Strategy Research Project

CREATING A JOINT AVIATION ENGINEERING AND FLIGHT TEST ORGANIZATION

BY

LIEUTENANT COLONEL DOUGLAS H. ROMBOUGH

USAWC CLASS OF 2007

This SRP is submitted in partial fulfillment of the requirements of the Master of Strategic Studies Degree. The views expressed in this student academic research paper are those of the author and do not reflect the official policy or position of

U.S. Army War College, Carlisle Barracks, PA 17013-

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
30 MAR 2007	**Strategy Research Project**	**00-00-2006 to 00-00-2007**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Creating a Joint Aviation Engineering and Flight Test Organiztion	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
Douglas Rombough	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)	8. PERFORMING ORGANIZATION REPORT NUMBER
U.S. Army War College,Carlisle Barracks,Carlisle,PA,17013-5050	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT
See attached.

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**20**	

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USAWC STRATEGY RESEARCH PROJECT

CREATING A JOINT AVIATION ENGINEERING AND FLIGHT TEST ORGANIZATION

by

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ABSTRACT

AUTHOR: Lieutenant Colonel Douglas H. Rombough

TITLE: Creating a Joint Aviation Engineering and Flight Test Organization

FORMAT: Strategy Research Project

DATE: 12 March 2007 WORD COUNT: 5,438 PAGES: 20

KEY TERMS: Compatible, Interoperable, Duplication of Effort

CLASSIFICATION: Unclassified

The Department of Defense does not have a joint aviation engineering and flight test (JAEFT) organization, yet each service has its own aviation engineering organizations and multiple flight test organizations. As a result, the Joint Requirements Oversight Council (JROC) does not have a single point of contact within each Service if faced with a joint aviation issue. This project will argue that a joint aviation engineering and flight test (JAEFT) organization is necessary to prevent duplication of effort within and among the services, to ensure joint compatibility where appropriate, and to standardize engineering practices. Having this organization will result in reduced acquisition timelines, reduced costs, and improved joint warfighting capabilities.

CREATING A JOINT AVIATION ENGINEERING AND FLIGHT TEST ORGANIZATION

Military aircraft are extremely expensive to design, develop, and procure. Once a Service fields a fleet of aircraft, it is even more expensive to sustain the fleet over the lifetime of the aircraft. Sustainment costs are high due in part to upgrades or modifications to improve capabilities or extend service life. The Department of Defense (DoD) is constantly struggling to find the funding necessary to afford the current aircraft inventory, and fund research projects to develop the next generation of aircraft. Additionally, the DoD expects, and directs, the Services to operate and fight as a member of a joint team. As such, the Services' equipment must be compatible and interoperable with each other.

When it comes to aviation, the concepts of compatibility and interoperability address many different functions. Many believe that these concepts suggest that Army and Air Force aircraft must be compatible for landing on Navy ships. These concepts might also suggest that mission planning systems for the Services must be compatible and interoperable in order to plan missions using joint aviation assets. They could even require something as simple as a ground power cart within an Army aircraft maintenance organization having the capability to "plug in" and power a Navy helicopter.

Despite these concepts, no organization within DOD is responsible to ensure aviation systems among the Services are compatible and interoperable with each other. Each Service component has many different organic aviation acquisition, engineering, and flight test organizations. Though there has been significant progress in the joint aviation acquisition arena, more work is necessary. (The term "acquisition" in this project refers to the entire life cycle of a product, from concept through production, operations and support, and retirement.) This study will argue that DoD requires a joint aviation engineering and flight test organization to pursue joint solutions for aviation requirements, while minimizing the costs of aviation acquisition programs. Such a joint organization would provide the required synergy for defining common requirements and common solutions for aviation related requirements among the Services.

Background

Military aviation is unique in that every Service has major aircraft acquisition programs, and those programs are substantially more costly than programs for other major weapon systems. In fact, the fiscal year (FY) 2007 funding estimate for DoD military aircraft research, development, and acquisition (RDA) totals 28.0 billion dollars. RDA is the sum of procurement dollars and research, development, test, and evaluation dollars. The only other major weapon

systems spread across all the Services are missiles and munitions, which has a DoD total of 3.9 billion dollars of RDA funding estimated for FY 2007. For other major weapon system comparisons, the Navy/Marines have 11.3 billion dollars of funding estimated for FY 2007 for RDA of vessels. Additionally, the Army and Marine Corps combined have 7.2 billion dollars of RDA funding estimated for FY 2007 for combat and wheeled vehicles. Thus, military aviation is by far the most expensive major weapon system in the Department of Defense, and all the Services have major aircraft programs requiring life cycle funding.[1] Though synergy and cost savings might well be achieved for other weapon systems, the costs of aviation programs sets aviation apart, and therefore, aviation synergy issues must be addressed as a priority.

