering and Manufacturing Development (EMD), established a new acquisition baseline that decreased the number of aircraft to be procured, established the Block acquisition strategy, extended the schedule for Comanche aircraft development, improved risk management techniques, and added all component qualification testing.

In conjunction with RCOA, the Comanche Project Office and the Contractor Program Office initiated action to reorganize and streamline the program management structure and integrated product teams (IPTs), which minimized duplication of effort and improved communication, accountability and authority. In addition, studies to improve the efficiency of the production lines were conducted.

Constructive actions have been taken to restructure, reorganize, and improve the Comanche Program and to reduce the level of program risk. However, continued emphasis is needed to ensure that technical and system integration issues will not arise that could result in future breaches of program cost, schedule, and performance measures.

Restructure Course of Action

Based on an independent cost estimate of the Cost Analysis Improve Group (CAIG), the Research, Development, Test, and Evaluation funds increased from $8.3 billion in July 2000 to $12.2 billion in October 2002. RCOA provided an additional $4.0 billion for EMD and established a new baseline that decreased the number of helicopters to be procured from 1,213 to 650. The CAIG indicated that total procurement costs decreased from $39.4 billion to $27.0 billion. Based on those CAIG estimates, we calculated that the average unit cost increased from $32.7 million to $41.8 million. The RCOA established the Block acquisition strategy and extended the schedule for Comanche aircraft development. The delivery date for the first-unit-equipped aircraft was extended 7 months and the delivery date for the first Comanche aircraft with initial operational capability was extended 33 months. Those extensions provide a more realistic schedule for program development. RCOA also improved risk management techniques and included qualification testing for all components.

Baseline Breach. The EMD Phase of the Comanche development began following a Milestone II decision in April 2000. Officials of the Comanche Project Office stated that on September 1, 2001, the Comanche Project Manager informed the Secretary of the Army and Army Chief of Staff that Milestone II cost, schedule, and performance commitments could not be accomplished. They also stated that the Army Chief of Staff approved interim direction to discontinue the Milestone II program and re-plan the engineering and manufacturing development work to be conducted in FY 2002 and beyond.

Cost Analysis Improvement Group Estimating Process. EMD started in FY 2000 with completion planned for FY 2011. During the summer and early fall of 2002, DoD's Cost Analysis Improvement Group (CAIG) was asked to perform a limited cost assessment of the Comanche Program for the Comanche Overarching Integrated Product Team and the Defense Acquisition Board. According to the CAIG estimate for RCOA, the Comanche Program EMD Phase will cost $6.5 billion (FY 2002 dollars) at completion.

New Acquisition Program Baseline. On October 17, 2002, the Under Secretary of Defense for Acquisition, Technology, and Logistics approved the proposed Acquisition Program Baseline for the Comanche, requiring the Army to program funds for Research, Development, Test, and Evaluation and Procurement to the estimates and funding profile established by CAIG. The Under Secretary of Defense for Acquisition, Technology, and Logistics reduced the Comanche procurement objective from 1,213 aircraft, approved at Milestone II Acquisition Program Baseline on July 7, 2000, to 650 aircraft and approved a procurement rate of 60 aircraft per year. Research, Development, Test, and Evaluation cost increased from $8.3 billion to $12.2 billion. We calculated that the average procurement unit cost increased from $32.7 million to $41.8 million. However, total Procurement cost decreased from $39.4 billion to $27 billion, and total life-cycle-cost decreased from $86.7 billion to $68.5 billion. See Appendix C for additional information.

Acquisition Block Strategy. The Comanche uses evolutionary (time-phased) principles for development, production, and fielding that are designed to meet user mission needs required over time. The strategy is defined by "Blocks" of capability that were developed as a balance between providing mission capabilities and minimizing program execution risk. The Comanche Project Manager stated that an independent assessment study recommended that the RCOA use a three block acquisition strategy instead of a two block acquisition strategy. The study recommended that Comanche move five Block I threshold requirements to Block II. As a result, Block I requirements for the Comanche radar, Link-16 communication system, satellite communications, Level IV unmanned aerial vehicle control, and turreted gun system full accuracy were redefined as objectives for Block 1 and threshold requirements for Block II. See Appendix E for details of the Block requirements.

Comanche Schedule. RCOA extended the time frame for development of the Comanche aircraft. The delivery of the first-unit-equipped aircraft was extended 7 months and the first Comanche aircraft with initial operational capability was extended 33 months. Table 2 depicts a comparison between Milestone II EMD timelines and the RCOA timelines.

Table 2. Comparison of Schedules

	Milestone II	RCOA
Aircraft No. 3 delivery	February 2004	December 2004
Aircraft No. 3 first flight (developmental testing)	April 2004	March 2005
Start operational test	August 2004	April 2006
Limited user test	May 2005	September 2006
Low rate initial production long lead	October 2003	November 2005
Low rate initial production Defense Acquisition Board	June 2005	December 2006
First-unit-equipped (18 aircraft)	December 2008	June 2009
Milestone III decision	December 2006	August 2009
Initial operational capability	December 2006	September 2009

FY 2003 Milestones. RCOA reduced the number of milestones scheduled for completion in FY 2003 from 15 to 5. Table 3 shows milestones scheduled for completion in FY 2003.

Table 3. Milestone Schedule

Date	Milestone
May 2, 2003	Weigh the main transmission
May 9, 2003	Start major assembly of Aircraft No. 3
July 1, 2003	Complete radar stationary target development
July 23, 2003	Integrate the Engineering and Manufacturing Development flight control software
September 3, 2003	Complete the armament critical design review (less armament interface unit)

Table 4 depicts the schedule extension of the other 10 milestones.

Table 4. Schedule Extension

	Milestone II	RCOA
Operational Flight Program 10.20	November 2002	April 2004
Full Electro-Optical Sensor System 1st flight (Aircraft No. 2)	December 2002	April 2004
Aviation Combined Arms Team Trainer Access for Training development	January 2003	January 2004
Aviation Combined Arms Team Trainer available at the training site	June 2003	January 2004
Comanche Radar hardware	June 2003	March 2006
First Integrated Communications, Navigation and Identification Avionics hardware	August 2003	April 2004
Force Development, Test, and Experimentation training complete	August 2003	May 2005
Static Test Article complete	September 2003	September 2004
Clear Voice First Integrated Communications, Navigation and Identification Avionics Operational Flight Program	October 2003	December 2004
Mission Equipment Package	October 2003	July 2004

See Appendix F for the RCOA schedule with milestones beginning in FY 2004. To meet the FY 2003 milestones, the Comanche Program must first complete certain performance tasks. See Appendix G for applicable FY 2003 performance tasks.

Risk Mitigation. The Comanche risk management process was designed to identify areas that require special attention and close scrutiny during the design and development phase so that technical performance, cost, schedule, supportability, and producibility goals of the Comanche Program are achieved.

The Comanche risk management program uses a software tool that provides a standardized set of risk assessment criteria in order to establish a program risk baseline, document abatement plans, and monitor progress status. The Comanche risk monitoring method includes a tiered review process where each risk item, from lowest IPT level to program level, is assessed and re-assessed for potential impacts at the higher level. The original Milestone II process emphasized program-level tracking only for high-risk items; however, the revised risk management process stresses increased awareness of all risk items across multiple echelons of IPTs, and risk mitigation step management at the lowest appropriate IPT level. According to the Comanche Project Office, moderate risks are monitored in a similar manner as high risks.

The Army directed that the restructured Comanche Program could not have any high-risk items. On October 18, 2002, the Comanche Program reported that there were no high risks, and 19 moderate risks carried at the program level. The Milestone II program had identified nine high-level program risks. The Comanche Project Office lowered all nine high-level program risks to moderate or low-level program risks under the restructured program. The Comanche Project Office believes that RCOA mitigated the original Milestone II integration and technical risks items by expanding the schedule and providing additional resources. The risk assessment process is continuous, and new risks have been identified during the process of developing the restructured program. However, no high risks have been identified. See Appendix H for more information on the risk mitigation plan.

Qualification Testing. Qualification testing simulates defined operational environmental conditions with a predetermined safety factor, the results indicating whether a given design can perform its function within the simulated operational environment of a system. Since RCOA expanded the schedule and provided additional funds, many of the subcontractors added full qualification testing to their schedules. The added qualification testing will help reduce system integration risks.

Organizational Restructure

Throughout the history of the program, the Comanche Project Office and its contractor have been criticized for poor performance. In reports dated from 1997 to 2001, the Inspector General of the Department of Defense, and the General Accounting Office reported that the Comanche Program faced significant risks related to cost overruns, scheduling delays, and degraded performance. In an effort to improve program management, the Comanche Project Office and the Contractor Program Office have reorganized to streamline the program's management structure and established a more effective IPT approach to managing

program issues. Additionally, the Army has made use of outside studies and assessments to evaluate the program. See Appendix I for details of the outside studies and assessments.

