NICHE AIRCRAFT ACQUISITIONS:

COMPLEX THINGS COME IN SMALL PACKAGES

BY

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This study is an examination of the Department of Defense's (DoD) development and employment of aircraft designed to meet specific operational capability gaps. Modern conflict necessitates that the DoD develop capabilities to meet the needs of the warfighter which cannot be met by existing platforms. These requirements typically require the rapid procurement and employment of what appear to be simple platforms. The processes which facilitate these acquisitions, however, often become convoluted and dysfunctional. This thesis addresses the sources of this dysfunction in order to aid those who would seek to develop these niche capability aircraft for future conflicts. Beginning by framing the current acquisitions framework for meeting the capability needs of the warfighter, this thesis provides a framework for tailoring the future procurement of niche aircraft. It then analyzes two case studies of past niche aircraft acquisitions to highlight the obstacles that can emerge during the course of niche aircraft procurement and employment. The final chapter links the lessons from the case studies to the current acquisitions process and supplies recommendations to those charged with developing and acquiring the niche capability needs of the warfighter in future conflicts.

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APPROVAL

The undersigned certify that this thesis meets master's-level standards of research, argumentation, and expression.

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DISCLAIMER

The conclusions and opinions expressed in this document are those of the author. They do not reflect the official position of the US Government, Department of Defense, the United States Air Force, or Air University.

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ABSTRACT

This study is an examination of the Department of Defense's (DoD) development and employment of aircraft designed to meet specific operational capability gaps. Modern conflict necessitates that the DoD develop capabilities to meet the needs of the warfighter which cannot be met by existing platforms. These requirements typically require the rapid procurement and employment of what appear to be simple platforms. The processes which facilitate these acquisitions, however, often become convoluted and dysfunctional. This thesis addresses the sources of this dysfunction in order to aid those who would seek to develop these niche capability aircraft for future conflicts. Beginning by framing the current acquisitions framework for meeting the capability needs of the warfighter, this thesis provides a framework for tailoring the future procurement of niche aircraft. It then analyzes two case studies of past niche aircraft acquisitions to highlight the obstacles that can emerge during the course of niche aircraft procurement and employment. The final chapter links the lessons from the case studies to the current acquisitions process and supplies recommendations to those charged with developing and acquiring the niche capability needs of the warfighter in future conflicts.

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Chapter 1

Introduction

In 2008, Air Force Chief of Staff Gen Norton Schwartz recognized that the United States Air Force was missing a small and specific range of capabilities necessary to meet the needs of modern irregular warfare. Having identified this capability gap, he pushed the Air Force to acquire an aircraft that was small, nimble, and cheap in support of ongoing Counter Insurgency (COIN) operations in Iraq and Afghanistan. The concept for this acquisition was designated as Light Attack and Armed Reconnaissance (LAAR).[1] Gen Schwartz envisioned the acquisition program would quickly obtain 100 light fixed-wing aircraft. These aircraft were envisioned to considerably reduce hourly aircraft operating costs and increase the Service's ability to provide timely kinetic air support.[2] The LAAR program, however, has been beset with problems ever since Department of Defense (DoD) set out to acquire it through its established acquisitions process. Problems have included contract disputes, concerns over domestic production, and Congressional intervention. As a result of these problems, the platform that Gen Schwartz sought to acquire to fill a niche capability role has failed to field a single airframe in six years. The LAAR program exemplifies a problem common to DoD acquisition of niche capabilities: the acquisition system is not conducive to rapid development of aircraft to meet urgent or emergent operational capability needs. This thesis examines the current processes used by the DoD to facilitate these niche acquisitions, and

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[1] Robert Dorr, "The LAAR Lightweight Combat Aircraft Is Coming to the Air Force," 25 Jan 2010, http://www.defensemedianetwork.com/stories/the-laar-lightweight-combat-aircraft-is-coming-to-the-air-force/ (accessed 1 April 2014).

[2] Door, 1.

apply them to two niche aircraft programs from the Vietnam War to suggest improvements for the current process.

Background

Niche aircraft are platforms brought into service to fill small but critical requirements in times of conflict. Such requirements cannot be met as well or effectively with existing assets. The need for these platforms has endured since the dawn of manned flight in nearly every conflict in which the United States has been involved. The fact that these aircraft are designed to meet the needs of the immediate conflict often leads to their postwar recapitalization and retirement, only to have their need recreated at the beginning of the next conflict. This phenomenon, called "the Phoenix cycle," is well known within niche aviation circles.[3]

In the last century, niche aircraft played a role in every modern conflict. During World War II, the British 161 Squadron (Special Duties) performed aerial infiltration missions into Nazi-occupied Europe using modified Westland Lysander Mk III's. Flying by moonlight with a map and compass, pilots would land Lysanders on short improvised landing strips, lit by torches, to pick up downed airmen and aid French Resistance fighters.[4] During the Korean War, communist forces harassed United Nations troops with night raids, known as "Washing

[3] The standard work examining this phenomenon remains Robert Powell, *Quenching the Phoenix : Air Force SOF and the Phoenix Cycle* (Maxwell AFB, AL: School of Advanced Air and Space Studies, 2008).
[4] Anders Berndt, Westland Lysander, http://flyghistoria.se/lysanderE.html. (accessed 23 January 2014), Modified with a "spy ladder" as well as additional oil and fuel tanks, 161 Squadron Lysanders landed 101 and extracted 128 agents throughout the course of the war. The role for which the Lysander was created, army support, disappeared in 1940 with the German conquest of the Western Europe. Special operators soon discovered the Lysander's excellent handling qualities, and ability to conduct very short take offs and landings (VSTOL), made it eminently suitable for "special duties" missions. Although not purpose-built for clandestine infiltration, the Lysander is an example of adapting a small aircraft to fulfill niche mission requirements. The seminal work of 138 Squadron remains Hugh Verity, *We Landed by Moonlight* (Shepperton: Ian Allan Ltd, 1978).

Machine Charlie" flights, flown by cloth PO-2 biplanes that were nearly invisible to radar.[5] During the American war in Vietnam the United States Air Force (USAF) started the Credible Chase program to provide the Vietnamization effort with a simple interdiction platform and also developed the OV-10 to provide battle space management in a forward air control (FAC) role.

In its recent battles in Iraq and Afghanistan the USAF has developed and acquired a range of niche platforms for intelligence surveillance and reconnaissance (ISR), infiltration/exfiltration, transport, and battlefield command and control (C2). For the major commands within the USAF, niche capability gaps led to the development of aircraft such as Air Combat Command's (ACC) MC-12 Liberty Ship and Air Force Special Operations Command's (AFSOC) Non-Standard Aviation (NSAv) program. While these programs met the Service's need for niche capability they also demonstrated that niche aircraft are developed to fit the requirements generated by the current security environment and are not expected to fill an enduring role in the Air Force. Recently, the different major commands have sought to recapitalize, transfer, or retire many of these niche aircraft as the demand has decreased with the withdrawal of American forces first from Iraq and now from Afghanistan.

The enduring nature of the requirement for niche aircraft seems counterintuitive, yet every major conflict since the advent of airpower has identified their need. The development of light fixed-wing (LFW) aircraft to meet the niche requirements of modern conflicts, however, has historically been difficult for multiple reasons. The immediate requirement for these aircraft often shortens the timeline for development compared to general-purpose aircraft such as fighters or bombers. Typically aircraft are developed through either a deliberate or one of two

[5] Conrad Crane, *American Airpower Strategy in Korea 1950-1953*, University Press of Kansas: Kansas, 2000, 84

rapid acquisition processes, which for general-purpose aircraft can take 15-to-20 years. The time constraints that accompany the requirement for niche aircraft, however, often demand rapid fielding and result in the acquisition systems buying and heavily modifying existing commercial off the shelf (COTS) aircraft.

COTS

On the surface the use of COTS to fill niche aircraft requirements appears to be a technological shortcut, in which the standard process of development can be compressed by using an existing platform. As such, the expectations levied against COTS platforms suggest they are a quick solution that can be fielded in short time and at minimal additional cost. The reality of using COTS aircraft to meet niche requirements is quite different. Often the level of modification required to make these aircraft meet mission requirements generates unexpected delays in platform development and fielding. The process of applying COTS technology to niche aircraft development becomes even more difficult when one considers the factors that can inhibit their development.

Statement of the Research Question and its Significance

Niche mission aircraft by their nature do not fit into existing USAF norms, and consequently their development can be hampered by existing service doctrine and bias. Their relatively small cost, and the spontaneity of their requirement, can also lead to difficulties politically and fiscally when one considers the small number of stakeholders backing niche program development. These limiting factors raise the question of how should the USAF meet niche mission requirements in the future.

If the past is a guide, future conflicts will require the USAF to develop niche aircraft to overcome unforeseen gaps in its capabilities. To successfully navigate the intricacies of developing a solution USAF leadership must be able to reference and avoid the factors that have historically inhibited the development of niche aircraft. The utility of COTS incorporation into platform development lies in its potential to ease the burden associated with these factors. The pursuit of successful COTS integration, however, requires awareness of its inherent pitfalls so that they can be mitigated successfully.

Methodology

The process of answering the research question begins by framing the processes that comprise the acquisition options available to the USAF, and continues by examining how COTS technology is integrated into the process. This thesis explores the process of development of two aircraft that were designed during the Vietnam War to fulfil niche mission demands of the Services. The first is the Credible Chase program which was intended to provide a LFW aircraft transferrable to the South Vietnamese for their use as a multi-role mobility and interdiction platform: in essence, a "mini-gunship." The second is the OV-10 program necessitated by the need to replace aging forward air control (FAC) platforms with a more modern, purpose-built one. This thesis uses a comparative case study method, using a common analytic framework, to examine the successes and failures of each program through their respective requirement, fielding, and testing.

This thesis identifies four variables that provide a framework for analyzing both the DoD's current acquisition process and the case studies. These variables are: time of need, complexity, breadth, and endurance. These variables were identified and selected because they

are factors inherent to any defense acquisition, and consequently aid in framing the development of niche capability aircraft within the current acquisitions process. The factors are not all-inclusive but they provide a common framework to aid in the analysis of defense acquisition and the two associated case studies.

To develop a complete picture of the development of Credible Chase and the OV-10, this study draws upon multiple bodies of evidence. Evidence includes primary sources such as official histories, Congressional testimony, progress and training reports, as well as Service and Joint Chiefs of Staff memoranda relating to the programs. Secondary sources will include books and articles that discuss each program. To assess the validity of the lessons learned from previous niche aircraft development, this study will show how the factors above influenced funding, implementation, and mission outcome.