In order to examine the feasibility of this proposal and justify creating a joint aviation engineering and flight test (JAEFT) organization, the reader must be equipped with a fundamental understanding of key processes, organizations, and standardization practices that currently comprise the systems in use for developing aviation programs. Specifically, an overview of how the Services are currently organized with their aviation research and development organizations is essential for understanding the need for a joint organization within DoD to manage aviation procurement issues. Secondly, DoD expects the Services to find joint solutions to aviation problems and requirements. An understanding of DoD requirements and expectations for aviation related procurement will enable the reader to comprehend the need for a major change in current DoD business practices. Additionally, this study will outline how the Federal Aviation Administration (FAA) interacts with DoD to procure aviation systems, and will argue the need for a single joint office to manage FAA related issues. Finally, this paper will outline key "standardization" issues that support the need for a single agency capable of directing common practices across the Services.

This background information will establish the requirement for a new organization that must be able to standardize engineering practices, prevent duplication of effort within and among the Services, ensure joint compatibility where appropriate, reduce acquisition timelines, reduce costs, and result in a better fleet of aircraft. The goal of this new organization should be to ensure a joint aviation force that is interdependent and collaborative, so it is capable of unified action.

Service Organization

Currently, aviation acquisition, engineering, and flight test organizations are scattered among several different organizations across, and within each of the Services. Understanding where the organizations are located within each Service and how they are interrelated can be

difficult and very confusing. For example, the Army has a complex and confusing organizational structure for its aviation acquisition, engineering, and flight test programs. The U.S. Army's Aviation and Missile Life Cycle Management Command (AMCOM) is the primary aviation acquisition and engineering organization for the Army, and is located at Redstone Arsenal in Huntsville, Alabama. Within AMCOM is the Program Executive Office (PEO) Aviation. "The Program Executive Officer, Aviation, reports directly to the Army Acquisition Executive."[2] PEO, Aviation, is the manager for most rotary wing, fixed wing, and unmanned aircraft systems within the Army. "PEO Aviation is the responsible management official who provides overall direction and guidance for the development, acquisition, testing, systems integration, product improvement, and fielding of assigned programs."[3] However, the Aviation and Missile Research, Development, and Engineering Center (AMRDEC) is located underneath a second, separate command, the Research, Development, and Engineering Command (RDECOM). Within AMRDEC is the Aviation Engineering Directorate, which is the airworthiness authority for Army developed aircraft, and provides engineering support to PEO Aviation.[4]

Another organization that supports Army Aviation and falls under RDECOM is the Aviation Applied Technology Directorate (AATD). The AATD is located at Fort Eustis, Virginia, and "develops, demonstrates, and applies technologies that enhance and sustain Army Aviation."[5]

Within a third, separate command, the U.S. Army Test and Evaluation Command (ATEC), is the Developmental Test Command (DTC). Within the DTC is the Army Aviation Technical Test Center (ATTC) that "plans, conducts, analyzes, and reports on the developmental and airworthiness qualification of aircraft, aviation systems, and associated equipment throughout the life cycle."[6] The ATTC is currently located at Fort Rucker, Alabama, but is due to move to Redstone Arsenal as a result of the 2005 Base Realignment and Closure (BRAC) recommendations.[7]

The preceding organizations are the primary Army organizations, but not the only ones supporting the Army's fleet of aircraft. The three separate commands listed, AMCOM, RDECOM, and ATEC, are commanded at the two-star level. These organizations are Army-centric, despite their attempts at establishing joint relationships with the other Services in the past several years.