Comanche Project Office Reorganization. The current Project Manager recognized that the Comanche Project Office was not properly organized to meet the needs of the EMD Phase of the acquisition process. To mitigate that problem, the Comanche Project Office was reorganized to correspond to the major efforts within the program: air vehicle, engine, sensors, communications, supportability, systems engineering, and business. The organization chart in Appendix J, describes the current structure of the Comanche Project Office.

Contractor Program Office Reorganization. The contractor's old management structure was not effectively organized for the EMD Phase. The previous contractor structure included a Joint Program Office located in Huntsville, Alabama; a Boeing Office located in Philadelphia, Pennsylvania; and a Sikorsky Office located in Stratford, Connecticut. Each office had a program director with a complete staff. Under the reorganized structure, those original contractor offices merged into one Contractor Program Office located in Bridgeport, Connecticut, a liaison office in Washington D.C., and a liaison office in Huntsville, Alabama. The merger resulted in a decrease in the number of personnel from 73 to 38. See the charts in Appendix K for the previous contractor organizational structure and Appendix L for the present structure. Combining those three offices into one office minimized duplication of effort and improved communications, accountability, and authority.

The Program Director for the Contractor Program Office is the former Program Director of the Comanche Joint Program Office. The Deputy Program Director for the Contractor Program Office is the former Program Director for the Sikorsky Office. The joint venture charter was designed to ensure fair representation between Boeing and Sikorsky by having the director represent one company and the deputy director represent the other company. New positions were created to include Human Resources; Program Independent Analysis; Information Systems; Quality; and Supplier Management. According to Contractor Program Office personnel, employees who work for Boeing may now be under the direction of a Sikorsky employee, a Boeing employee may direct a Sikorsky employee, or a subcontractor employee may direct Boeing and Sikorsky employees. Also, the contractors have made significant progress in upgrading the quality and experience level of personnel assigned to the Comanche Program.

According to the Comanche Project Office and the Contractor Program Office, weekly meetings are held to ensure adequate communication between the two offices. Weekly meetings are also held between the Contractor Program Office and the subcontractors. During our interviews, the subcontractors emphasized

that communication has significantly improved with the Contractor Program Office. The subcontractors believe the Contractor Program Office adequately provides requirements to the appropriate level.

Integrated Product Team Concept. IPTs are defined as teams composed of representatives from appropriate functional disciplines working together to build successful programs, identify and resolve issues, and make recommendations for courses of action. There are three types of IPTs that serve as advisory bodies to the project manager:

- overarching IPTs that focus on strategic guidance, program assessment, and issue resolution;
- working level IPTs that identify and resolve program issues, determine program status, and seek opportunities for acquisition reform; and
- program level IPTs that focus on program execution and may include both Government and contractor representatives.

Comanche IPT Structure. The alignment of IPTs in the Comanche Project Office and the Contractor Program Office is a key element of RCOA. The Comanche Project Manager and Contractor Program Director co-chair a management process that emphasizes the "teaming concept," and IPTs include both Government and contractor participants. The Comanche Project Manager believes this enables IPT members to rapidly react to variations in their respective areas of cost and risk, but with sufficient control measures in place to preclude changes to the contract. The Comanche Project Office and the Contractor Program Office formed four levels of management structure to assist in coordinating activities within and across IPTs.

- Level I Program IPTs include Weapon Systems Engineering and Integration, Chief Engineer, Operations Team, Supportability, Quality, Business Management, and Supplier Management. Level I Program IPTs are responsible for identifying and managing program risk, weapon system specifications and interface control documents, the program execution plan, program schedules, and process control configuration and change. The Weapon Systems Engineering and Integration IPT is co-led by Comanche Project Office and Contractor Program Office engineering representatives and focuses on Process Improvement. Its eight groups are tasked with system engineering and requirements management, performance assessment, configuration management, data management, system safety, program integration, planning and resource management, and program security. The Comanche Chief Engineer heads the Aircraft Systems IPT. He is also the Chief Technical Officer. The Operations Team consists of three

IPTs: subassembly, major assembly, and final assembly. The Supportability IPT is co-led by the Contractor Program Office Supportability Director and the Project Management Office Division Chief. Only supportability disciplines that produce a product are standalone IPTs, such as the training system, the technical publications, and the support equipment. Supportability disciplines that are not stand-alone IPTs provide coordination and oversight, and requirements dissemination to the appropriate IPTs.

- Level II System IPTs are responsible for system schedules, system specifications and interface control documents, requirement traceability, standards and standard practice, compliance and waivers, change accountability, and system risk. The chief engineers for the Comanche Project Office and the Contractor Program Office have responsibility for four Level II IPTs, the air vehicle, mission equipment, test and evaluation and technology systems. The Air Vehicle IPT includes Comanche Project Office representatives, Contractor Program Office representatives, and five subcontractors. The Mission Equipment IPT includes representatives from 11 major suppliers. Supplier teleconferences and IPT meetings are held on various days of the week.

- Levels III and IV Product IPTs are responsible for hardware and software, drawings and databases, product cost and schedule, performance and quality, and associated risks. Each IPT meets once a week to discuss progress and associated issues. There are 25 Level III and IV Product IPTs.

IPT Improvements. Under the previous IPT structure, the Comanche Project Office and the Contractor Program Office IPTs were not closely aligned. Subsequent to the realignment of the Comanche Project Office and Contractor Program Office IPTs, the contractor and its subcontractors stated that they perceived an increased level of communication and integration participation at the product IPT level. They also said that communication between subcontractors and the Contractor Program Office improved since the restructure.

The Comanche Project Manager and contractor believe that the IPT oversight coupled with published minutes documenting IPT plans and decisions will provide the Comanche Project Office added assurance that contract tasks remain within scope. Although the contractor has employed IPTs in the past, there have been concerns that the approach lacked clear lines of authority and decision making authority. Those concerns have been addressed in the current restructure. See Appendix M for the IPT structure. The IPT process includes daily, weekly, monthly, and quarterly meetings with Contractor Program management, directors, and the Comanche Project Management Office.

Production Line Organization. In July 2002, the Contractor Program Office had a consultant team perform a study of the proposed Comanche production line in the Bridgeport, Connecticut, facility. According to the Contractor Program Office, the study organized the production line to reduce staging points and floor space, so that the aircraft can be assembled faster, more proficiently, and within the current confines of the facility. The Contractor Program Office originally focused the configuration of the facility on the EMD Phase, and planned to expand the Bridgeport facility for full rate production. The study focused on transitioning from low rate initial production to full rate production, where it began with the last production element of the helicopter and worked back through the production flow. The study eliminated the need for facility expansion by reducing major assembly floor space by 56 percent, final assembly floor space by 43 percent, parts storage by 40 percent, and parts travel throughout the facility by 40 percent. It also eliminated the use of cranes in major assembly, and reduced the number of cranes used in final assembly. According to the Contractor Program Office official, in November 2002, the Boeing production facility in Philadelphia, Pennsylvania, went through a similar study for the Comanche main rotor blade and fantail blade production line.

Conclusion

Historically, the Comanche has experienced funding problems, changing requirements, and technology issues that resulted in four previous restructures. Comanche Project Office personnel stated that they reported a baseline breach on September 2001, which resulted in the fifth restructure of the program. The Under Secretary of Defense for Acquisition, Technology, and Logistics approved RCOA for the latest restructure in October 2002. As a result, the Comanche Program uses a Block approach for development, production and fielding that is designed to meet user mission needs, as required over time. To make the program executable, additional funding was provided for EMD, a new baseline was established, delivery of the first-unit-equipped aircraft was extended 7 months, the first Comanche aircraft with initial operational capability was extended 33 months, and the Comanche Program added all component qualification testing. To achieve success with the restructure, the Army and the prime contractor reorganized the management structure, established more effective IPTs, and made use of outside studies and assessments to evaluate the Comanche Program. The risk management process was improved to increase awareness of all risk items across multiple echelons of IPTs, and incorporate risk mitigation step management at the lowest appropriate IPT level. Not withstanding the recent constructive actions, continued emphasis is needed to ensure that technical and system integration issues will not arise that could result in future breaches of program cost, schedule, and performance measures.

Appendix A. Scope and Methodology

We reviewed documentation dated from June 1988 through October 2002. We used criteria and references cited in the Memorandum of the Secretary of Defense on, "The Defense Acquisition System," October 30, 2002; DoD Instruction No. 5000.58 "Defense Acquisition Workforce," January 14, 1992 (administrative reissuance incorporating through Change 3, January 31, 1996); Interim Defense Acquisition Guidebook, October 30, 2002; and Army Regulation 70-1 "Army Acquisition Policy," December 15, 1997.