Limitations

The term "niche aircraft" as described in the preceding pages is defined to limit the scope of this study. Niche aircraft are considered here to be LFW aircraft designed to meet current or impending shortfalls in capability based on relatively low-cost solutions. While the case studies of this thesis are specific to LFW platform development its conclusions and recommendations are applicable to any niche aircraft development program. The use of two case studies from the Vietnam War enables the study of COTS and non-COTS aircraft development from similar security environments. In addition, much of the documentation from the Vietnam War has been declassified and is available to the public. The limits of this study accordingly lie in the fact that it does not provide an all-encompassing solution to platform development in future warfare. This utility of this study instead is to provide the reader with a

clear understanding of the factors that generally influence niche program development so that obstacles to these programs can be overcome. The conclusions of this study, while not context specific, will aid future program development by tempering expectations and allowing for the preemption of limiting factors that adversely affected niche program development in the past.

Overview

A common problem with contemporary conflict is that the role of niche aircraft in modern warfare has not been adequately studied or analyzed. This thesis examines the application of the current DoD acquisition system to niche program development through a comparative case study approach. Providing baseline knowledge of the USAF's acquisition process is important in framing the discussion for each case study. Chapter 2 accomplishes this by discussing the USAF aircraft acquisition program's normal and rapid development processes. It will also include current USAF guidance on COTS technology and the associated benefits and limiting factors of its inclusion into the acquisition process.

Chapters 3 is the first of two case study chapters. This chapter provides an in-depth analysis of the development of the Credible Chase program. This chronological analysis focuses on the use of COTS as a means for expediting the process of niche aircraft development, as well as the ramifications that this had on the ability of the program to meet its requirements. Chapter 4 examines the creation and employment of the OV-10 in the Vietnam War. This chapter highlights the factors that affected the development of the OV-10 and discusses the ramifications that resulted from its development as a non-COTS airframe.

This study concludes by analyzing how the lessons learned from the Credible Chase and OV-10 programs are applicable to the USAF as it prepares for or confronts the challenges of future conflicts. Reflecting on these lessons, both positive and negative, it provides a starting point for developing future niche mission aircraft. These lessons will assist officers in tempering their expectations and developing strategies to acquire niche aircraft successfully. The time will soon come when the need for immediate solutions to new and unanticipated missions will require Air Force leaders to create niche mission aircraft again. Understanding the implications of using COTS technology, as well as the factors that inhibits its successful integration, is critical to meeting the future needs of the Air Force and developing the capabilities that emerging and future missions will require.

Chapter 2

Acquisition of Niche Aircraft

"The troops are at war, but the Pentagon is not."

-Robert Gates

Military innovation occurs in peace, war, and in response to new developments in technology. As a bureaucratic organization, the Department of Defense (DoD) has established methodologies for identifying capability gaps within the services and resolving them accordingly. This chapter will examine the DoD's current process for resolving capability gaps. This process, known as the Joint Capabilities Integration and Development System (JCIDS), will be evaluated in this section with respect to niche aircraft acquisition.

Understanding the intricacies of the current process is essential to this analysis as it generates a starting point for formulating process improvements. While the case studies which accompany this analysis are from a different era and reflect a different acquisitions process, the lessons they provide are relevant to those currently seeking to fill niche capability gaps. All acquisition processes share common elements on which their effectiveness depends, and possess lessons which are universally applicable. This commonality also allows for the use of universal variables which can be effectively used to compare DoD acquisition methods.

In this analysis, the JCIDS process and the two niche acquisition case studies that follow will be evaluated in terms of four of these universal variables: Time of need, Complexity, Breath, and Endurance. Time of need derives from the perceived urgency of the warfighter and drives the speed at which a solution must be implemented. Complexity

frames the intricacy of the niche solution and the training that accompanies its employment. Breadth relates to the scope of the employment of the capability, and the extent to which it is used for the original gap it was designed to fill. The final variable is endurance, which belies the utility of the platform, the nature of the capability gap, and the continued necessity to solve the latter with the former. This analysis begins by examining the impact of these variables on the JCIDS process and its subsequent effects on the development of niche capabilities.

While it is incumbent on the DOD as an organization to develop and deliver capabilities, the traditional JCIDS process had been criticized for its complexity and failure to be timely and inclusive.[6] Recent changes to the process have been implemented to improve the service's ability to deliver innovative solutions to fill capability gaps required by the warfighter. This chapter examines the revised JCIDS process to determine how it provides for innovation during peace, war, and periods of technological improvement.

The importance of the conceived urgency of the warfighter is a critical variable that underpins this new methodology. The processes contained within JCIDS are designed to fill the requirement based on the perceived timing of the event that demands it.[7] The expedited staff processes developed to allay the previous problems of JCIDS are beneficial to minimizing previous problems with the old system. It is the conception of the event that limits the requirements entry into the process and the solution that will fill the DoD's capability gaps.

[6] Patrick Wills, *JCIDS Changes*, Defense Systems Management College: Defense Acquisition University, 19 October 2012, 1, retrieved from: www.dau.mil/MA/docs/JCIDS_Changes.pptx 21 Jan 2014. (acccessed 10 March 2014) Wills provides and overview of the criticisms common to the JCIDS proccess that recent changes were designed to alleviate. These criticisms are: "Solution development and delivery are not timely, decisions are made late to need or with poorly scoped information, process is complex, cumbersome and too document centric, lacks mechanisms to focus reviews across portfolios, does not control requirements creep, fails to include key customers (combat commands) in the proccess, does not have tracking mechanisms to trace developments from gap identification through feilding."

[7] Event: The expected time when the requirement will be of critical importance to the warfighter, i.e.: impending conflict, immediate warfighter need required to save lives or accomplish the mission.

The conception of time in relation to the event is particularly applicable to development of niche aircraft for several reasons. First, niche capabilities often represent time sensitive solutions to capability shortfalls and consequently demand rapid fielding (time of need). Like all aircraft, niche platforms require time to develop and modify before they can be fielded. They are, however, often smaller and less complex than their major program counterparts and are consequently more apt to utilize Commercial of the Shelf (COTS) technology (complexity). Historical examples of niche aircraft development also vary in their perceived longevity (endurance) and the actual scope of implementation (breadth). These variables, as they pertain to niche aircraft, are important methods of delineating how the development of these platforms fits into the DOD acquisition framework. They will be used in this study to analyze and differentiate between the different processes that work within JCIDS. Niche aircraft by their definition are innovative solutions designed to fill existing gaps in the service's capabilities and therefore are the perfect case study to determine the utility of the recent changes in the DOD's JCIDS process.

Joint Capabilities Integration and Development System (JCIDS)

The JCIDS acquisition support system identifies gaps in existing military capabilities and solves them through the implementation of material and non-material solutions. This system works in conjunction with the Planning, Programming, Budgeting, and Execution process (PPBE) and the Defense Acquisition Management System (DAMS) to meet the needs of the DOD.[8] The JCIDS process is iterative and also can be tailored to expedite the fielding of solutions to meet validated capability

[8] https://learn.dau.mil/, ACQ101, Lesson 1.6: JCIDS, 5

requirements.[9] Recent restructuring of the JCIDS process has led to the delineation of requirement staffing into three "lanes": deliberate, emergent, and urgent (Fig 1).

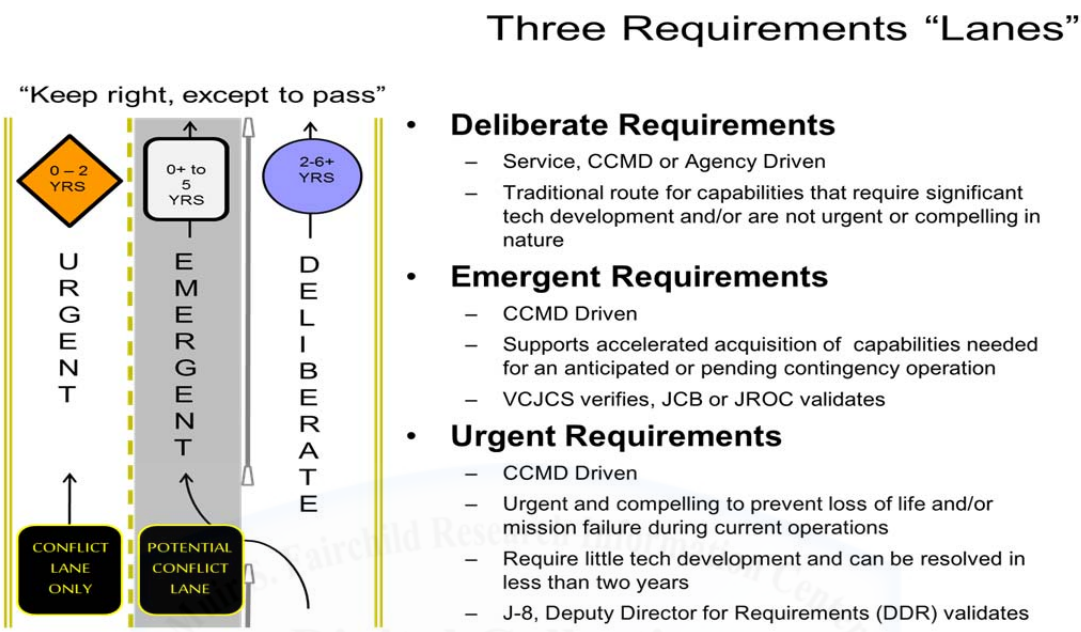

Figure 1. The Three Requirement "Lanes" of JCIDS[10]

These lanes are designed to categorize requirements based on the perceived urgency of their need. This analysis of the JCIDS process will review the application of these three lanes with respect to their ability to develop niche aircraft solutions. Each category will be analyzed through a comparison of several variables: time of need, complexity, breadth, and the expected endurance (lifespan) of the capability. Using this methodology this section will examine the utility of the processes within JCIDS for developing niche capabilities based upon different levels of urgency.

[9] CJCSI 3170.01H, Joint Capabilities Integration and Development System, 10 January 2012, Enclosure A-1

[10] Patrick Wills, JCIDS Changes, Defense Systems Management College, Defense Acquisition University, 19 October 2012, 9 retrieved from: www.dau.mil/MA/docs/JCIDS_Changes.pptx 21 Jan 2014.