The Navy, Marines, Air Force, and Coast Guard aviation acquisition and engineering organizations are similar to those in the Army. However, unlike the Army, the Navy, Marines, and Coast Guard primarily uses a single major command, Naval Air Systems Command (NAVAIR), to develop their aviation programs. NAVAIR "provides unique engineering, development, testing, evaluation, and management capabilities to deliver airborne weapons

systems that are technologically superior and readily available."[8] Although, NAVAIR is headquartered at Patuxent River, Maryland, there are ten principle test and development activities at locations distant from Patuxent River, Maryland.[9]

The Air Force Materiel Command (AFMC) is the major command organization under which all Air Force aircraft acquisition, engineering, and testing takes place.[10] Underneath AFMC, the primary organizations dedicated to program management and engineering are located at Wright-Patterson Air Force Base in Dayton, Ohio. The primary organizations dedicated to testing are located at Edwards Air Force Base in California, and Eglin Air Force Base in Florida. Other Air Force organizations dedicated to aircraft engineering or testing are located at several different locations throughout the United States.[11]

The complexity of Service organizations supporting aviation programs is further compounded by the fact that one Combatant Command has its own aviation acquisition program. The United States Special Operations Command (USSOCOM), with headquarters at MacDill Air Force Base in Florida, maintains its own distinct organization for special operations aircraft acquisition. USSOCOM has several dedicated aircraft engineering and flight test organizations within its command, but USSOCOM also relies on some of the Service engineering and flight test organizations listed above.

Overall, DoD and Service aviation program organizations are a confusing myriad of different, and occasionally competing organizations responsible for the management, engineering, and flight testing aircraft. All too often, the relationships between the aviation acquisition organizations within the different Services are informal, and only accomplish joint solutions through negotiation.

Joint Capabilities and Warfighting Expectations

Though most of the organizations listed in the previous paragraphs are Service-centric and do not appear to be guided by a joint vision, the DoD requires and expects the services to develop joint solutions to aviation issues and problems. As a result, one of the biggest changes in defense acquisition policy and procedures over the last few years has been the establishment of the Joint Capabilities Integration and Development System (JCIDS). JCIDS was developed under the direction of U.S. Defense Secretary Donald Rumsfeld to address shortfalls in the DoD requirements generation system. "These shortfalls were identified as: not considering new programs in the context of other programs, not sufficiently considering combined service requirements and effectively prioritizing joint service requirements, and not accomplishing sufficient analysis."[12] The procedures established in the JCIDS support both the Chairman of

the Joint Chiefs of Staff (CJSC) and the Joint Requirements Oversight Council (JROC) in identifying, assessing, and prioritizing joint military capability needs as specified in Title 10, United States Code.[13] The following outlines the functions and makeup of the JROC. The JROC:

> Assists the Chairman, Joint Chiefs of Staff (CJCS) in identifying and assessing the priority of joint military requirements (including existing systems and equipment) to meet the National Military Strategy (NMS). The Vice Chairman of the Joint Chiefs of Staff (VCJCS) chairs the Council and decides all matters before the Council. The permanent members include the Vice Chiefs of the U.S. Army (VCSA) and U.S. Air Force (VCSAF), the Vice Chief of Naval Operations (VCNO), and the Assistant Commandant of the Marine Corps (ACMC). The Council directly supports the Defense Acquisition Board (DAB) through the review, validation, and approval of key cost, schedule, and performance parameters at the start of the acquisition process, prior to each milestone review, or as requested by the Under Secretary of Defense (Acquisition, Technology, and Logistics) (USD(AT&L)).[14]

Unfortunately, the JCIDS works best in reviewing new acquisition programs of a large scope that are filling a capability gap or need. Not every upgrade or modification to an existing aircraft will flow through the JCIDS process. For example, an engine, avionics, or sensor upgrade program for an existing aircraft in one Service, is not subject to the JCIDS process, and thus will not be under the purview of the JROC. Therefore, the JROC or another individual Service, may not be aware of all the opportunities for joint solutions to aviation problems or issues. Obviously, a "joint" organization should be able to monitor and track the technology improvements on aircraft and identify opportunities for cross-Service utilization.

Since the Goldwater-Nichols Department of Defense Reorganization Act of 1986, the services have made slow progress in looking into more joint aviation acquisition opportunities. Some success stories are worth noting, and are illustrative of the benefits of a "joint" approach to aviation acquisition programs.