We met with Comanche Project Office personnel and contractor personnel to discuss schedule and organizational changes initiated under the latest restructured program. We interviewed subcontractor and Defense Contract Management Agency representatives at Northrop Grumman, General Dynamics, Hamilton Sundstrand, Kaiser Electronics, TRW, Northrop Grumman Navigation Systems Division (formerly Litton Guidance), BAE Systems, Lockheed Martin, and Harris Corporation to identify their involvement with the Comanche Program through the various IPTs. We also met with personnel from the Cost Analysis Improvement Group to discuss their review of the Comanche Program.

The following was based on information provided by personnel within the Comanche Project Office. The Comanche Program was going through a restructure during the audit fieldwork timeframe. The Comanche Program's schedule was changed to meet its recommended restructure. Funding continued in accordance with the original funding profile. The contract amendment, based on the restructured program, was signed November 14, 2002. The Comanche Project Manager stated that monthly performance reporting would not be based on actual cost of work performed until February 2003. Beginning in February 2003, cost performance reports will report the status of performance as required by the Interim Defense Acquisition Guidebook, October 30, 2002, which implements the guidance in American National Standards Institute/Electronic Industries Alliance Earned Value Management System Standard 748-98, May 19, 1998. The Statement of Work and the work breakdown structure had not been completed. Therefore, there was no post restructure performance data available to assess Comanche cost, schedule, and performance for the restructured program.

We performed this audit from July 2002 through March 2003 in accordance with generally accepted government auditing standards. We did not test management controls because data related to program performance after RCOA did not exist at the time fieldwork was conducted.

Use of Computer-Processed Data. We did not use computer-processed data to perform this audit.

Use of Technical Assistance. We did not use technical assistance to perform this audit.

General Accounting Office High-Risk Area. The General Accounting Office has identified several high-risk areas in DoD. This report provides coverage of the DoD Weapon Systems Acquisition high-risk area.

Prior Coverage

During the last five years, the General Accounting Office (GAO) and the Inspector General of the Department of Defense (IG DoD) have issued five reports discussing the RAH-66 Comanche. Unrestricted GAO reports can be accessed over the Internet at http://www.gao.gov/. Unrestricted IG DoD reports can be accessed at http://www.dodig.osd.mil/audit/reports.

GAO

GAO Report No. GAO-01-450, "Comanche Program Objectives Need to Be Revised to More Achievable Levels," June 7, 2001

GAO Report No. GAO/NSIAD-99-146, "Comanche Program Cost, Schedule, and Performance Status," August 24, 1999

IG DoD

IG DoD Report No. 99-021, "Acquisition Management of the Comanche Program," November 8, 1998

IG DoD Report No. 98-185, "Financial Management of the RAH-66 Comanche Helicopter Program," August 6, 1998

IG DoD Report No. 98-125, "Protection of the Comanche Helicopter Against Radio Frequency Weapons," April 28, 1998

Appendix B. Comanche History

The following history of the Comanche Program was based on information and documentation provided by personnel in the Comanche Project Office:

December 1983. The Office of the Under Secretary of Defense approved the family of light helicopter program to enter the Concept of Exploration and Development Phase with an estimated cost of $3.0 billion for development.

August 12, 1984. Acquisition Plan No. 1 for the Light Helicopter Experimental Program was approved. The objective of the program was to provide an affordable family of aerial vehicles with all weather and night operation capabilities to replace the current aging, obsolete light fleet. Production was scheduled to start no later than FY 1990. The project was described as a light rotorcraft development program consisting of one vehicle for armed reconnaissance and attack roles and a common variant for utility missions. Program goals included a primary mission gross weight range of 7,500 - 8,500 pounds for the scout and attack aircraft; average unit-fly-away cost of $5 million in FY 1984 dollars; and a production quantity of 4,500 aircraft.

June 26, 1985. Acquisition Plan No. 2 was approved with an estimated development cost of $4.0 billion. Production was scheduled for FY 1992. Program goals included a primary mission gross weight range of 8,500 pounds for the scout and attack aircraft and a single pilot utility aircraft.

July 28, 1986. Acquisition Plan No. 3 was approved with an estimated development cost of $3.2 billion. The acquisition and plan was updated to address an Army Material Command innovative approach for maintaining competition within funding constraints and maximizing risk reduction prior to full-scale development. Program goals included a single pilot scout and attack aircraft; a single pilot utility aircraft; significant combat capability and survivability improvements; a primary mission gross weight of 8,000 pounds (plus or minus 500 pounds) for the scout and attack aircraft; and a unit flyaway cost, in constant FY 1984 dollars, not to exceed $6 million for the scout and attack aircraft and $4 million for the utility aircraft.

February 18, 1987. Acquisition Plan No. 4 was approved with an estimated development cost of $4.4 billion. The schedule risk of that strategy was assessed to be low to medium. A 66-month competitive development was planned with a contract to be awarded in January 1988. The program structure scheduled the first flight in April 1991, low-rate-initial production contract award in June 1993, and the initial operational capability in November 1995. Program goals included a single pilot scout and attack aircraft and a single pilot utility aircraft; significant

combat capability and survivability improvements; a primary mission gross weight of 9,500 pounds for the scout and attack aircraft; and a weighted average unit flyaway cost goal of $6.3 million in FY 1984 dollars.

January 20, 1988. The Secretary of Defense issued an acquisition decision memorandum stating the light helicopter, as presented in the FY 1988-1989 President's Budget and subsequent Defense Acquisition Board reviews, was no longer a viable program for affordability reasons. The Army was directed to refocus the light helicopter program to develop and acquire a light-weight, low-cost helicopter for the light attack and armed reconnaissance missions to replace the aging AH-1 Cobra and OH-58/OH-6 fleets with a program composed of a single variant light helicopter comprising a total procurement quantity of approximately 2,100 aircraft.

June 1988. The Defense Acquisition Board approved the refocused Light Helicopter Program to enter Milestone I, Program Definition and Risk Reduction Phase. The aircraft was required to have an empty weight of 7,500 pounds and a unit flyaway cost of $7.5 million dollars in FY 1988 dollars, and a procurement quantity of 2,096 aircraft.

June 17, 1988. The Deputy Secretary of Defense approved the Light Helicopter Program to proceed into the Demonstration and Validation effort. Major emphasis would be to develop and integrate the mission equipment package technology rather than airframe development and to structure the program so that appropriate technological advancements could be used to upgrade the present inventory of various helicopters.

August 1990 (first restructure). The Secretary of Defense directed the Army to restructure the Light Helicopter Program. The number of production aircraft was reduced to 1,292 units. Full-scale production was deferred and the Demonstration and Validation Phase was extended an additional two years. The restructure also added prototype testing and scheduled initial operational capability production for the end of 1998.

January 1991. The Under Secretary of Defense for Acquisition directed that the Longbow Radar be integrated on the Light Helicopter. The Boeing and Sikorsky team was awarded a contact to complete the Demonstration and Validation effort. The period of performance was from April 1991 through July 1995, with an option for a 39-month Engineering, Manufacturing, and Development Phase. The contract also called for the manufacture of prototype aircraft.

April 15, 1991. The Department of Army announced that the Light Helicopter had been renamed the RAH-66 Comanche.

January 29, 1992 (second restructure begins). The Secretary of Defense directed the Comanche Program to submit a plan to restructure its development contracts to prove-out all critical components, including avionics, an upgraded T800 engine, and the Longbow system.

January 4, 1993 (second restructure approved). The Under Secretary of Defense issued an Acquisition Decision Memorandum authorizing the restructure. The memorandum authorized Comanche to proceed with the program commensurate with the funding outlined in Alternative Number 2, Program Budget Decision 702, dated December 11, 1992. Alternative Number 2 supported a Demonstration and Validation Phase program that included three prototypes, flight-testing of the growth engine, and additional effort on the turreted gun.

September 30, 1993. The contractor was directed to defer work on the Aided Target Detection and Classification, commonality effort, growth engine integration, and training from FY 1994 to FY 1995, and to delete work efforts on the Longbow.

October 29, 1993. The Military Deputy to the Army Acquisition Executive and the Comanche Project Manager agreed to a new streamlining plan, designated Replan I, which merged the current Demonstration and Validation Phase with aspects of the Engineering, Manufacturing, and Development Phase to accelerate initial operational capability and reduce acquisition cost.

March 1994. Replan II was initiated to provide direction for avoiding program inefficiencies, and de-scope work based on budget shortfalls.

December 9, 1994 (third restructure begins). The Secretary of Defense announced that the Comanche Program would be restructured as a technology program leading to two flyable prototypes and no production aircraft.