Deliberate Requirements

The traditional method of requirement identification and solution generation follows the deliberate requirements process. The differences between this process and the one required for emergent and urgent needs is exemplified through a comparison of their staffing processes and the perceived temporal need of the warfighter. Deliberate requirements are generated in part by Capabilities Based Assessments (CBA) conducted by the Services, Combatant Commands, and other DOD components.[11] The basis for these assessments is framed by the strategy and guidance found in the following documents: National Security Strategy, National Defense Strategy, National Military Strategy, Quadrennial Defense Review, Guidance for Employment of the Force, and Defense Planning Guidance.[12]

The USAF in particular uses the CBA as an "analytic basis for identifying requirements and associated gaps in context of warfighting risk."[13] To achieve this, the DoD uses the CBA to conduct several activities to determine warfighter needs, fill capability gaps, and minimize operational risk. First the CBA determines the capability the warfighter needs to successfully complete its assigned mission. Then by comparing the needs of the warfighter to the capabilities they currently possess, the CBA process identifies gaps or redundancies that need to be corrected. From this gap analysis the CBA examines the existing Doctrine, Organization, Training, Material, Leadership, Personnel, Facilities, and Policy (DOTmLPF-P) to determine if the gaps can be met through existing resources such as COTS.[14] The results of this analysis are documented in an Initial Capabilities Document (ICD) or DOTmLPF-P Change Recommendation (DCR). The deliberate process then "proceeds to a

[11] CJCSI 3170.01H, Joint Capabilities Integration and Development System, 10 January 2012, A-1
[12] CJCSI 3170.01H, A-2
[13] AFI 10-601, Operational Capability Requirements Development, 6 November 2013, 34
[14] AFI 10-601,

Material Development Decision, and an Analysis of Alternatives to support a material solution decision. This is followed by prototyping, design, development and eventual production."[15]

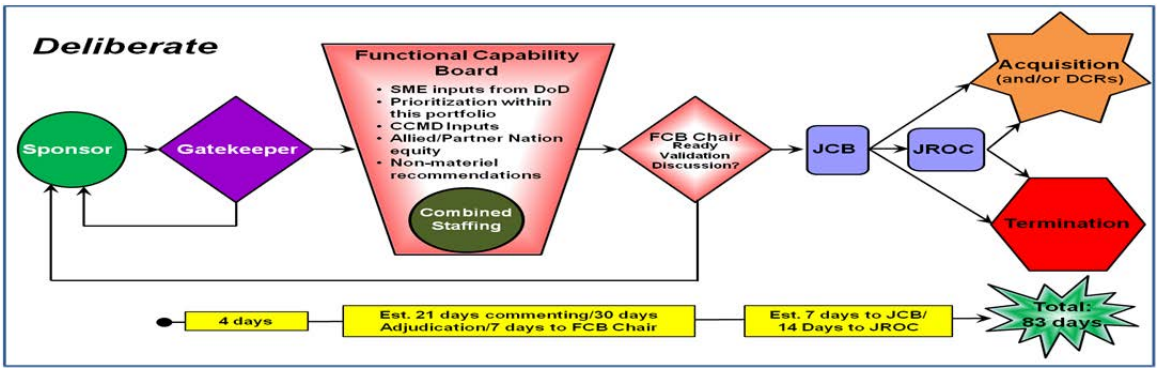

Figure 2. The Deliberate Requirement Process (Staffing)[16] – 83 Day

While the CBA is only the first formal study in the deliberate requirements process, understanding its origins and purpose is relevant to this study in that it highlights the particularities of the deliberate requirement lane (Fig. 2). The origins of the CBA in terms of identifying capability gaps based on high level strategic guidance indicates that it has a long time horizon for development. The JCIDS manual directs that capability requirements with expected timeframes that exceed two years for urgent requirements and five years for emergent requirements should instead follow the deliberate planning process. [17] The long-term focus of the deliberate process enables the proper staffing and funding of the requirement's solution throughout its entire lifecycle. This long-term approach is therefore well suited to complex solutions that require large amounts of time and do not have an immediate need.

[15] Wills, 9
[16] Wills, 11
[17] JCIDS Manual, 19 January 2012, B-51

Just as the deliberate process is well-suited to complex requirements, it also enables the development of requirements with large economies of scale. Major USAF acquisitions such as the F-22 can and should be met with the deliberate process as its design and production will take years, if not decades, to meet. Major programs also demand that the entirety of their lifecycle requirements are taken into account and are budgeted accordingly. For programs with an expected endurance beyond five years this process is ideally suited to meet its needs. The time to field the requirement, however, must also not pose an unacceptable risk to the warfighter. When the expectation of the event that demands the requirement falls within five years, the DOD must look to the emerging requirements process for a solution.

Emergent Requirements

The process for developing emergent requirements was developed to provide a middle ground whereby a requirement can be expedited to the warfighter but given the time needed to put it through its paces prior to employment. Joint Emergent Operational Needs (JEON) are requirements "identified by a combatant command that are inherently joint and impact an anticipated or pending contingency operation."[18] The utility of the JEON is that it fills the gap between deliberate and urgent planning. It allows Combat Commanders (CCDR) the ability to identify and fill capability gaps that could result in unacceptable loss of life or mission failure before an operation begins.[19] JEONs are staffed for verification by the Vice Chairman of the Joint Chiefs of Staff (VCJCS) and receive subsequent validation by the Joint Requirements Oversight Council (JROC) or Joint Capabilities Board (JCB) within 31 days (Figure

[18] CJCSI 3170.01H
[19] Wills, 9

3).[20] Once validated, the JEON allows the initiation or rapid acquisition and fielding of the requirement within five years from the date of submission.

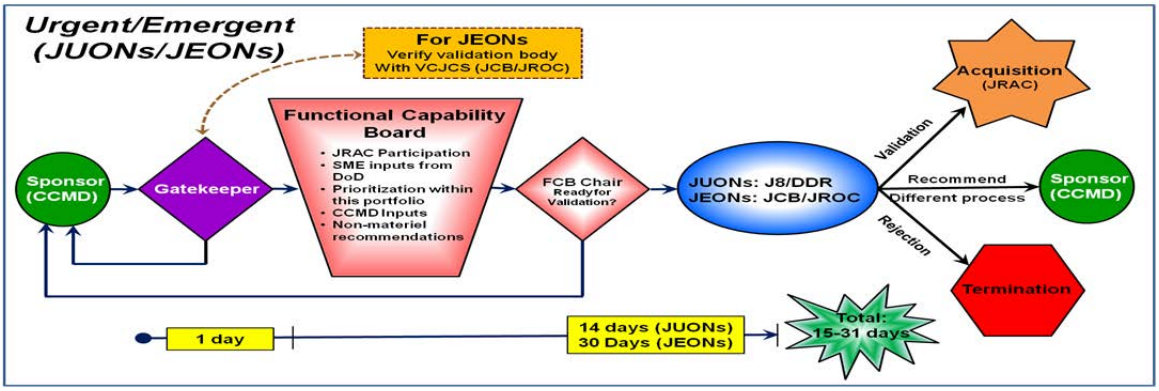

Figure 3. The Urgent/Emergent Staffing Process[21]

This five-year window allows for flexibility in generating the requirement to meet an impending capability gap. Time of anticipated need is therefore moderated to allow for uncertainty in the developing conflict, provided it is expected within five years. This longer timeline also allows for the development of requirements with greater complexity and scale. Complex requirements demand additional time for development of critical components such as engineering and software, and larger quantities of scale require more time for production. The constraints inherent to the JEON process allow for the rapid development of requirements that can be reasonably completed within the allotted time.

JEONs do not also contain the same planning steps and documentation that provide deliberate requirements with complete lifecycle management. To facilitate the transition from initial fielding to

[20] JCIDS Manual, E-2
[21] Wills, 11

sustainment, or to enable the fielding of further capabilities, additional planning documents may need to be developed. For example, if a niche aircraft is developed through the JEON process and its capabilities can be utilized following the conflict, or beyond five years from the date of submission, steps can be taken to facilitate its transition to an enduring capability. The emergent capability can receive budgetary and procedural support necessary to provide for enduring use through the completion of a Capability Development Document (CDD) and Capability Production Document (CPD).[22] Taken as a whole, the utility of the JEON lies in its ability to give the CCDR the capacity to fill time sensitive capability gaps for anticipated operations. The JEON enables peacetime innovation and allows for the transition from an emergent to a sustained capability. The JEON, therefore, is a useful tool for the DoD and will increase its ability to fill capability gaps prior to engaging in combat operations.

Urgent Requirements

The urgent acquisition lane enables the DoD to fill immediate capability gaps and provide for innovation during a state of conflict. The processes that allow for this are encompassed by Joint Urgent Operational Needs (JUON) and Urgent Operational Needs (UON). These processes are defined by Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3170.01H as capability requirements identified by a CCMD (JUON) or a DoD component (UON) "impacting an ongoing or anticipated contingency operation. If left unfulfilled, UONs result in capability gaps potentially resulting in loss of life or critical mission failure."[23] UONs differ from JEONs in several respects: time, staffing, and intent. UON's

[22] JCIDS Manual, B-51
[23] CJCSI 3170.01H, GL-6,7

address capability shortfalls for an ongoing conflict that require remediation within two years, and accordingly the UON staffing process is expedited to take no longer than 15 days (Figure 3). The goal of the UON is to field a needed capability within 180 days of a validated request.[24]

One of the most important aspects of the JUON process is that is allows the warfighter to "own" the requirement and directly affect how their needs are met. Validation is accomplished through the Joint Staff Deputy Director for Requirements for JUONs and designated sponsors for DoD component UONs.[25] Delegation of authority allows for verification of the capability requirement by the Services, CCMDs, and other components through their own variations of the JCIDS process.[26] This also enables the components and CCMDs to serve as their own gatekeepers and enables the components to drive a requirement with which they are already familiar. The intent of UON is to deliver a capability to the warfighter in a time of conflict. It is not intended to "be used for acquisition development activities, requesting non-material solutions or force developments."[27] To ensure that the intent of the urgent process is met, the USAF has developed criteria for submitting a UON. These criteria ensure that the USAFs UONs fall in line with the

[24] AFI 10-601, 62
[25] CJCSI 3170.01H, A-3
[26] CJCSI 3170.01H, A-3, 2. Delegated verification authority for the components are listed as:
(1) Services have validation authority for capability requirements unique to their organizations.
(2) USSOCOM has validation authority for capability requirements unique to its organization.
(3) The Defense Business Systems Management Committee has validation authority for defense business systems (DBS).
(4) Documents for capability requirements that are funded primarily or wholly with National Intelligence Program (NIP) funding, and are related to Major System Acquisitions (MSA), or are programs designated by the Secretary of Defense or the Director of National Intelligence (DNI) to be of special interest, will be developed, reviewed, and validated in accordance with the Intelligence Community Capability Requirements process.
(5) With the exception of NIP-funded IC capability requirements, the JROC reserves the right to exert validation authority over any capability requirement by changing the JSD to JROC Interest or JCB Interest.
[27] AFI 10-601, 62

intent laid out in the CJCSI and that the needs of the warfighter are met.[28]

The intent of the UON process is important in determining its effectiveness in acquiring niche capabilities. The timeline associated with urgent needs allows for minimal design considerations. While COTS technology could possibly be fielded in 180 days, aircraft modification and personnel training could significantly delay the timeline depending on aircraft and mission complexity. Similarly, the scale of development must be small to be met by a UON. The short timeframe simply does not allow for large quantities of a given capability to be produced. Endurance, however, can be facilitated much to the same extent as a JEON. Should a capability be determined to be a successful and an enduring requirement, the system is set up to facilitate this transition.