In June 2005, the JROC directed the establishment of the Joint Unmanned Aerial Vehicle Center of Excellence (JUAVCOE) at Creech Air Force Base in Indian Springs, Nevada.[15] This is a jointly manned organization whose mission is primarily facilitating the development and integration of joint doctrine for the use of unmanned aircraft systems.[16] Even though the individual Services have maintained their individual program offices for unmanned aircraft systems, this new organization also "will leverage existing Service initiatives and activities to provide joint, integrated solutions and improved interoperability."[17] There is also a new Joint Transport Rotorcraft currently completing concept design and analysis which will provide the U.S. military with a common rotary wing platform, to save the individual Services significant

research and design costs. The Office of the Secretary of Defense endorsed the program, and also directed it to be a joint program and supported by all the Services.[18] Finally, the Joint Strike Fighter and the V-22 Osprey are two other well-known joint aviation acquisition programs.

While these examples above are examples of successful joint aviation acquisition programs of new aircraft, it is difficult to find examples of joint progress on handling upgrades or modifications to existing aircraft. A new joint organization could act as the "gatekeeper" to manage upgrades and modifications for existing aircraft. All the Services stand to benefit if a joint organization is tracking and shepherding upgrades and modifications to existing aircraft across all the Services, by ensuring that upgrades or modifications to aircraft in one Service, are visible to the other Services. Such integration would help achieve joint interoperability, while reducing costs by sharing research and development costs among the Services, and taking advantage of economies of scale.

The FAA and DoD Aviation Acquisition Programs

The Federal Aviation Administration greatly influences the development of military aviation acquisition programs. Frequently, the individual Services have airworthiness certification issues arising from new acquisition programs that require coordination with the FAA. The FAA provides airworthiness certification for commercial aircraft, just as military organizations provide airworthiness certification for military aircraft. This division of responsibilities is not so clear when the military purchases commercial off-the-shelf (COTS) aircraft or components.

COTS is a unique challenge currently confronting the Department of Defense. Past DoD practices required all Services to purchase fixed wing aircraft for transporting "high priority" personnel. Most of these "VIP" aircraft use the FAA's airworthiness certifications since the airframes perform the same mission for both the military and commercial sectors. However, the Services are now looking to COTS aircraft, modifying them, and using them in a more demanding military environment.

Two current examples of COTS procurement are the Army's Armed Reconnaissance Helicopter (ARH) and Light Utility Helicopter (LUH) programs. "The ARH is a combination of a commercial off-the-shelf (COTS) airframe integrated with a non-developmental item (NDI) mission equipment package (MEP)."[19] The civilian Bell 407 helicopter is the airframe used for the ARH. Likewise, the LUH is using the civilian version of the Eurocopter EC145. Both the Bell 407 and EC145 have FAA airworthiness certifications. Fielding these aircraft is going to require close and frequent coordination between the FAA and the DoD.

The FAA has recognized the challenges posed by DoD's new COTS acquisition initiatives and is working to establish a memorandum of agreement with the DoD to address many certification challenges. This memorandum of agreement "relates to providing certification, technical assistance, and continued airworthiness services by the Federal Aviation Administration (FAA) for Commercial Derivative Aircraft (CDA)."[20]

As a result of this memorandum of agreement (MOA), the FAA created the Military Certification Office (MCO). The MCO will act as a liaison or program manager to the DoD. While it was anticipated that the MCO would streamline FAA and DOD certification efforts, many failed to anticipate the financial burden this memorandum would impose on the FAA. This MOA provided "for reimbursement to the FAA for effort spent on DoD programs."[21] Thus, the Army's recent increase in pursuing CDA acquisitions, coupled with Air Force CDA acquisition programs, has imposed significant budget constraints on the FAA. These budget constraints are due to the FAA's increasing oversight of military projects, requiring greater resource utilization, and a dedicated group of FAA engineers to work unique issues.[22]

In response to the demand for greater oversight of the DoD, the FAA has identified the need for one office or organization that could serve as a single DoD conduit of information flow between the DoD and the FAA to address the airworthiness issues of CDA. A joint organization that routinely deals directly with the FAA's MCO would be a crucial link in simplifying complex DoD organizational structures to address federal aviation regulation requirements, and any other issues that may arise.[23]

Benefits of a Joint Engineering and Test Flight Organization

One of the key benefits of a joint organization lies in the potential for standardizing aviation engineering and flight test procedures. For example, one engineering practice not standardized within the Army, or among the Services, is electromagnetic environment effects testing. More specifically, this is testing for electromagnetic interference (EMI). There is significant disagreement among some of the Army's aviation engineering organizations on the specific EMI tests that must be accomplished for new or improved components installed on aircraft. Currently, a component that has been proven in another Service is required to undergo additional EMI testing in order for it to be installed and flight tested on Army Aviation assets. Additional EMI testing has the second order effect of increasing costs and delaying the fielding of needed assets. By streamlining and standardizing EMI testing, new developmental items would get to the field faster, and in greater numbers, saving both money and time.[24]