February 28, 1995. The Army Acquisition Executive Officer approved the Comanche Project Manager's acquisition strategy for submission to the Defense Acquisition Board. The acquisition strategy provided for two prototypes and six Early Operational Capability aircraft for warfighter evaluation. The strategy also required initial operational capability in 2006.

March 21, 1995 (third restructure approved). The Under Secretary of Defense issued an Acquisition Decision Memorandum approving the Army's restructure plan to continue the Demonstration and Validation Phase. The Memorandum approved the two prototypes, and six Early Operational Capability helicopters configured with the reconnaissance mission equipment package.

November-December 1997 (fourth restructure begins). The Comanche Project Manager initiated planning to restructure the Pre-Production Prototype Plan. The restructure plan would reduce technical risk, accelerate the fire control radar

development, and field a fully capable production configuration aircraft at initial operation capability. The plan would use existing program funding resources and replace the six Early Operational Capability aircraft with six pre-production prototypes and eight initial operational test and evaluation aircraft. That would reduce the inefficiencies of maintaining a significantly different Early Operational Capability configuration.

July 27, 1998 (fourth restructure approved). The Under Secretary of Defense for Acquisition, Technology, and Logistics approved the Pre-Production Prototype Plan. The Plan accelerated Comanche Radar development and the fielding of a fully capable production configuration aircraft at initial operational capability in September 2002.

April 2000 (Milestone Decision). Milestone II approval validated the technology of the individual subsystems and risk reduction efforts, and paved the way to begin integration and testing of the total aircraft system in engineering, manufacturing, and development.

April 2000 (Engineering, Manufacturing, and Development Phase). The Under Secretary of Defense for Acquisition, Technology, and Logistics issued an Acquisition Decision Memorandum that approved the Comanche to enter the EMD Phase, and established a low-rate initial production quantity of up to 84 aircraft. The EMD Phase initiated an acquisition Block approach. To address the design and schedule risks, the program was structured with the following explicit objectives:

- optimize program efforts within available resources;
- recognize cost growth and schedule extensions;
- ensure that all program risks are addressed and do not exceed a moderate level;
- apply DoD 5000 evolutionary acquisition strategy via a blocking process that provides an initial training capability and initial fielding of mission capable systems with provisions to incorporate additional planned requirements;
- incorporate emerging Objective Force requirements; and
- ensure that all aircraft configuration and software functionality is aligned to the blocking process and meets Army requirements as defined by the most recent approved Operational Requirements Documents; and adjust all program hardware and software deliverables to ensure successful completion.

Those objectives would allow continual configuration and functionality upgrades increasing the capabilities from Initial Training Capability through Block I, II, and, finally, Block III. Subsequent Blocks would provide for future capabilities.

Design and development of the armed reconnaissance and attack Mission Equipment Package was to be completed during documentation, tooling, and manufacturing efforts. Flight-testing of prototype number two was to focus primarily on risk reduction efforts including integration and demonstration of the software and Mission Equipment Package. The program was to develop and integrate the Comanche Radar concurrent with airframe development. Component, subsystem, and flight-testing were required to evaluate the design.

September 1, 2001. The Comanche Project Manager informed the Secretary of the Army and Chief of Staff that Milestone II cost and schedule commitments could not be accomplished.

December 2001 (fifth restructure begins). The Army Chief of Staff approved interim direction to discontinue the Milestone II program and re-plan Engineering, Manufacturing, and Development Phase work for 2002 and beyond.

April 18, 2002. The Contracting Officer for Comanche issued a Letter of Instruction to the Boeing Sikorsky Team requesting that a proposal for the restructured program be submitted by September 16, 2002.

October 7, 2002. The Defense Acquisition Board approved the restructure of the Comanche Program.

Oct 17, 2002 (fifth restructure approved). The Under Secretary of Defense for Acquisition, Technology, and Logistics issued a memorandum approving the Block structure as proposed by the Army and authorized EMD through Block III capability, the Acquisition Strategy, the Acquisition Program Baseline, 73 low rate initial production aircraft, and a total procurement quantity of 650 aircraft at a rate of up to 60 per year. The Defense Acquisition Board will reassess the Comanche procurement quantity and annual buy rate at the Future Combat Systems' Milestone B review scheduled for May 2003. The Army is to program the research, development, test, and evaluation, and procurement funds to comply with the CAIG estimate and the Cost Analysis Improvement Group funding profile.

Appendix C. Acquisition Program Baseline

	Milestone II - 07/07/00 at 62 Aircraft Per Year			RESTRUCTURE - 10/07/02 at 60 Aircraft Per Year	
	Objective	Threshold		Objective	Threshold
Then Year $M (info only/No deviation criteria):					
Research, Development, Test and Evaluation	8,253.80			12,224.00	
Procurement	39,358.20			26,995.00	
Military Construction	522.30			58.10	
Total Acquisition Cost	48,134.30			39,277.10	
Operations and Support	38,546.90			29,188.50	
Total Life Cycle Cost	86,681.20			68,465.60	
Base Year $M (FY 00):					
Research, Development, Test and Evaluation	8,474.10	9,321.50		11,973.70	13,171.07
Procurement	29,093.60	32,003.00		20,893.00	22,982.30
Military Construction	368.40	405.20		46.80	51.48
Total Acquisition Cost	37,936.10	41,729.70		32,913.50	36,204.85
Operations and Support	19,307.80	21,238.60		14,632.70	
Total Life Cycle Cost	57,243.90	62,968.30		47,546.20	N/A
Average Procurement Unit Cost $M (FY 00)	24.144	26.559		32.342	35.576
Program Acquisition Unit Cost $M (FY 00)	31.275	34.402		50.636	55.700
Quantities:					
Total Research, Development, Test and Evaluation	8			4	
Total Procurement	1205			646	

Appendix D. Management Tenure

DoD Instruction No. 5000.58 "Defense Acquisition Workforce," January 14, 1992, administrative reissuance incorporating through Change 3, January 31, 1996, states that the project manager and the deputy project manager of major defense acquisition programs shall be assigned to the position, at least until completion of the major milestone that occurs closest in time to the date on which the person has served in the position for 4 years. That requirement may be waived for the following reasons: humanitarian reassignment, discharge, or retirement; relief of dutiesIntegrated Product Team Organization and reassignment in the interest of the DoD; promotion, where promotion in place is not allowable.

Since June 1991, there have been four Project Managers for the RAH-66 Comanche:

- Colonel Robert Birmingham — September 2000 – present*
- Brigadier General Joseph Bergantz, (promoted to Major General as the Program Executive Officer for Aviation) — June 1997 - July 2000
- Brigadier General James Snider, (has since been promoted to Major General) — September 94 - July 1997
- Brigadier General Orlin Mullen, (Retired) — June 1991 - August 1994

According to the Comanche Project Office, since 1986, there have been three Deputy Project Managers for the RAH-66 Comanche:

- Mr. Frank Wallace, — May 2002 – present*
- Mr. Darrell Harrison, — 1994 – May 2002
- Mr. Bob Hubbard — 1986 – 1994

* Those persons were still in their position as of the date of report publication. (Based on auditor's recent conversations with Colonel Birmingham and Mr. Wallace)