The transition of a solution developed by a UON into an enduring capability is not as complex as one might think. The following example shows how the USAF would accomplish this process. Within 90 days of the initial employment of the solution to the UON, the USAF directs the Lead Command in charge of the UON/JOUN/JEON to produce a Capability Transition Decision (CTD).[29] The USAF then uses the CTD to assess how well the solution met the requirement and if it could be utilized in the future. If the CTD determines that the solution was successful, does not require further modification, can be used in again, and is financially viable for long term sustainment, the solution can then become an enduring requirement. If this is the case, then the transition will be facilitated with a CPD and a CDD as appropriate.

[28] AFI 10-601, 62. The USAF UON submission criteria are: 1. The urgent need has identified a capability gap or shortfall that will result in imminent loss of life and/or result in critical mission failure during an ongoing/current conflict or crisis situation. 2. The urgent need solution should be capable of being fielded within a 180 days of a validated request. A UON request will not be held up in cases where this is unable to be determined at the time of validation. 3. The UON origination and submission must come from an AF Component Commander

[29] AFI 10-601, 64

The application of these factors to the creation of niche aircraft indicates that the urgent process is not designed to foster the development of niche platforms. Should a capability exist and the UON can facilitate its fielding within 180 days, however, it is possible that this avenue can be utilized. This said, the training and modification that typically accompany the fielding of aircraft for military missions could easily preclude rapid employment and consequently be better solved through the use of the deliberate or emergent processes.

The JUON, JEON, and deliberate planning lanes are the primary methods the DoD uses to make acquisitions. Within this framework, allowances can and have been made for special cases for Major Commands (MAJCOMs) with special acquisitions requirements such as United States Special Operations Command (USSOCOM).

USSOCOM Acquisition

Just as each DoD component has its own acquisition process that falls in line with JCIDS, USSOCOM utilizes its own process known as the Special Operations Forces Capabilities Integration and Development System (SOFCIDS).[30] Accordingly, USSOCOM has validation authority for capability requirements and UONs unique to its organization.[31] While USSOCOM follows the basic premises of JCIDS for acquisitions, its authorities and roles as both a CCMD and a Functional Command uniquely influences the commando acquisition process. For example, USSOCOM is obligated to organize train and equip (OT&E) SOF as well as overseeing their employment.

[30] USSOCOM Directive 71-4, "Special Operations Forces Capabilities Integration and Development System, 9 June 2009.
[31] JROCM 179-02, Delegation of Authority for Special Operations Capabilities to Special Operations Command, 2 November 2009.

USSOCOM is unique within DoD in its acquisitions ability. According the Command's website, "Title 10 United States Code, Section 167, vests the USSOCOM Commander with the responsibility and authority for the development and acquisition of Special Operations (SO)-particular equipment, the authority the to exercise functions of the head of agency, and the authority funds."[32] The Commander, USSOCOM, delegates this authority to an acquisition executive who leads the Special Operations Research, Development, and Acquisition Center (SORDAC). SORDAC works through its program offices to provide Special Operations Forces (SOF) warfighters with the technology, acquisition, and logistics they require to accomplish their missions (Figure 4).

Figure 4. SORDAC Organization Structure[33]

The unique authorities and roles of USSOCOM are relevant to the development of niche aircraft when the capability gap is associated with special operations missions. Given its Title 10 authorities, USSOCOM can coordinate on "JROC and JCB interest documents and may review Joint Integration, Joint Information, and Independent documents

[32] USSOCOM, Acquisition Authority, Retrieved From: http://www.socom.mil/sordac/Pages/AcqAuth.aspx, (accessed 30 January 2014)
[33] SORDAC Organizational Structure, Retrieved From: http://www.socom.mil/sordac/Pages/OurOrganization.aspx , (accessed 30 January 2014)

developed by other sponsors to identify opportunities for cross-component utilization and harmonization of capabilities."[34] This authority, in effect, allows for the rapid fielding of capabilities in existence or in use by another component which can be co-utilized to fulfil a niche role. The potential for development of niche capability falling within the spectrum of special operations is enormous, and consequently the utility of the unique traits USSOCOM brings to acquisition cannot be understated. In FY 2012 alone, the "SORDAC Contracting Office executed more than 15,260 contract actions, obligating $3.427 billion."[35] Although large-scale military deployments are currently winding down, USSOCOM's role in filling special operations forces (SOF) niche capability gaps will remain a high priority as irregular warfare missions continue at an unprecedented pace.

Commercial-Off-The-Shelf (COTS)

Innovation during peacetime, wartime, and in times of significant technological development often requires looking for solutions beyond traditional government suppliers. Capabilities generated in the commercial sector cannot be overlooked by the DoD as it seeks to find innovative solutions to fill existing or expected capability gaps. An analysis of the benefits of COTS technology must go hand-in-hand with thorough study and mitigation of the limiting factors that accompany it.[36] The process of mitigating these risks falls to the Program Manager (PM) and the Systems Engineers (SE) as they weigh the costs and benefits of integrating COTS into program development. The utilization

[34] JCIDS Manual, E-10
[35] SORDAC Authorizations, http://www.socom.mil/sordac/Pages/AcqAuth.aspx, (accessed 30 January 2014).
[36] Defense Acquisition Guidebook, Commercial-Off-The-Shelf, Chapter 4, 4.3.18.4, https://acc.dau.mil/CommunityBrowser.aspx?id=638351, (accessed 1 February 2014).

of COTS and modified COTS is endorsed in US law through the Federal Acquisition Streamlining Act of 1994 and the Clinger-Cohen Act.[37]

These laws increase DoD procurement options by enabling them to take advantage of the commercial market. Working to integrate these laws and COTS, DoD Instruction (DoDI) 5000.02 directed that the acquisition process be redesigned to "support reduced costs, improve effectiveness and maximize the use of commercial off-the-shelf technology."[38] This legislation and instruction indicates that the both the DoD and lawmakers see the benefits of COTS integration and value structuring the procurement system to take full advantage of commercial technology.

The integration of COTS into system design has three primary benefits: "it reduces development time, allows for faster insertion of new technology, and lowers lifecycle costs by taking advantage of the more readily available and up-to-date commercial industrial base."[39] COTS products reduce development time by providing a predesigned or possibly existing product to plug into the system design process. The breadth and interoperability of commercial products also allows for seamless updates and supplementation with innovative technology. The fact that COTS is pre-established also lends itself to the reduction of sustainment costs as the production base often already has an economy of scale of which the DoD can take advantage. The importance of these factors in expediting program completion and moderating cost cannot be understated. While the integration of COTS products can be extremely beneficial, the complications that come along with the incorporation of commercial products must also be understood.

[37] Defense Acquisition Guidebook, Commercial-Off-The-Shelf, Chapter 4, 4.3.18.4,
[38] DoDI 5000.02, Operation of the Defense Acquisition System, 25 November 2013, 72
[39] Defense Acquisition Guidebook,

One of the primary drawbacks of using COTS products for military applications is that they were not designed specifically for employment by the DoD. As such, the military use of commercial products can be limited by the vendors supply chain, licensing, and use of proprietary functions.[40] The obvious result of these drawbacks is that the vendor can limit the sourcing to their own production line, restricting the use of their product and its interoperability. In the next chapter, this limitation is made evident by the DoD's attempt to modify a commercial aircraft to fill a niche combat need. In this case, the project's development was limited by the vendor's inability to produce aircraft in a timely manner. This limitation led to significant delays in crew training and the projects goals eventually being overcome by events.

Another factor that the PM must consider when using COTS is whether or not it requires modification to facilitate its military application. Modifying COTS may result in the inability of the program to receive upgrades from the vendor or commercial replacements.[41] These pitfalls can significantly hamper program development, but with proper mitigation their adverse consequences can be overcome.

The PM and SE can diminish the potential for adverse effects in several ways. They should evaluate how the military use of the product will differ from its commercial use, as well as analyze potential adverse environmental impacts that could affect operational use of the product. The PM should also establish a good relationship with the vendor to determine how the lifecycle of the COTS product can be sustained and supported should the vendor change.[42] The PM and SE can also mitigate the hazards of COTS through test and evaluation of the product, analyzing its potential for interoperability, upgrades, and modification.

[40] Defense Acquisition Guidebook, 4.3.18.4
[41] Defense Acquisition Guidebook, Modified COTS: "which, by definition, is not a COTS product under section 403 of title 41, US code, is allowed under section 431 of title 41, US code"
[42] Defense Acquisition Guidebook,

These steps are not all inclusive, but provide a common sense approach for properly integrating COTS into the acquisition process.

Application

In January 2014, then-Deputy Secretary of Defense Ashton Carter identified two miscalculations made by the Pentagon at the outset of the wars in Iraq and Afghanistan. He said, "First, it believed that these wars would be over in a matter of months. Second the Pentagon was prepared for a traditional military-versus-military conflict."[43] The first of these miscalculations resulted in the Pentagon's reluctance to procure acquisitions unique to Afghanistan and Iraq that would be of little use after the conflicts had ended. The result of the second was that the military was not well-suited to meet an unconventional enemy. Adapting to the wars, defense acquisition added measures for providing innovative solutions to the warfighter to meet urgent and emergent needs.

In November 2013, Secretary Carter issued an interim policy to replace DoDI 5000.02.[44] Recent changes to Defense acquisitions required DoDI's be updated to internalize of these changes within the DoD bureaucracy. These modifications have enhanced the DoD's ability to deliver innovation to the warfighter in times of peace, war, and impending conflict. Systemic adjustments such as the JEON and JUON have been empowered by the impetus of the recent conflicts in Iraq and Afghanistan. Giving a justification for change, these conflicts provided the rational to establish procedures for expediting the requirement process in times of urgent or emergent need.

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[43] Ashton B. Carter, *Running the Pentagon Right*, Foreign Affairs, January/February 2014, http://www.foreignaffairs.com/articles/140346/ashton-b-carter/running-the-pentagon-right, 2. (accessed 15 March 2014).

[44] New DoD Interim Instruction 5000.02 Issued, https://dap.dau.mil/Pages/NewsCenter.aspx?aid=343, (accessed 29 January 2014). "This instruction provides the detailed procedures that guide the Operation of the Defense Acquisition System and applies to all organizational entities within the Department

In the wake of these changes the questions now become, "What lessons will the DoD internalize to facilitate rapid acquisitions in the future, and how will they do it in an era of fiscal restraint?" According to former Secretary Carter, "the DoD comptroller is working to institutionalize funding mechanisms for both the JUON and JEON. These mechanisms should allow department leaders to quickly reprogram funds and make use of the rapid-acquisition authority."[45]

In looking at both of the miscalculations stated by former Secretary Carter, the importance of rapid acquisition of niche aircraft can be seen. Niche capabilities are developed to fill unforeseen capability gaps. They also provide the warfighter with capabilities such as intelligence, surveillance, and reconnaissance (ISR), lift and close air support (CAS) critical to fighting irregular warfare threats. Depending on the expected time of need, complexity, breadth, and endurance the development of niche aircraft can accomplished through one of the three development lanes (Table 1).