Another key aviation engineering practice where standardization could provide many benefits is software certification and testing. Any redundant or unnecessary software development testing requirement placed on a component or a system by a government engineering organization can significantly increase the cost of that component, or delay follow-on integration and testing. An aircraft component may meet software certification requirements established by one organization within the DoD, but not meet requirements for another organization. Aircraft components requiring software could be as simple as a digital clock or as complex as a fly-by-wire flight control system. However, most components are integrated into a system, which makes development and testing all the more complex. In fact, "the flight test community continues to wrestle with the daunting task of evaluating aircraft dependent on millions of lines of software code."[25] Flight test engineers are constantly struggling to find the right balance of laboratory, simulation, and open-air-range testing programs to test systems faster and at less cost.[26] Having a joint organization standardize and become the resident experts on software development processes and testing requirements would be very beneficial to all program managers within all the Services. After all, "the complexity of systems testing is multiplying as aircraft and weapon systems become more integrated."[27]

A third engineering process worth mentioning is the process of aircraft corrosion control and prevention. Aircraft corrosion has been a significant problem in the past, and has been the subject of multiple studies and General Accounting Office (GAO) reports. A July 2003 GAO report included the following:

> No single office exists within each of the military services to manage corrosion control over equipment and infrastructure. Instead, each service has multiple corrosion offices within various operational units and weapon systems programs. These offices often have different policies, procedures, and funding channels that limit coordination and standardization. In many cases, corrosion control officials were not aware of the activities and achievements of their counterparts in other commands and across the services.[28]

Though this GAO report referenced all military equipment within the DoD, it specifically discussed the impact on approximately 15,000 military aircraft and helicopters.[29] Not every aviation-related program office can afford to have a corrosion control and prevention office, nor is it necessary. A JAEFT organization could become the "center of excellence" for aviation corrosion control and prevention. This organization could work with industry to establish materials selection practices that stress upfront corrosion analyses, and provide defense contractors with the requirements to ensure rigor in their design practices.[30]

The three engineering processes described are just three examples of aviation engineering practices that require standardization. Those three processes, as well as many

other engineering processes dealing with aviation issues, fall under the overarching process of airworthiness certification. As discussed earlier, each Service has their own military airworthiness process, and they each have specific organizations responsible for determining and certifying that an aircraft is safe to operate in a manner and environment for which it was designed. A JAEFT organization would help identify those airworthiness issues that are handled differently among the Services and provide the guidance, leverage, and credibility to ensure standardization.

Eliminating duplication of effort is a second potential benefit for establishing a joint organization. To be viable and feasible, a new JAEFT organization must prevent duplication of effort within and among the Services. By eliminating duplication of effort, the DoD would save research and development costs and be able to take advantage of economies of scale for procurement of common equipment. One area to study is the acquisition of aircraft survivability equipment (ASE) among the Services. Each Service has its own program offices pursuing ASE for use on organic aircraft. For example, for years the Army has been the lead for countering the infrared missile threat by developing a Suite of Infrared Countermeasures (SIIRCM). The SIIRCM has two primary systems called Advanced Threat Infrared Countermeasures (ATIRCM) and Common Missile Warning System (CMWS).[31] "The ATIRCM/CMWS design is modular to allow multiple configurations on a wide range of aircraft and other vehicles."[32] At one point in time, the SIIRCM program was being developed for all of DoD, but the Navy and Air Force have since backed out of the program.[33] The Army and USSOCOM have been installing the ATIRCM/CMWS on all Apaches, Black Hawks, and Chinooks deploying to Iraq and Afghanistan.[34]

A second example of a duplication of effort among the services also involves aircraft survivability equipment. To handle the radio frequency missile threat, the Army has also been developing a Suite of Integrated Radio Frequency Countermeasures (SIRFC). The SIRFC has already been integrated on the Special Operations MH-60K and is being integrated on the latest Block III upgrade for the AH-64D Apache Longbow aircraft.[35] Other DoD aircraft, such as the Marines' AH-1Z SuperCobra helicopter, have a different set of ASE, manufactured by different contractors.[36] Bottom line, program offices within the different Services have been pursuing different options to counter a common problem; defeating missile threats. The development of ASE appears to be "below the radar screen" for the JROC, allowing the Services and different program offices to develop their own programs. A joint organization would provide the oversight, guidance, and leverage necessary to prevent duplication of effort. Preventing

duplication of effort is not limited to ASE, but applies to a variety of sensors, weapons systems, and other mission equipment packages.