Appendix E. Block Requirements

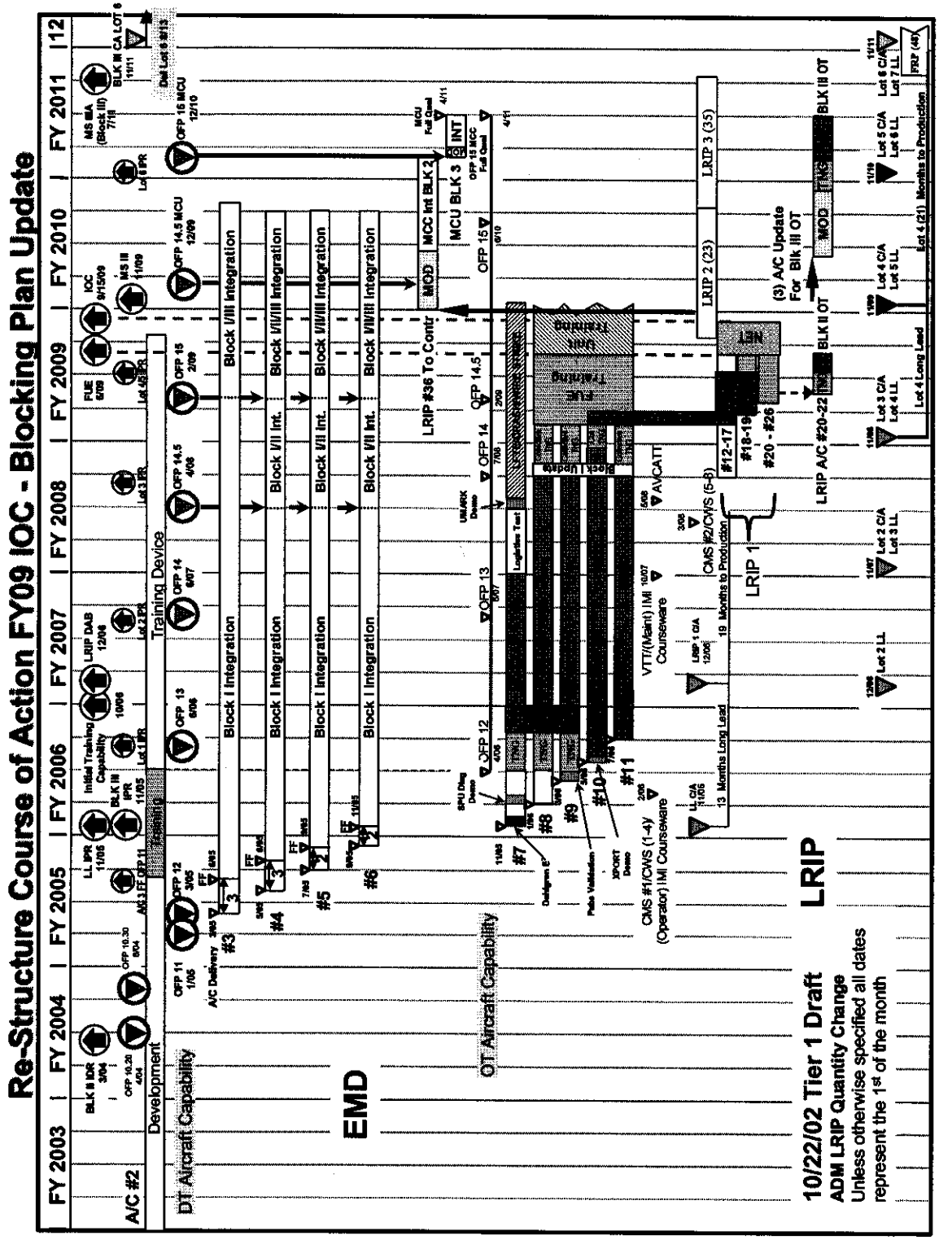
Block I (Production Lots 1-3). Block I aircraft will be First Unit Equipped and Initial Operational Capabilities aircraft capable of conducting armed reconnaissance and attack missions. They also have an Embedded Battle Command on the Move capability. As part of this block strategy, the aircraft will accurately designate for and launch the Hellfire Missile and 2.75 inch rockets. The aircraft are fully interoperable with joint and combined arms team members and enhance the Air-Ground Maneuver Team by improving Beyond Line-of-Sight and joint communications with ultra-high frequency and variable-high frequency (voice/digital/secure), satellite communication, and Enhanced Position Location and Reporting System. Block I aircraft will also possess the unmanned aerial vehicle Level II control and Turreted Gun System.

Block II (Production Lots 4-5). Block II aircraft are required to be equipped with the capability to control unmanned aerial vehicle with the Tactical Common Data Link. The aircraft are also required to be equipped with additional communication capabilities for beyond line-of-sight and joint operations with Link-16.[*] Block I aircraft will be upgraded to Block II configuration.

Block III (Full Rate Production Lots 6 and Beyond). Block III aircraft are required be equipped to bring more stowed kills to the fight in support of the air-ground maneuver team and self deployment operations using auxiliary fuel tanks to conduct operations intra-theatre and outside the continental United States. Block III aircraft are required to be equipped with the Enhanced Fuel and Armament Management System that improves the Comanche's ability to engage targets with direct precision fires to help provide actionable combat information and enable the aircraft to maneuver out-of-contact and survive. Block III aircraft are also required to be equipped with sensor fusion between the onboard sensors to improve the ability to detect, identify, and affiliate by allowing aided recognition of targets. Block II aircraft will be upgraded to Block III configuration as appropriate.

[*] Link-16 is a high capacity, anti-jam, secure, extended line-of-sight, flexible communication, navigation and identification system.

Appendix F. Comanche Program Schedule



Appendix G. FY 2003 Performance Tasks

The major tasks for FY 2003 changed under RCOA. The following are examples of major tasks for FY 2003 broken down by the Mission Equipment Package, Air Vehicle, and Supportability functions of the program:

The major tasks for the Mission Equipment Package in FY 2003 include:

- Electro-Optical Sensor System risk reduction for Aircraft No. 2 delivery;
- Electro-Optical Sensor System Development,
  - hot bench unit assembly and checkout,
  - Aircraft No. 4 unit assembly and test, and
  - begin weight-improvement program unit redesign;
- Clear Voice Integrated Communication, Navigation, Identification Avionics development through integration test;
- Digital Clear Voice Integrated Communication, Navigation, Identification Avionics hardware and software integration;
- continue Comanche Radar risk reduction efforts; and
- processors and displays delivered to hot bench.

The major tasks for the Air Vehicle in FY 2003 include:

- continue component support for Aircraft No. 2, which is under-going testing at West Palm Beach;
- weapon system critical design review with component breakout scheduled for April 28, 2003;
- production start for Aircraft No. 3, No. 4, No. 5, and No. 6;
- weight improvement redesigns for the electrical systems and component parts;
- indemnification of hardware and software integration across the Project Management Office, refine interdependencies to meet Operational Requirements Document requirements; and
- develop the T802 engine by LHTEC for aircraft production.

The major tasks for Supportability in FY 2003 include:

- continue logistic support analysis, diagrams, and reliability, availability, and maintainability documents in support of the design;
- conduct first year of Core Depot Analysis; and
- initiate an Obsolescence Review Board.

Appendix H. Risk Mitigation

The Comanche risk management process was designed to identify areas that require special attention and close scrutiny during the design and development phase so that technical performance, cost, schedule, supportability, and producibility goals of the Comanche Program are achieved. During the normal design, build, and test activities, the IPTs conduct analyses, identify issues, and assess the impact of those issues on the compliance with program requirements and schedule. The risk management program is a continuous evaluation process, with monitored risk items and associated ratings changing over time. RCOA mitigated the original Milestone II Program risk items by expanding the schedule and providing additional resources. It also identified the need for more technical details in the risk mitigation plans. The original Milestone II process emphasized program-level tracking only for high-risk items; however, the revised risk management process stresses increased awareness of all risk items across multiple echelons of IPTs, and risk mitigation step management at the lowest appropriate IPT level. According to the Comanche Project Office, moderate risks are monitored in a similar manner as high risks. Since the risk assessment process is continuous, new items have been identified during the restructuring refinement, but no high risks have been identified. The Milestone II program did list high-risk items; however, the Army directed that the restructured program could not have any high-risk items.

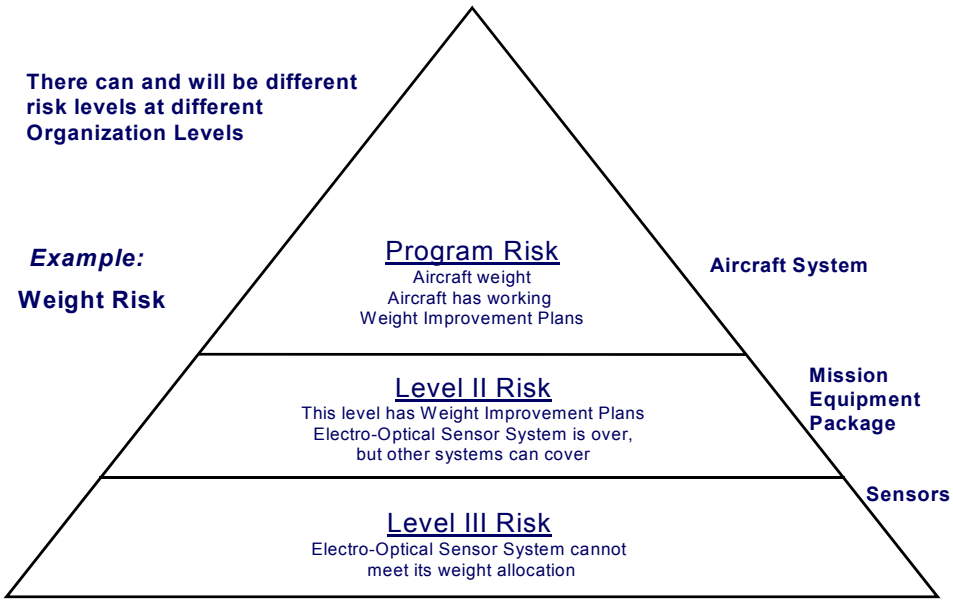
The Comanche risk management software tool was developed by the Government Comanche Project Office to support the overall Comanche risk management program. The objective was to provide a standardized set of risk assessment criteria and to make those assessments available, on-line, to all members of the Comanche team, including subcontractors and vendors, who need them. The tool is used to establish a program risk baseline, document abatement plans, and monitor risk status. Each IPT team accesses the risk management tool and its data through the use of interactive screens. That allows members to document all their risk mitigation and reduction planning in a centralized database.