	Urgent	Emergent	Deliberate
Time of Need	**0-2 Years**	**0-5 Years**	**2-6+ Years**
Complexity	**Low[1]**	**Medium[1]**	**High**
Breadth/Scale	**Low[1]**	**Medium[1]**	**High**
Endurance	**High[2]**	**High[2]**	**High**

1. **Complexity and breadth can be increased through the use of COTS.**
2. **Can be sustained indefinitely through a positive CTD finding**

Table 1. Variables vs. Staffing Lanes

[45] Carter, 7

The case studies that follow analyze the development of two niche aircraft programs, Credible Chase and the OV-10, using these variables as the basis for a comparative framework. These case studies illustrate the fact there are different methods for developing niche capabilities. Both methods were accompanied by their own set of complications. In addition, the case studies show the DoD must institutionalize processes to develop and employ niche capabilities, as well as anticipate the complexities that will hinder its efforts. The results of the comparative analysis lead to a series of conclusions and recommendations on how the DoD should meet these requirements, and if the current process can facilitate the development of niche aircraft in response to warfighter needs.

Chapter 3

Credible Chase

The operational need for niche aircraft has occurred in almost every American conflict in the twentieth century. This case study outlines one such niche aircraft program from the Vietnam War, known as Credible Chase. The Credible Chase program was designed to provide a light, fixed-wing gunship capability transferable to partner nations.

The need for Credible Chase occurred late in the Vietnam War when the United States began to transfer the role of maintaining Vietnamese security to the forces of the Republic of Vietnam (RVN, South Vietnam). The corresponding US withdrawal and transfer of combat operations to the RVN's military was known as the policy of "Vietnamization." The success of this policy depended, in part, on the ability of the US DoD to provide innovative solutions to bolster the capabilities of the South Vietnamese Air Force (RVNAF). One glaring capability gap apparent to advisors, military analysts, and decision makers at the onset of Vietnamization was the RVNAF's lack of light mobility and ability to interdict insurgent supply lines and forces. Domestic and international pressure on US leaders to end the country's role in the conflict led to an urgent need to fill this capability gap. The need for light mobility and interdiction demanded the rapid fielding of a solution, one that could only be filled with a niche aircraft. The program developed to meet this requirement was Credible Chase.

The Credible Chase program requirement was first generated in the Secretary of Defense's (SECDEF) office. The intent behind the program requirement was finding innovative solutions to fill capability gaps associated with Vietnamization. The Credible Chase program in

particular would provide the VNAF with a light fixed-wing gunship which could operate from unimproved short takeoff and landing (STOL) strips. The VNAF was in need of an aircraft that would be simple enough to be easily integrated into their operations. Not only should Credible Chase provide the VNAF with light interdiction and mobility capabilities but the platform would need to be rugged, reliable, and maintainable. As with many innovative solutions developed in wartime, the Credible Chase program faced significant obstacles in accomplishing its intended mission as this chapter demonstrates.

Although the Credible Chase program was developed almost a half century ago, the factors that influenced its creation, lifespan, and ultimate demise are still relevant to the discussion of niche aircraft acquisition today. The Credible Chase program demonstrates the impact of common misperceptions about niche aircraft as they ultimately caused leaders to make decisions based on faulty or incorrect assumptions. The lessons that can be learned from this analysis have enduring potential as they are and will remain common to niche aircraft acquisitions now and in the future. This case study begins by framing the strategic environment from which the need for niche capability originated. It then evaluates the Credible Chase program based on the four factors common to niche aircraft acquisition identified in the Introduction: time of need, complexity, breadth, and endurance.

Background and Context

In 1968 North Vietnam launched the Tet offensive with the intent of inciting a "General Uprising" of peasants against the regime in South Vietnam. While the offensive failed to achieve its primary goal it

unexpectedly resulted in a significant political victory for the North.[1] The breadth and intensity of the operation surprised President Lyndon Johnson and the American people, who had been led to believe by senior commanders that victory in Vietnam was in sight. In the words of one scholar, "many of those who had previously supported the war effort, began to question continued American involvement in a Southeast Asian war that now appeared unwinnable."[2] Shortly after Tet, Johnson announced that he would not seek re-election. His announcement ultimately led to the election of Richard Nixon as president. Nixon campaigned on an exit strategy from Vietnam that would achieve "peace with honor."[3]

It was President Nixon's belief, based on the advice he had received, that the best way peace could be achieved was through a policy called Vietnamization. This policy shaped American decisions regarding the war, including its conduct, for its remainder. Vietnamization had three stated purposes: "reverse the Americanization of the war, withdrawal the half million troops from Vietnam in a way that would not bring collapse in the south, and to negotiate a cease fire and a peace treaty."[4] The timing of this policy corresponded with rising domestic opposition to the war following the Tet offensive, as well as disclosures in the media of subsequent clandestine US raids into Cambodia to destroy

[1] Richard Holmes, The Oxford Companion to Military History, Oxford University Press: 2001, 955
[2] James Willbanks, *Abandoning Vietnam*, (Lawrence, KS: University Press of Kansas: 2004), 5. The offensive was conducted by Viet Cong guerilla forces in numerous South Vietnamese cities and towns including the capital, Saigon, during Tet, the Vietnamese new year. The timing of the offensive was designed to take advantage of relaxed security measures associated with a significant national holiday. Ultimately the offensive cost the Viet Cong and North Vietnamese "horrendous" losses, the numbers of which scholars continue to debate. For details see Spencer Tucker, *Vietnam* (Lexington, KY: University Press of Kentucky), 139-140; 144.
[3] Willbanks, 7
[4] Nixon "desired to pull the United States out of Vietnam and achieve 'peace with honor.' Considered dispassionately (especially if one happens to be American and not South Vietnamese), Vietnamization did just that. U.S. troops were withdrawn, a peace treaty was signed, a cease-fire (short lived though it may have been) was initiated, and South Vietnam had survived for two more years." Willbanks, 227.

North Vietnamese staging bases.[5] Domestic politics, including frustration with how the war was being fought, was a key driver behind the policy of "Vietnamization," by shifting the burden of the responsibility for fighting to the South Vietnamese. The war had been largely fought and directed by the US from 1965 up until this point.

To reach Nixon's goal for the policy, Military Assistance Command, Vietnam (MACV), as well as other headquarters, put together a number of plans. One such plan, overseen by the SECDEF, Melvin Laird, was designed to revitalize the VNAF. South Vietnamese armed forces had grown reliant on the U.S. Air Force to provide most of its aerial capabilities such as intelligence gathering, air mobility, and airstrikes. As a result of this reliance, the RVNAF had very limited capabilities or capacity to conduct independent air operations. The plan, known as the Consolidated RVNAF Improvement and Modernization Plan (CRIMP), was designed to grow the RVNAF from 17,000 in 1968 to 64,000 personnel by 1973.[6] This unprecedented growth in manpower would be accompanied by a corresponding growth in aircraft. By the time of the US withdrawal in 1973 CRIMP had made the RVNAF, at least on paper, one of the most powerful air forces in Southeast Asia.[7]

One program heavily influenced by Vietnamization and CRIMP was the Credible Chase program. The AC-130 gunship had proven itself as a formidable platform in Vietnam, but this platform and its ability to provide long-loiter, on-call accurate fire support, was not included in Vietnamization.[8] The resulting capability gap necessitated the development of a platform that could be used and maintained by the

[5] The Cambodian raid sparked nationwide student protests and a tragedy at Kent State University when four students were shot and killed by the Ohio National Guard. In South Vietnam, morale among US troops plummeted as soldiers became preoccupied by the prospect of becoming the last casualty in a war that was winding down." Holmes, 956. "

[6] Willbanks, 31

[7] Willbanks, 32, By 1973 the RVNAF operated 1700 aircraft in six air divisions.

[8] Bernard Nalty, *The War Against Trucks: Aerial Interdiction in Southern Laos, 1968-1972*, (Washington D.C.: 2005, Air Force History and Museums Program, U.S. Government Printing Office), 237.

RVNAF to support their interdiction needs. Based upon the advice of Leonard Sullivan, Deputy Director of Research and Engineering for Southeast Asia (DDR&E), Laird became an advocate for the development of an armed light fixed-wing gunship.[9] The light gunship would, in theory, fill the capability gap left in the RVNAF after the departure of the US Air Force's AC-130s from the theater.

Time of Need

The capability gap generated by the needs of Vietnamization and the pending U.S. withdraw created an urgent need to provide the VNAF with a capable platform for interdiction. In early 1971, the SECDEF emphasized to the services his desire to find innovative approaches to the Vietnamization of interdiction efforts. Program files note that "he requested the Services to conduct studies which might allow the RVNAF to conduct their own counter-infiltration efforts in the future."[10] A requirement had developed from RVNAF shortfalls in airlift and firepower in the ongoing CRIMP program. As a result, "In May 1971, the SECDEF tasked the SECAF to evaluate the concept of using light off-the-shelf Short Takeoff and Landing (STOL) 'mini-gunship' aircraft in a counter infiltration role" to fill this capability gap.[11] The solution proposed by DDR&E recommended the purchase of STOL mini-gunships to alleviate this shortfall. A smaller, less-complicated "mini-gunship" would fill the RVNAF capability gap with a minimum investment in manpower logistics and training. The time of need for the mini-gunship program, however, was extremely short as the SECDEF directed the Air Force to combat test it the following dry season (early 1972). Based upon this guidance the

[9] Nalty, 252
[10] Director of Plans Pacific East Asia, Credible Chase – Files, 1971-1973. 1. Document is now declassified. USAFHRA Call No: K143.054-1, IRIS 1011680.
[11] Director of Plans Pacific East Asia, Credible Chase – Files, 1.

Air Staff created the Credible Chase program to test and field the mini-gunship concept.