As discussed earlier in this paper, the Joint Unmanned Aerial Vehicle Center of Excellence was established to address compatibility and interoperability issues among unmanned aircraft systems. However, in contrast, there is no joint organization doing the same for manned aircraft, resulting in disjointed and overlapping development of similar capabilities.

For example, the new Block III Apache Longbow helicopter, which will provide network-centric warfare capabilities to both the Army's current and future combat systems, will not possess the desired compatibility and interoperability to work with other Service aircraft.[37] This new Apache Longbow should be able to digitally send on-board sensor imagery to Marine SuperCobra and V-22 aircraft participating in the joint fight. It should also be able to send that same imagery to Air Force F-16 aircraft. But in reality, the Apache Longbow lacks the systems required to ensure compatibility and interoperability. This shortcoming will eventually be overcome, but not without spending additional resources.

Any solution to the compatibility and interoperability problems confronting aviation forces clearly lies in a joint aviation organization that provides a non-Service-centric recommendation to the JROC for all aviation related requirements. This joint organization would require the authorities to earmark precious research and development dollars for joint aviation requirements, and determine which aviation platforms must make technology improvements to ensure compatibility with other platforms.

A good case study in aircraft compatibility and interoperability is the Rockwell Collins Common Avionics Architecture System (CAAS). The CAAS product line was an effort to reduce development, maintenance, and integration costs for special operations helicopters within USSOCOM.[38] The CAAS was originally designed to become the standard cockpit layout for all special operations MH-60 and MH-47 series aircraft.

> The vision for the CAAS was to create a scalable system that would meet the need of multiple helicopter cockpits to address obsolescence and modernization issues and use a single, open, common avionics architecture system for all platforms to reduce the total cost of ownership (TCO).[39]

USSOCOM saw such great promise in the CAAS that they presented the idea to the Army's UH-60 and CH-47 program management offices. Despite initial resistance, the Army Chief of Staff got involved and directed the UH-60 and CH-47 program offices to integrate the CAAS cockpit into their production lines. The CAAS product line was started in the late 1990s, and currently the U.S. Coast Guard's HH-60, the U.S. Navy's VH-60, and the Army's new ARH are planning to install the CAAS cockpit in their aircraft. Also, the Navy selected a slight

variation of the CAAS cockpit for their CH-53 Sea Stallion helicopters. Already the CAAS is providing savings in software maintenance, integration, documentation, flight test, and training costs, and in numerous other areas.[40] Had there been a JAEFT organization to observe the initial success of the CAAS development, there may be many more platforms across the Services reaping the benefits of the CAAS. Given its proven costs savings and efficiencies, CAAS should be installed on every DoD aircraft at the next opportune time for upgrades or modifications.

Another case study in compatibility and interoperability is Blue Force Tracking (BFT). The DoD installed BFT on as many ground combat vehicles and aircraft as possible deployed to Operation Iraqi Freedom. However, initially there were seven different BFT systems that did not talk with each other to allow BFT to provide true situational awareness. In order to establish an initial work around, all of the different BFT systems were linked via satellite to an office in the United States. That location then integrated the various signals and retransmitted them back via satellite to Iraq to enable the BFT system to function as designed. A joint organization responsible for ensuring the interoperability of all command and control systems would have been able to identify this issue prior to deployment of aircraft and vehicles into a combat environment.

Establishing a Joint Engineering and Flight Test Organization

Given the benefits described, a new JAEFT organization would help reduce acquisition timelines for aviation modifications and new aircraft development. The organization would overwatch all the Science and Technology efforts within each of the Services, and would establish liaison with such organizations as the Defense Advanced Research Projects Agency. If a program office were searching for a new capability, the JAEFT organization would identify other organizations that could help. Ideally, there would be efforts already ongoing within another Service having a common requirement and a common timeline, which would reduce the initial concept exploration required. The JAEFT organization would also be more likely to know if industry had a COTS item or capability that closely matched the need of the requesting program office. The partnership process is a great way to reduce both cost and acquisition timelines if managed appropriately. In fact, in a recent briefing prepared by the Navy staff on the subject of Program Objective Memorandum, Fiscal Year 2008, multiple concerns over the high cost of aircraft were outlined. The brief concluded with a chart on the options for the way forward. The options listed for the way forward included the increased use of COTS and "participation in joint programs for procurement quantity efficiency."[41] Also, a JAEFT

organization would be able to streamline the cumbersome process of receiving the JROC and Defense Acquisition Board approval when necessary.