Different levels of the IPTs at the subcontractors were interviewed to determine how they identified and mitigated risks. Most of the IPTs use a risk criteria identification process similar to the one used by the Comanche Project Office. The risk management process begins when an Analysis and Integration Team, an IPT, a subcontractor, a supplier, or the program management office identifies a risk element. The risk element is then analyzed using a standard assessment of risk factors* to determine if the risk is high, moderate, or low. If the risk is placed

* The risk factors included in the determination of risk level are: design, technology, manufacturing, production, material, personnel resources, test, software, complexity, and dependence.

in the high or moderate level, then the appropriate level IPT will create an abatement plan, with milestones, which is integrated with the Comanche Program schedule. Risks are tracked and reported on a monthly basis at the program level, which allows for quick action; therefore, mitigating the impact of the risk.

The Comanche risk monitoring method includes a tiered review process where each risk item, from lowest IPT level to program level, is assessed and re-assessed for potential impacts at the higher level. For example, a high risk, at a Level III IPT, may have alternative options available at the next or higher echelon (Level II IPT), thereby mitigating the magnitude of the risk at the higher IPT organization levels. For example, the lowest level in Figure 1 represent the Level III Sensors IPT, which handles the day-to-day activities. The middle level is the Level II Mission Equipment Package IPT, which has oversight to all Mission Equipment Package activities, to include the Level III Sensors IPT. The top level is the Program Level I Chief Engineer, which provides oversight to the Level II Mission Equipment Package IPT.



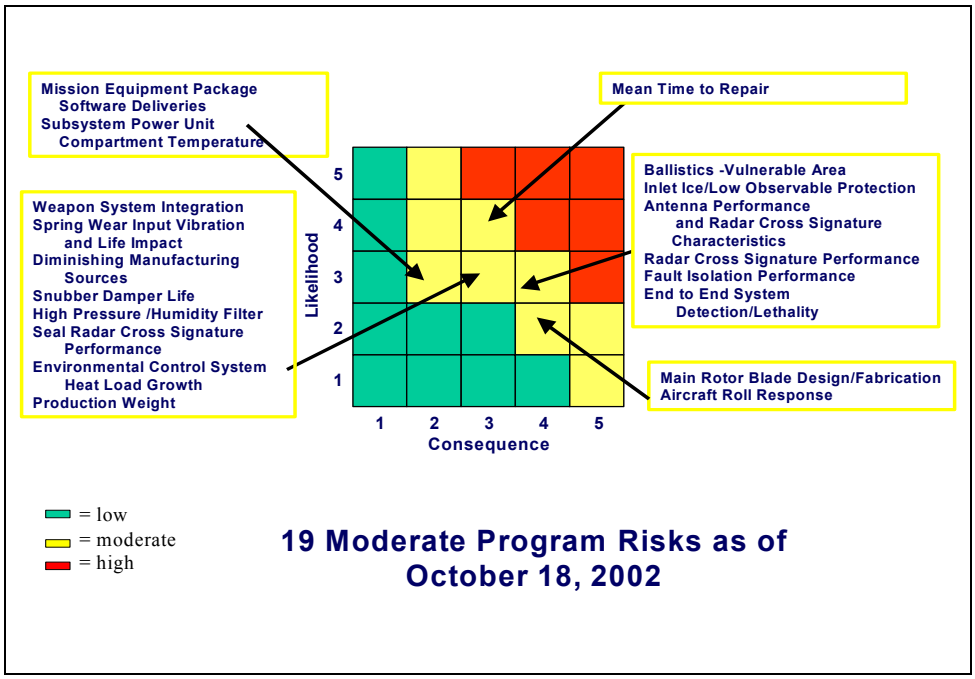
Source: Comanche Project Office

Figure 1. Tiered Risk Assessment and Management

Risk Examples. According to the Comanche Project Manager, the weight of the aircraft will always be a risk. Therefore, the program developed weight improvement plans to see where weight could be reduced. Also, Block II hardware will focus on weight reduction items.

There is also a risk that the Electro-Optical Target Acquisition Designation System and Night Vision Piloting System Image, may smear or "bloom" during weapons fire. The risk abatement plan calls for monitoring at system level for weapons flash and for bloom adverse effects during armament integration.

As of October 18, 2002, the Comanche Project Manager reported that there were no high risks at the program level; however, he reported 19 moderate risks carried at the program level, with abatement plans created for each risk. See Figure 2 for a listing of the 19 moderate risks.



Source: Comanche Project Office

Figure 2. Comanche Program Level Risk Matrix

Appendix I. Third Party Assessments

Three independent Comanche Program assessment reports were completed prior to the Defense Acquisition Board's decision on October 7, 2002. The Comanche Project Manager stated that the following assessment reports were used to develop the program restructure strategy: the Office of the Secretary of Defense Tri-Service Assessment Initiative; the Integrated Mission Equipment and Armament Functionality Rack and Stack Process; and the Graybeard Comanche Assessment.

The Office of the Secretary of Defense Tri-Service Assessment Initiative. The Office of the Secretary of Defense Tri-Service Assessment Initiative was carried out between June and November 2000. The initial assessment focused on the transition of the Comanche Program for Program Definition and Risk Reduction to EMD, software related issues, diagnostics, and force interoperability. The assessment team included the Comanche Program Management Officer; and representatives from the Tank-automotive and Armament Command, Armament, Research, Development and Engineering Center; Aviation and Missile Command (US Army); Naval Air Systems Command, and the first team subcontractors. The assessment team information sources were program team interviews, Comanche documents, program review briefings, Overarching IPT Milestone II presentation material, external reports (General Accounting Office), Comanche software models, lessons learned from similar programs, and other information.

The Assessment determined that the first order priorities were system engineering management and organizational program enablers. Under the system engineering management approach, the Comanche Program would establish and integrate system level processes, resources, management, responsibility, and leadership. There would be a systems engineering focus across the Comanche Program and an established end-to-end system engineering authority. Systems engineering discipline was an issue area under systems engineering management. Two of the team's recommendations appear to have been implemented as part of RCOA. One recommendation was the designation and empowerment of a single program systems engineer, a hardware engineer, a software engineer, systems integrator, a systems architect, a systems test manager, and a systems configuration manager with authority over all developer organizations. The second recommendation was designating Government equivalents to contractor personnel.

The Integrated Mission Equipment and Armament Functionality Rack and Stack Process. In 2001, Richard R. Bruckman Associates was tasked to address the un-executability of the Comanche Mission Equipment and Armament Functionality segment. Bruckman Associates recommended that the Comanche Program:

- maintain initial operational capability,
- conduct a 6-month initial operational test and evaluation prior to initial operational capability,
- perform low rate initial production unit qualification in FY 2007,
- use producible configuration for low rate initial production units,
- start Block I in FY 2005 with Milestone III in FY 2009,
- conduct a 6-month operational test and evaluation prior to Milestone III,
- use qualified low rate initial production units for Block I and operational test and evaluation, and
- defer functionality and sensor and weapons candidates.

The Graybeard Comanche Assessment. In March 2002, a Graybeard Comanche assessment panel consisting of senior civilian, and active and retired military officials concluded that the Comanche program should go forward but not as proposed by the Comanche Program Management Officer. The panel recommended that the EMD contract be changed to:

- incentivize weight reduction without compromising capability, operational availability, service life, and operations and sustainment cost;
- tie executive compensation and penalties to contract performance;
- tie award fee to milestone deliverables; and
- use a combined incentive fee and award contract.