The idea of using a light STOL mini-gunship to provide niche capabilities had been tried before in Southeast Asia. The mini-gunship had been previously tested in Thailand under the "Pave Coin" program.[12] Initial combat test results from the Pave Coin program had been encouraging, and while the idea of incorporating them into Vietnamization was new, the positive initial results of testing in Thailand made the Credible Chase program an easier sell to Congress.[13] Convincing Congress of the utility of the program was a crucial step its development. Congress held the purse strings for the defense budget and its support was required to secure rapid funding for Credible Chase so it could meet program deadlines. The initial request to Congress for the procurement of 30 aircraft (15 AU-23 Fairchild Peacemakers and 15 AU-24 Helio Stallions) was submitted initially as an amendment to the fiscal year (FY) 1972 budget.[14] Due to the urgency of the project, the funding request was moved up, and the DoD instead approached Congress with a requested reprogramming of 1971 funds to cover the cost of Credible Chase. In his testimony before Congress, the Air Force's Deputy Chief of Staff for Research and Development, Lt. Gen. Otto

[12] National Museum of the Air Force, *Fairchild AU-23A*, 23 October 2009, http://www.nationalmuseum.af.mil/factsheets/factsheet.asp?id=3228, (Accessed 2 Feb 2014). The combat evaluation of PAVE COIN, was done in June and July 1971. The AU-23A was tested for eight possible missions: armed escort of helicopters, close air support, hamlet defense, STOL airlift and resupply, armed reconnaissance, border surveillance, forward air control, and counter infiltration. USAF crews flew 73 missions (94 sorties) and RVNAF crews flew 68 missions (85 sorties). Several types of weapons were test dropped/fired including 2.75 inch rockets (explosive and smoke), cluster bomb units (CBU-14), MK 6 Mod 3 flares, and MK 81, 82 and 106 practice bombs. More than 8,000 rounds of 20mm ammunition was also fired, including both high explosive incendiary and target practice tracer types. Several problems were discovered during the PAVE COIN program, the most serious was the extreme vulnerability of the aircraft to all but the lightest antiaircraft fire (below 12.7mm).

[13] House of Representatives, Hearings on the Congressional Budget Amendment Aircraft Procurement - Air Force, 5 Aug 1971, AFHRA K143.054-1 V.17, IRIS 01011690, p334.

[14] Senate, Amendment to Budget: Department of Defense – Military: Hearings before the Committee on Appropriations, 92nd Cong., 18 October 1971. AFHRA K143.054-1 V.17, IRIS 01011690, 1080. The 14.5 million required for the Credible Chase concept was offset by a decrease in the Missile Procurement appropriation due to a rephrasing of the Minuteman II update program.

Glasser, defended the operational necessity for acquiring 30 aircraft from two vendors, and justified the need to fund the program based on its urgency.[15]

As could be expected, the urgency that drove Credible Chase funding appeared to some members of Congress as the result of muddled Service programming needs and priorities.[16] After reviewing the implications of the program, Gen. Glasser, as well as Maj. Gen. Howard Fish (Deputy Director of Budget, USAF), convinced the House of Representatives Appropriations Committee that the program had been studied in depth by the commanders in the field.[17] The purchase of 30 aircraft instead of the traditional two or three typically procured for testing was unprecedented, but would enable 24-hour, seven-days-per-week operations for evaluating the concept in South Vietnam. The generals argued even if the "concept were not to prove entirely successful, these airplanes could still be used by the Vietnamese in a close air support and hamlet defense role."[18] Gen. Fish also explained that the need for urgency was being driven by environmental factors in Vietnam. The Vietnamese dry season was the only permissible time to conduct an operational test of the Credible Chase concept due to the limitations that adverse weather would have upon aircraft operations. The 30 aircraft had to be ready for fielding in the spring of 1972, to run the test, and if successful, "get a capability built by the following dry season at the end of calendar 1972."[19]

[15] House of Representatives, 350. In the hearing, the DoD was grilled by Mr. Robert Sikes of Florida as to why the AF had sought two vendors when Fairchild appeared to be a much better source for delivering the number of aircraft due to their size. Fairchild had in excess of 160 million in assets and 11k workers as opposed to Helio's 1.3 million and 96 employees, 339.
[16] House of Representatives, Some members of Congress questioned Glasser, implying that the AF had not thought out the current FY budget well enough.
[17] House of Representatives, 350. "The plan was briefed and studied carefully by the commanders in the field, the 7th Air Force Commanders and the MACV commander, COMUSMACV.
[18] Senate, 1083.
[19] House of Representatives, 350.

The expectations surrounding the Credible Chase program were enormous. Senior Air Force leaders had made the assumption that developing and employing a fixed-wing gunship could be completed in a matter of months due to the fact that the aircraft was relatively small and simple in comparison to other aircraft in the US inventory. Time of need was driven by legitimate factors that constricted the window in which Credible Chase could be effectively utilized without being overcome by events. In the current acquisition framework, Credible Chase's time of need would classify it as a JUON. This fact, considering the previous chapter's analysis, would call into question the feasibility of rapidly generating a requirement as complex as a "simple" aircraft within a matter of months. In spite of this fact, Air Force leadership assumed if the funding was obligated, the successful employment of Credible Chase would immediately follow. The assumptions which framed the program's goals are represented by Gen. Fish's statement to Congress that: "these are simple aircraft and we have been able to move very fast with them."[20]

Complexity

The Fairchild AU-23 Peacemaker, and the Helio AU-24 Stallion, were indeed simple when compared to aircraft such as the more advanced AC-130 gunship developed and deployed for US operations in Vietnam. It was the fact that these niche aircraft would be less complex and easier to operate that the DoD chose them as a conduit to fill the existing CRIMP capability gap. This oversimplification framed the expectations of senior leaders as they set overly ambitious milestones and goals of the project (Fig 5). These expectations however, failed to consider factors that were outside the control of the DoD and neglected the nuances inherent in using commercial off-the-shelf (COTS) systems

[20] House of Representatives, 350.

for developing niche capabilities. The problem was one of relativism. COTS was easier in comparison to developing an interdiction aircraft from scratch, but the complexity inherent to the application of COTS was overlooked. The failure of leadership to incorporate these considerations into their analysis created an environment where the Credible Chase program would have to overcome insurmountable odds to reach the SECDEF's desired end state.

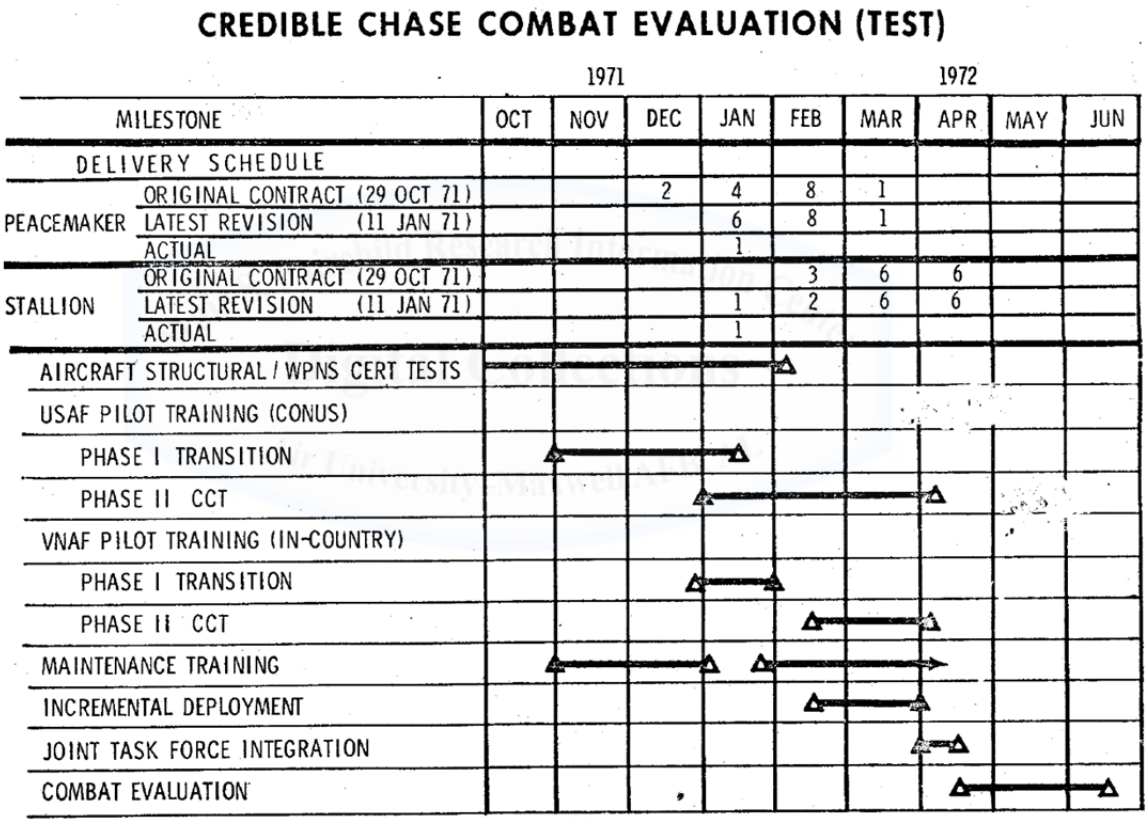

Figure 5. Credible Chase Phased Timeline[21]

The basic configuration of both the Peacemaker and Stallion were just as simple as Gen. Fish had explained to Congress. The modifications that were added to make the aircraft suitable as mini-gunships, however, added a level of complexity that had not been

[21] Col Taylor, Credible Chase, 20 January 1972. 2. Document is now declassified.

anticipated. These additions stole from the program the most precious resource with which it could ill-afford to part: time. The aircraft themselves were based off of their civilian counterparts with the addition of five ordinance stations, four wing pylons, and a fuselage pylon. To facilitate their role as an interdiction platform, the US Air Force also incorporated a side firing 20mm Gatling gun, a night vision sight (NVS), and a sensor collection equipment.[22] On the surface, these modifications appear to be relatively simple additions that substantially increased the capability of the basic COTS platforms being acquired. The second- and third-order effects of these modifications, however, had a significant impact on the USAF's ability to meet the initial expectations and timeline levied against Credible Chase (Figure 6).[23]

Image 1: AU-24 Stallion[24]

[22] Jack S. Ballard, *Development and Employment of Fixed Wing Gunships 1962-1972*, Office of Air Force History: 1982, 264.
[23] The militarization of the Credible Chase aircraft required additional time to modify, but also required additional aircrew training (U.S. and RVNAF) to operate these modifications.
[24] AU-24, Public Affairs Division, National Museum of the United States Air Force

Image 2: AU-23[25]

The Credible Chase program established its first roots at Eglin Auxiliary Field 3, Duke Field, with the intention of first training a US cadre at Duke and then training VNAF pilots in-country (Vietnam).[26] The training was programmed to proceed in two phases. The first phase consisted of transition training to the new airframes, while the second encompassed combat skills training, to include live fire and operational training of the various sensors and NVS. The first phase of training was accomplished according to the timeline despite various unforeseen difficulties that arose from operating the new aircraft. Initial training reports indicated that, contrary to perception, the new STOL aircraft were not easy to fly. All of the initial cadre of US pilots agreed that "the

[25]AU-23 Peacemaker, Public Affairs Division, National Museum of the United States Air Force
[26] General George S. Brown USAF to Commander Tactical Air Command General William W. Momyer, letter, 30 September 1971. Document is now declassified. USAFHRA: K143.054-1

normal STOL take-off and landing handling characteristics were totally different from any previous experience and required considerable skill and training to be properly and safely executed."[27]

Several physical problems with the aircraft also developed during the first phase. Initial delivery of the AU-23 was delayed due to structural failure of the stabilator, causing a week-long delay in the delivery of the first aircraft.[28] The initial cockpit layout was also problematic as the System Program Office did not allow for a Cockpit Configuration Control Board meeting prior to aircraft delivery. The result was that in the aircraft delivered "the flap handle could not be reached with the throttle advanced, and the jettison button could be inadvertently activated."[29] While these problems did not preclude the crews from flying the aircraft, they demonstrated a source of avoidable maintenance delays that negatively affected timely training.