The idea of a joint organization might be a new concept for the U.S. DoD, but it is not for several of our allies. The British have a military station called Boscombe Down, which is the tri-service home of military aircraft test and evaluation. At Boscombe Down, the Joint Test and Evaluation Group tests all aircraft types that satisfy military objectives.[42] The Canadians have the Aerospace Engineering Test Establishment, which is the exclusive flight test agency for the Canadian Forces (CF). It is "responsible for the evaluation of new systems to be installed on all CF aircraft."[43] Additionally, the French have a single flight test organization that is responsible for all military and civil products. Some aviation professionals within the U.S. who have dealt with these foreign organizations see great benefit in having one overarching organization providing directive authority for aviation engineering and acquisition issues. In fact, one current FAA test pilot, also a retired military test pilot, commented on the single French flight test organization by stating, "Their test community really carries a big stick."[44] Though these countries do not have the total number of military aircraft that the U.S. has, they all see the merit of having one overarching aviation engineering and flight test organization. This approach would be especially beneficial in the U.S., where a joint organization would carry more credibility and leverage than a single Service organization when dealing with the JROC or other high levels of the DoD.

Forming a JAEFT organization within the U.S. Department of Defense would require careful consideration on where the organization was assigned, and the skill set of the organic personnel. Ideally, U.S. Joint Forces Command (JFCOM) is where the organization belongs. Specifically, it should fall under one of the unique headquarters functions within JFCOM, the J-8 Requirements Integration Office. The J-8 office is responsible for integration and interoperability, which is necessary for joint forces to be capable of unified action.[45] However, the JAEFT organization should also have a direct reporting requirement to the JROC. These two relationships would give the organization the leverage, or power, it would need to ensure action on the part of the many research and development, and other acquisition offices within the Services. The organization should be comprised of engineers from all the aviation specialties. Examples are aircraft structural, electrical, systems, and power system engineers. The emphasis would need to be on engineers with strong backgrounds in aviation systems integration from an electrical and software perspective. Additionally, the JAEFT organization should have assigned experimental test pilots. Many test pilots are engineers, and make great project officers. They also have the operational experience in various aircraft and bring a

valuable perspective to solve issues or problems. These engineers and test pilots should possess expertise in both fixed wing and rotary wing aircraft. Given the existence of the JUAVCOE, unmanned aircraft systems would not have to be emphasized in this new JAEFT organization, as long as liaison is established with the JUAVCOE to ensure interoperability and integration.

Conclusion

The Department of Defense must make every effort possible to field and modify aircraft that are guided by a joint vision. It is simply too expensive to continue aircraft acquisition in a Service-centric or stovepipe manner. A JAEFT organization could provide this joint vision, and do it in a manner that is formal and directive, as opposed to informal and by negotiation. The combination of standardizing engineering practices, reducing duplication of effort within and among the Services, and ensuring joint compatibility and interoperability would help field a better fleet of aircraft to the DoD. Additionally, a JAEFT organization would be able to take the lead in concept exploration of new joint aircraft programs. The organization would ensure a joint-centric approach is taken during those critical initial stages of forming a new aviation acquisition program, in order for those programs to be "born joint." Some engineers and test pilots from the organization would be available as matrix support to the new joint program office to ensure continuity of effort through the follow-on phases of the acquisition. By providing this key oversight, acquisition timelines and costs will be reduced, and in the end, the military will get a better product. Engineering practices such as EMI testing, software testing, and corrosion control would be standardized and further reduce costs and acquisition timelines. Finally, a JAEFT organization would serve as a repository for technical information to benefit program managers in all Services. If it were assigned to JFCOM, and required to report directly to the JROC, the JAEFT organization would have the credibility and leverage to ensure the Services follow their lead. Given the potential efficiencies described in this paper, the time is now to establish a joint aircraft engineering and flight test organization.

Endnotes

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