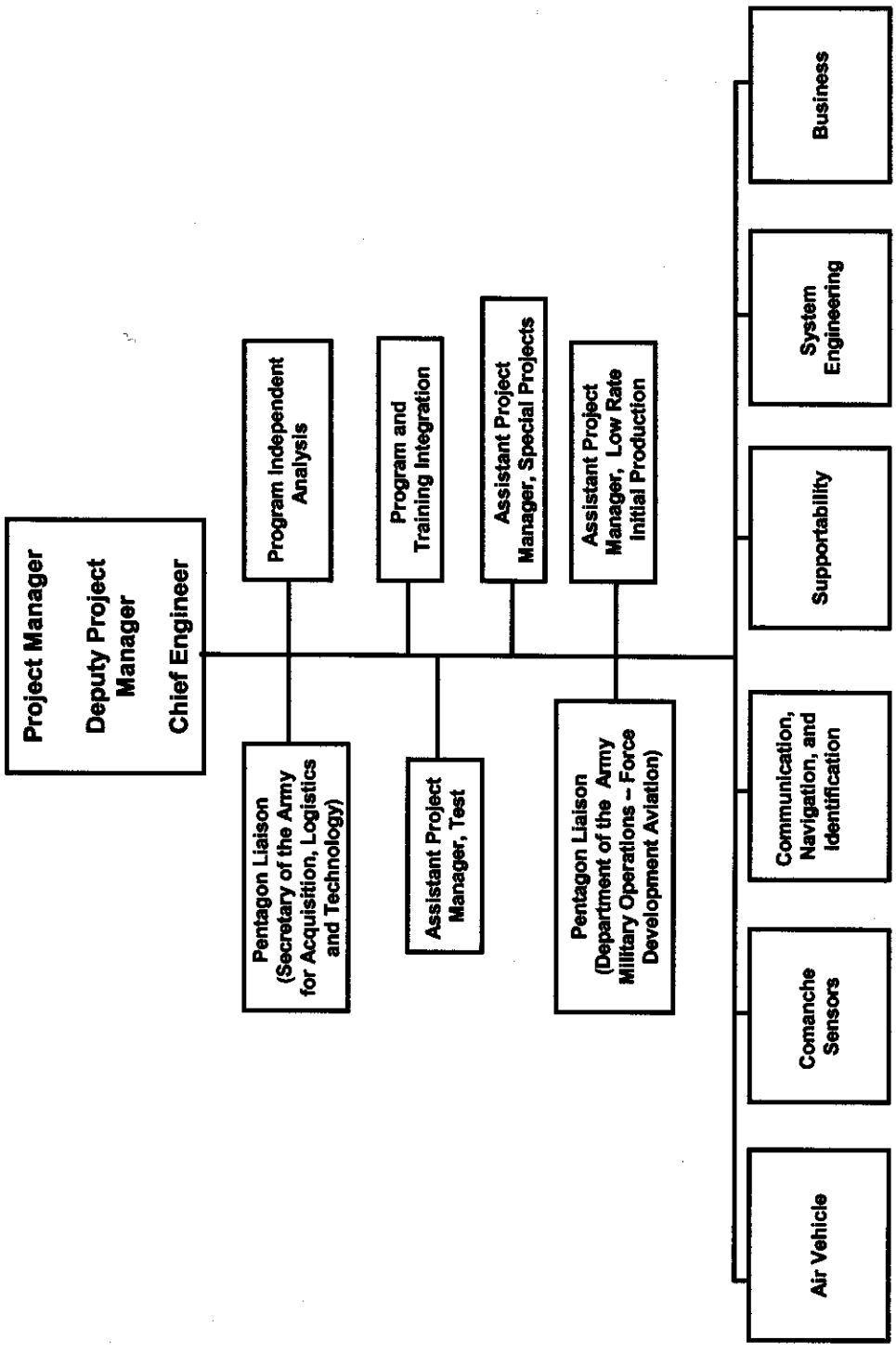
In addition, the panel made recommendations that would:

- require rigorous, independent technical assessment to evaluate technical and operational concerns;
- rebaseline and stabilize program requirements and funding;
- shift to an evolutionary acquisition strategy with spiral development;
- ensure contractor systems engineering is adequately staffed, equipped, and managed;
- complete a validated cost estimate;

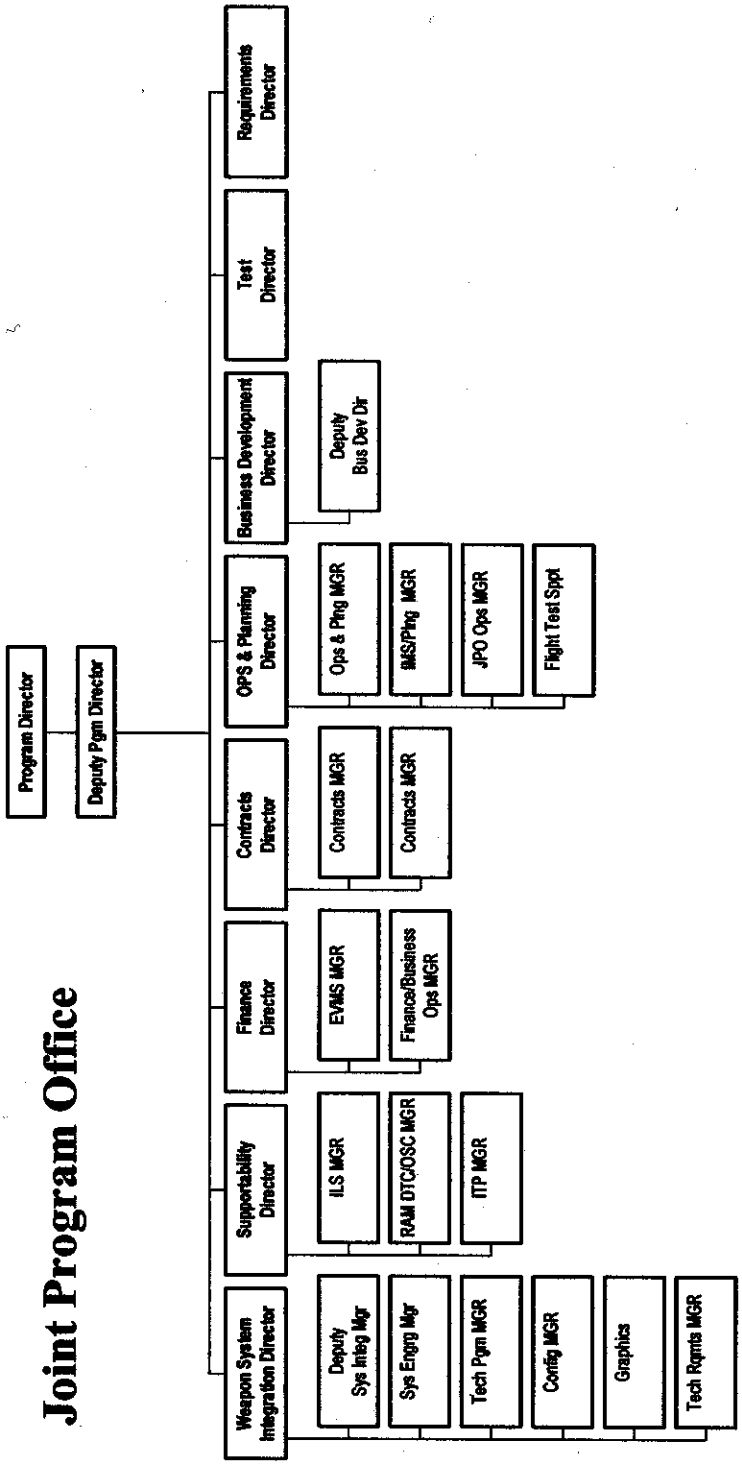
- direct development of network-centric system of systems test, simulation, analysis, and evaluation capability; and

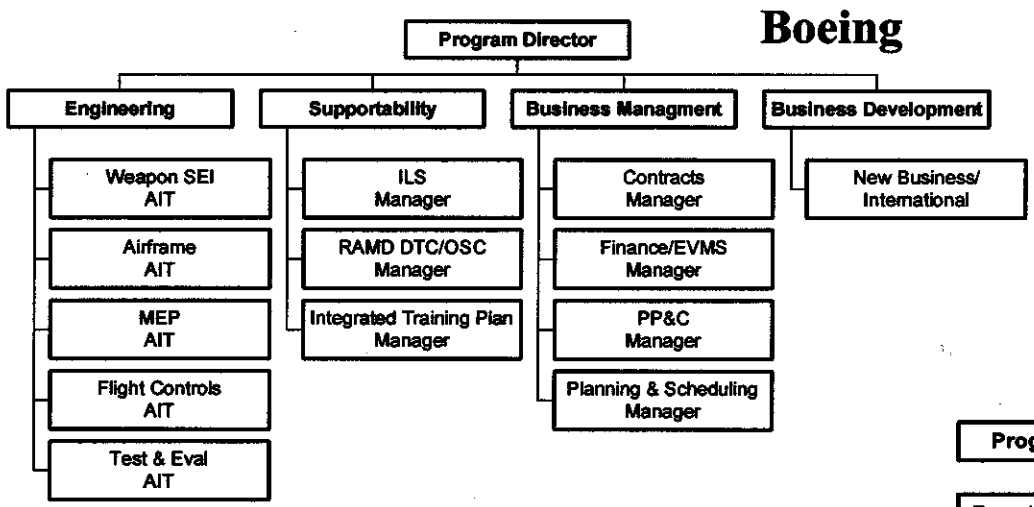
- test the gun and feed system on the aircraft to demonstrate accuracy, structural integrity, and reliability.