The first phase of Credible Chase testing proceeded on time despite these setbacks. This performance was due, in no small part, to the dedication of the Airmen assigned to carry out the project. The first phase of the Credible Chase Program also demonstrated that what was perceived as a simple solution ended up being much more complicated than anticipated. The rationale behind the initial set of expectations had been based on the size and mission systems of the aircraft. The realities instead demonstrated that although an aircraft may be relatively simple, the nature of its mission can add significantly to the complexity of a program. Analysis of the Credible Chase program demonstrates that complexity must be measured in terms of the aircraft, mission

[27] Brig. Gen. James A. Knight, *Credible Chase Task Force Commander's Monthly Status Report*, 17 December 1971, 2. Document is now declassified. The STOL characteristics of the aircraft permit the use of diverse runway headings to either side of the runway heading: 30 degrees either side of centerline on a 300' wide runway. As a result, take-offs and landings could generally be made safely into the wind.
[28] Brig. Gen. James A. Knight, *Credible Chase Task Force Commander's Second Monthly Status Report*, 18 January 1972, 2. Document is now declassified.
[29] Knight, *Second Report*, 4. Other design flaws included the instrument and radio controls being inaccessible to the pilot.

modifications, and crew training. While the first phase progressed as planned, the true limiting factor had yet to appear. If the project was to progress to its second phase, it would have to adapt to other threats to the projected timeline.

Breadth

This portion of the analysis examines the breadth of the program and the assumptions which led to the expectations surrounding its development and employment. Breadth, in this context, is assessed in terms of aircraft production and aircrew training. Production refers to the expected scale of development for the initial and follow on programs which was dependent on the vendor's ability to deliver mission capable aircraft. Aircrew training was also a significant factor in terms of breadth as the U.S. and RVNAF crews' level of proficiency was critical to employing the aircraft in the combat roles for which they had been purchased.

The initial scope of the Credible Chase project was limited to 30 aircraft split evenly between Fairchild and Helio, with a planned increase in production following successful completion of the program. The delivery of the aircraft was planned to begin in January and end at the beginning of April to facilitate the transition to combat from 15 Mar – 15 May 1972 (Fig 6).[30] The initial crew compliment from the RVNAF included 20 pilots, 20 gunners, and approximately 40 maintenance personnel.[31] In addition, "The original plan also included a 50/50 split of USAF/RVNAF crews deployed to Pleiku for the combat test which was to have been conducted around the clock in the tri-border area of South

[30] Knight, *Second Monthly Status Report*, 1.
[31] Director of Plans Pacific East Asia, *Credible Chase – Files*, 2

Vietnam (SVN)/Laos/Cambodia."[32] Pleiku was initially chosen due to poor local area security which consequently offered the greatest utility for the combat test.[33] The intent of the initial program was that after successful completion of combat testing in SVN, a follow-on program would be funded to extent this capability to all areas of SVN to assist with the Vietnamization of the interdiction effort.

The expectations for the Credible Chase program succeeding were high. The proposed follow-on program, once Credible Chase succeeded, was framed by the SECDEF's guidance: "Assuming the successful test of the Credible Chase interdiction concept, I recommend a program for incorporation with the objective of achieving an optimal RVNAF interdiction capability by the fall of 1972, which could, if necessary be self-sustaining with no more than limited US advisory effort."[34] To meet this objective, the follow-on program envisioned the provision of five squadrons of STOL mini-gunships to the RVNAF (200 aircraft), and included the support and training of an additional 2,100 personnel required to operate and maintain them.[35] Analysis of this plan and its associated timeline indicates that if the Credible Chase timeline was tight, expectations surrounding the follow-on program were overly optimistic. Despite these factors, and the fact that the follow-on plan was not funded by the FY 1972 or 1973 budget, the initial concept had to be proven first.

Following the delivery of the first Stallion and Peacemaker, American aircrew training was on schedule. The training of the two VNAF pilots and their enlisted men sent to train in the US also

[32] Director of Plans Pacific East Asia, *Credible Chase – Files*, 2
[33] Gen Momyer, Exclusive for Ryan from Momyer Subject: Credible Chase, 22 January 1972. Document is now declassified. 5. Basing options other than Pleiku were evaluated, but fell short. Tay Ninh, for example, was ruled out due to the fact that the capability would be redundant: helicopter gunships operating out of Bien Hoa were already conducting interdiction mission in the "Parrot's beak" region of the country.
[34] Col Taylor, Credible Chase, 20 January 1972. 2. Document is now declassified.
[35] Col Taylor, Credible Chase, 20 January 1972. 4. Document is now declassified.

progressed according to plan throughout the first phase of training.[36] Unfortunately, the second phase of the Credible Chase program was contingent on timely delivery of the additional platforms from both vendors. At this point, the reality of the program began to break with its expectations.

On 20 January, Gen William Momyer, Commander, Tactical Air Command, visited Eglin for a spot review of the Credible Chase program. His inspection came at a critical time, just as the program was transitioning from the first phase to initial combat skills training. Upon his arrival, Momyer found that external factors were beginning to significantly impact the programmatic plan. Production delays from both Fairchild and Helio resulted in the delivery of only one of each aircraft, instead of the five promised by each vendor.[37] Momyer noted, "phase II training which was to begin on 6 Jan with production aircraft was slipping on a day to day basis. Pilots aren't able to fire the guns and drop munitions until the delivery of the production aircraft."[38] To counter delays in training, Momyer directed several actions to improve and reduce the breadth of the operational training plan. His first recommendation was that the Air Staff should bring the 40 VNAF pilots and gunners from South Vietnam to Eglin to train in the US instead as aircraft were being delivered. His second recommendation was to reduce the breadth of the training profile by removing the requirement to train RVNAF personnel on operating the aircraft's sensors.[39] Momyer's recommendations from his spot visit clearly indicated that Credible Chase would have difficulty meeting its original schedule, primary due to slippage in the aircraft delivery schedule.

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[36] Knight, *Second Monthly Status Report*, 8.
[37] "Failure to meet delivery schedules automatically impacts this training schedule since it is on a very compressed schedule." Gen Momyer, 2.
[38] Gen Momyer, 2.
[39] Gen Momyer, 6. "Gen Minh (RVNAF) stated that VNAF gunners will have enough difficulty just trying to shoot and he didn't see how they could be trained and satisfactorily operate the portales" (sensor).

After the initial setbacks, Credible Chase's Operational Training and Evaluation (OT&E) plan was modified. The new OT&E plan would take place from April through May 1972 and included the training of the VNAF crews in the US. Data collected from these tests "would provide field commanders an assessment of STOL mini-gunship capabilities and limitations, to serve as a basis for determining VNAF requirements for such an aircraft."[40] The revised plan was further plagued by production complications, as the arriving production aircraft quickly developed structural problems.[41] As a result, all of the AU-23's were grounded and further deliveries were suspended until Fairchild resolved the problem with their aircraft. Manufacturing defects with the AU-24 also led to the grounding of the six production model aircraft. After isolating and resolving the problem, the AU-24 alone became the primary OT&E aircraft tested in accordance with the revised plan.

Examination of the expectations encompassing the breadth of the Credible Chase project demonstrated that Air Force leaders took for granted the ability of the vendors to meet their obligations. The cascading effect of delays in production had negative effects on an already tight US and RVNAF training schedule, resulting in a reduction of the scope of training objectives. The failure of Fairchild and Helio to meet their initial production schedule detracted from the proposed breadth of the program. This failure consequently called into question both vendors' ability to meet the subsequent demands of the SECDEF-envisioned follow-on program, as well as the suggested endurance of the mini-gunship concept.

[40] Credible Chase Planning, K143.054-1. 1. Document is now declassified.
[41] Credible Chase Planning, K143.054-1. 3. The AU-23 developed rib and skin cracking in the tail section and the AU-24 had longitudinal stability problems.

Endurance

Perceptions regarding the enduring nature of the Credible Chase concept varied with respect to the stake in the program: individual or organizational. The enduring nature of the STOL mini-gunship concept as a niche capability solution depended in many cases on the imagination of those in DoD, Congress, or the manufacturers' understanding of the program's end-state. The initial guidance from the SECDEF clearly outlined the need for a niche aircraft to fill a shortfall in aerial interdiction capabilities. The anticipated follow-on program for five squadrons of mini-gunships, contingent upon successful testing, would meet the short-term requirement of the US Air Force and DoD to meet the needs of Vietnamization. Some members of Congress, as well as and the vendors, saw the combat test and ultimately the endurance of Credible Chase in another light: considerable profit, for either themselves or their constituents, through follow-on Foreign Military Sales (FMS).

Members of Congress saw that the mini-gunship concept could provide a wide range of allies with an enduring STOL interdiction capability. Following a successful test, the Credible Chase aircraft could be sold through either FMS or the Military Assistance Program (MAP). Following the Congressional testimony for the budget amendment to fund Credible Chase, Congressmen Robert Wilson (Republican, California) had a separate conversation with Air Force officers. Wilson suggested some in Congress had an expanded vision for the enduring nature of this niche aircraft that extended well beyond Vietnamization. Wilson added, "he had discussed the aircraft with the Lebanese, Vietnamese, the 7th AF commander, South Americans, and 'others' around the world. All were enthusiastic but would not buy until 'we' [the US] took the lead."[42] The rationale behind the Congressional vision for

[42] Davis, Lt Col James C., Credible Chase Briefing for Congressman Wilson (California), XOV. Memorandum, 4 February 1972. 2. AFHRA K143.054-1 V.17, IRIS 01011690.

the program is understandable considering their additional motivations. From the perspective of some of Congressmen, Credible Chase served as the perfect proof of concept to bolster the credibility of the platform in order to make it more attractive for FMS and MAP.