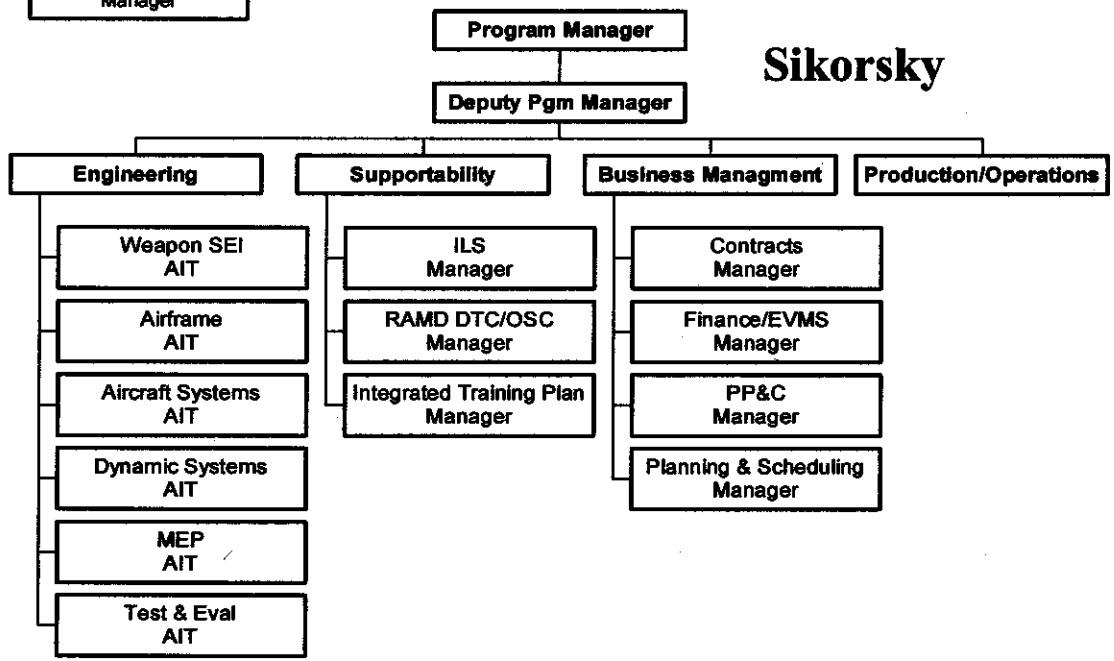
Appendix J. RAH-66 Comanche Organization



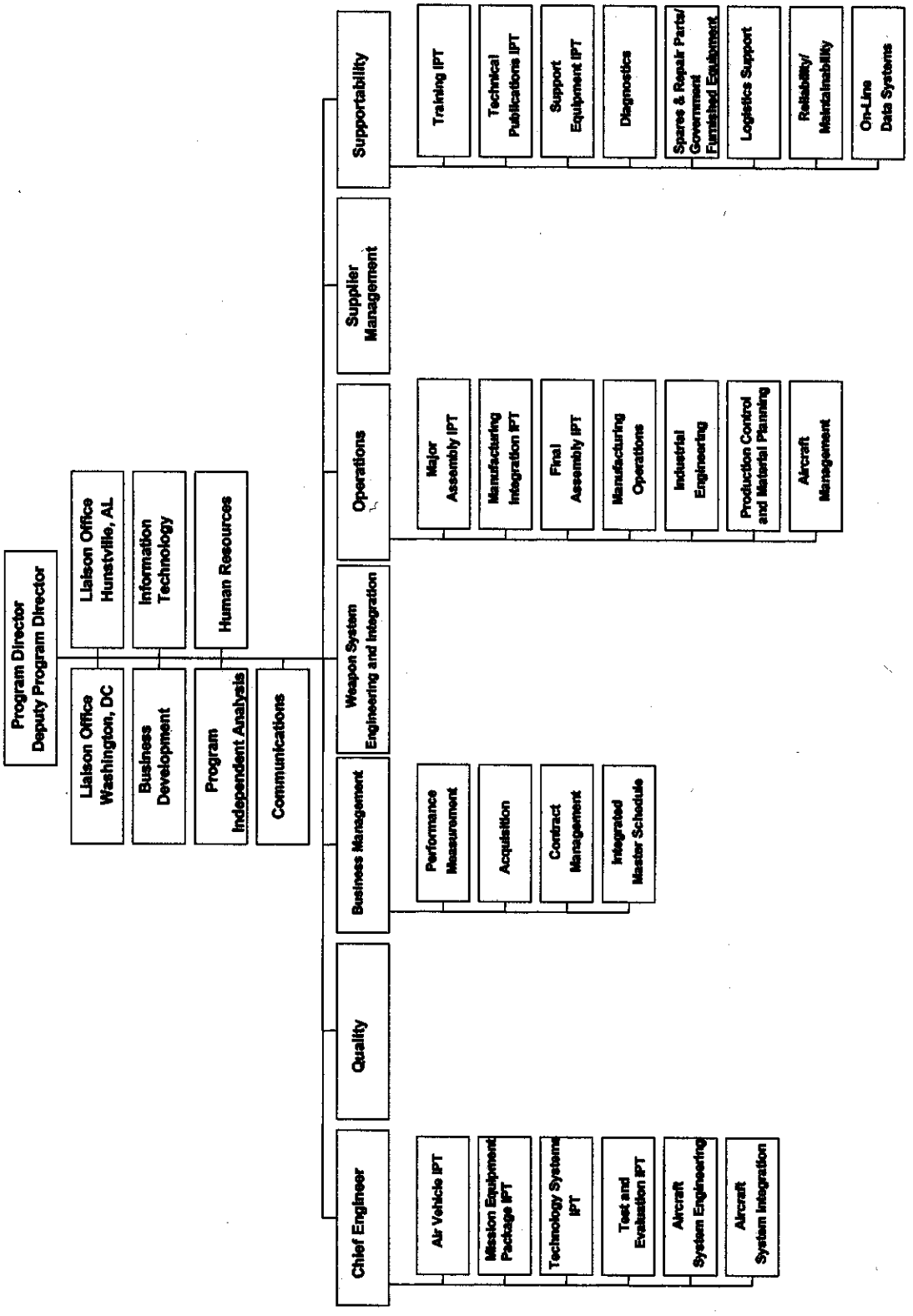
Appendix K. Old Contractor Organization




Boeing
Program Director
Engineering
Supportability
Business Managment
Business Development
Weapon SEI AIT
Airframe AIT
MEP AIT
Flight Controls AIT
Test & Eval AIT
ILS Manager
RAMD DTC/OSC Manager
Integrated Training Plan Manager
Contracts Manager
Finance/EVMS Manager
PP&C Manager
Planning & Scheduling Manager
New Business/ International


Sikorsky
Program Manager
Deputy Pgm Manager
Engineering
Supportability
Business Managment
Production/Operations
Weapon SEI AIT
Airframe AIT
Aircraft Systems AIT
Dynamic Systems AIT
MEP AIT
Test & Eval AIT
ILS Manager
RAMD DTC/OSC Manager
Integrated Training Plan Manager
Contracts Manager
Finance/EVMS Manager
PP&C Manager
Planning & Scheduling Manager

Appendix L. New Contractor Organization



Appendix M. Integrated Product Team Organization

Appendix N. Report Distribution

Office of the Secretary of Defense

Under Secretary of Defense for Acquisition, Technology, and Logistics
of Defense (Comptroller)/Chief Financial Officer
    Deputy Chief Financial Officer
    Deputy Comptroller (Program/Budget)
Director, Program Analysis and Evaluation

Department of the Army

Assistant Secretary of the Army (Financial Management and Comptroller)
Auditor General, Department of the Army
Commander, U.S. Army Aviation and Missile Command
    Program Executive Office for Aviation
    Program Director, Comanche Project Office

Department of the Navy

Naval Inspector General
Auditor General, Department of the Navy

Department of the Air Force

Assistant Secretary of the Air Force (Financial Management and Comptroller)
Auditor General, Department of the Air Force

Non-Defense Federal Organization

Office of Management and Budget

Congressional Committees and Subcommittees, Chairman and Ranking Minority Member

Senate Committee on Appropriations
Senate Subcommittee on Defense, Committee on Appropriations
Senate Committee on Armed Services
Senate Committee on Governmental Affairs
House Committee on Appropriations
House Subcommittee on Defense, Committee on Appropriations
House Committee on Armed Services

Congressional Committees and Subcommittees, Chairman and Ranking Minority Member (cont'd)

House Committee on Government Reform
House Subcommittee on Government Efficiency and Financial Management, Committee on Government Reform
House Subcommittee on National Security, Emerging Threats, and International Relations, Committee on Government Reform
House Subcommittee on Technology, Information Policy, Intergovernmental Relations, and the Census, Committee on Government Reform

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