Other members of Congress had other less ingenuous motivations. During the Air Force's initial budget amendment request in 1971, Congressmen Robert Sikes (D-FL) pushed extremely hard for the program to choose a single vendor, Fairchild.[43] While many of his arguments against using Helio were valid, he may have had a vested interest in promoting the Fairchild Company, given the sizeable stock he owned in the company.[44] While Congressmen Sikes was reprimanded after the war by Congress for this ethical lapse, his advocacy for one particular manufacturer shaped the development and eventual outcome of the Credible Chase program.[45]

At least one of the vendor's expectations regarding the future of their respective niche platforms matched that of some members of Congress. Fairchild's President, Tomas Turner, expressed his expectations in a letter to the SECDEF. Turner informed Secretary Laird that if his company's concept was not selected for the RVNAF, other countries were knocking at Fairchild's door to fill their own similar capability gaps.[46] Having "lost" his production model AU-23's to the USAF, Turner made a direct request to the SECDEF that the DoD loan

[43] House of Representatives, Credible Chase, 336. Congressmen Sikes pushed hard against including Helio as a vendor. He reasoned that Fairchild was a much more established company and that the Helio engines were made in Canada.
[44] "The House of Representatives voted overwhelmingly today to reprimand Representative Robert L. F. Sikes, Democrat of Florida, for financial misconduct." David Rosenbaum, House Reprimands Sikes For Financial Misconduct; Sikes Is Reprimanded by House For Misconduct in Stock Deal May Lose Chairmanship, 30 July 1976, http://select.nytimes.com/gst/abstract.html?res=F60F15F7355E1A738DDDA90B94DF405B868BF1D3, Accessed 25 February 2014.
[45] New York Times, House Panel Seeks Reprimand of Sikes On Interest Conflict; http://select.nytimes.com/gst/abstract.html?res=F10714F83F5B167493C0A9178CD85F428785F9 , Accessed 25 February 2014.
[46] Turner, Thomas To Secretary of Defense Melvin Laird. Letter 13 November 1972.

him one of the remaining Peacemakers to serve as a demonstration aircraft for touring South America and the Middle East. Turner argued the tour would be in the long-term interests of the US by stimulating FMS purchases.[47] The motivation behind this particular vendor's approach to the mini-gunship concept is one common to all aircraft vendors: sell as many aircraft as possible. For this reason, the expectations of at least one of the vendors for the Credible Chase program did not center around the success of the program, but rather on its ability to increase sales to foreign nations.

In early 1972 reality collided with the expectations of the program's stakeholders and their perception of how the program would endure began to shift. There were two primary factors responsible for this shift in expectations. First, the security situation in Vietnam had changed since the program's original conception. The Easter Offensive, waged by North Vietnamese forces in 1972, was characterized by large-scale maneuvers of conventional units as opposed to small hit-and-run attacks by insurgent forces.[48] The Offensive was blunted largely by high-end American conventional airpower; but North Vietnamese mobile anti-aircraft systems, including man-portable surface-to-air missiles, made low-level actions by less capable aircraft difficult if not impossible.[49] The second factor lay in the continued inability of the vendors to deliver working aircraft within the aggressive timeline established by the DoD. These factors, coupled together, led to the Credible Chase program being overcome by events. The final nail in the coffin for SECDEF's vision of the Credible Chase program came from the Commander of the Military

[47] Turner saw that the mini-gunship concept was being explored by other vendors, particularly by companies in Israel. With a model in production, Turner envisioned sales to the following countries: Iran, Saudi Arabia, Kuwait, Bahrain, Argentina, Brazil, Ecuador, Bolivia, Colombia, and Venezuela. Turner, Letter to SECDEF. 2.
[48] For a detailed historical account of the Easter Offensive, see Dale Andradé, *Trial by Fire: The 1972 Easter Offensive, America's Last Vietnam Battle* (New York: Hippocrene, 1995).
[49] Major A.J.C. Lavalle, ed., *Air Power and the 1972 Spring Invasion*. Vol. 2, Monograph 3 (Washington, D.C.: Office of Air Force History, 1985), 10-11; 34-35.

Assistance Command Vietnam (COMUSMACV) who recommended in May 1972 that the test aircraft not be provided to the RVNAF:

> "Basic rational included: The VNAF is now undergoing a most difficult period of growth and expansion, coupled with the burden of countering the current RVN offensive; based on test results it did not appear that the STOL could add significant capabilities to the VNAF; the problems and difficulties encountered with the aircraft during the OT&E require resolution, and the addition of two different types of aircraft to the 15 other types already operating in the VNAF would compound the manpower and logistics support problems."[50]

The reflections of the COMUSMACV were passed through the Secretary of the Air Force (SECAF) to the SECDEF in June of 1972. As a result of COMUSMACV's recommendation, the DoD sought to divest of the aircraft to another country.[51] After official requests from the armies of Thailand, Laos, and Cambodia, an Assistant Secretary of Defense developed three courses of action (COA) to divest Credible Chase aircraft. These COAs were:

> "Option I: Trade 13 Peacemakers for ten Thai T-28Ds to be delivered immediately to Laos and Cambodia. Provide Helio Squadron to Cambodia on an urgent basis.
>
> Option II: Withdraw the STOL offer to the Thai and provide both Credible Chase squadrons to the GKR (Government of Khmer Republic, i.e.: Cambodia).

[50] Credible Chase Planning, K143.054-1. 5.
[51] Melvin Laird, Memorandum from the SECDEF to SECAF. *Light Armed STOL Aircraft for the VNAF*. Washington D.C., 11 July 1972. Document is now declassified. The SECDEF acknowledged the recommendation of the SECAF to not provide the STOL aircraft to the VNAF. He suggested a different course of action whereby Thai T-28's would be exchanged to Laos in return for the US providing the STOL aircraft to the Thai's.

Option III: Withdraw the STOL offer and pursue alternatives for use of the STOL which are not related to SEA, are not time-sensitive, and require further definitization (sic)."[52]

An objective analysis of these COAs suggested the first was the most beneficial for the US and its allies. Choosing this COA would provide a policy option to circumvent Congressional restrictions on DoD support to Laos, as well as add a much-needed capability to the air forces of both Thailand and Cambodia.[53] With this consideration in mind, SECDEF Laird approved the first COA and the Credible Chase aircraft were split into two units. The AU-23 Peacemakers went to Thailand and the AU-24 Stallions were shipped to Cambodia.

The final outcome of the Credible Chase niche aircraft capability demonstrates that the initial expectations for its endurance were highly dependent on the motivations of the different players involved in the acquisition. Long-term expectations of endurance by members of Congress and individual vendors ended up being closer to reality as they saw the Credible Chase program as a means to bolster FMS. Conversely, the SECDEF and the Air Force's initial expectation was tied to early positive results from Credible Chase program and the continuing short-term need for the niche capability in support of the policy of Vietnamization.

[52] Credible Chase Files. Assistant SECDEF to SECDEF, STOL Aircraft for Thailand. Memorandum, 3 November 1972. Document is now declassified.
[53] Credible Chase Files, Lt Gen Eade, Problems in Providing Support to Military Activities in Laos Under Current Legislation. Document is now declassified. The Symington Amendment limited USG expenditures for Laos to $350 million. "The USG program for Laos in FY 72 is $376 million of which the DoD ceiling is currently set at $251.6 million. Very little flexibility exists within the amendment for minimizing, or eliminating by transfer actual program and delivery costs."

Final Considerations of Credible Chase

This analysis of the Credible Chase program is intended to highlight the complications which can arise when developing niche capabilities during periods of conflict. While this case study represents the development of a platform in a war long since ended, the lessons from Credible Chase still have relevant application to current and future niche aircraft acquisitions. Assumptions and expectations surrounding any acquisition, especially those required to fill JUONs, must be linked to reality. Credible Chase should not be viewed in terms of success or failure, rather as providing an abject lesson in critically and objectively looking at seemingly easy solutions to fill urgent niche capability gaps.

The lessons from Credible Chase are apparent in the assumptions and expectations that surrounded its time of need, complexity, breadth, and endurance. In this example, senior leaders identified a capability gap and time of need correctly, but made several assumptions that ultimately led to the program being overtaken by events. Since the aircraft was relatively simple, Air Force leaders took aircraft production and crew training for granted. After all, the Pilatus Porter on which the AU-23 Peacemaker was based had been used extensively throughout Southeast Asia for years. As a result, unanticipated production delays and manufacturing problems had significant negative, cascading effects on crew training and the ability to field Credible Chase in timely manner. Failure to combat test the platforms during Vietnam's dry season reduced the proposed breadth of the test and negated the SECDEF's desire to field a force of STOL mini-gunships for Vietnamization. Another factor which influenced the outcome of Credible Chase was the lack of a coherent vision between the buyers, testers, and vendors on the enduring nature of the program. The DoD, Congress, and manufacturers each had different visions of the program's end state. The result of this discord was that the stake holders had differing ideas regarding the

utility of Credible Chase and therefore placed different value on the temporal sensitivities associated with the project.

Innovation and the acquisition and fielding of niche aircraft capabilities in times of conflict requires that senior leaders perform two functions: temper their expectations by anticipating delays in modifying COTS aircraft; and, unify the expectations of the programs stakeholders under a single, coherent vision throughout the acquisition process. Credible Chase serves as an example of where urgent need, and the premium placed on time, clashed with the realities of production and the changing nature of the conflict. Despite the use of well-proven COTS aircraft, the desired platforms could not be built, modified, and tested in time to meet the needs to fill the capability gap in a timely manner.

Chapter 4

The OV-10 "Bronco"

"The system will always accommodate additions but never can anything be taken out. That is why all weapons grow in weight, complexity and price; if something smaller is desired, you have to start over"

- W.H. Beckett (Inventor of the OV-10)

The process of developing a niche capability aircraft does not always face the severe time constraints which plagued Credible Chase. As such, this chapter examines the development of a niche aircraft designed to fill a capability gap similar to Credible Chase, but one confronted by a differing set of constraints. The OV-10 "Bronco" was literally designed in a garage and became the first aircraft built specifically to fill a counterinsurgency (COIN) role. Early in the Vietnam War, USAF leaders desired a new aircraft to conduct the Forward Air Control (FAC) mission, one that would replace its aging FAC fleet.[1] While the time constraints placed on its development were not as stringent as those surrounding Credible Chase, the development of the OV-10 faced its own unique challenges. The OV-10 program overcame these challenges to become the Air Force's mainstay FAC aircraft and an enduring example of a successful niche aircraft acquisition program.

The requirement behind the development of the OV-10 would currently be classified as an emergent operational need (see Chapter 2

[1] Maj. James Overton, "FAC Operations in Close Air Support Roles in SVN," HQ PACAF CHECO Division, 31 January 1969, 2. An airborne FAC had 2 primary roles in Vietnam: visual reconnaissance and strike control. As a strike controller, he was involved in: target acquisition, communication with the ground commander, positive identification of friendly positions, briefing of strike aircraft, marking the target, controlling the strike, and assessing and reporting bomb damage.

for details). The Air Force required a FAC platform to replace its aging fleet, but was not confronted with an immediate capability shortfall. Given these two conditions – an emergent need without an immediate capability shortfall – the DoD was able to test the OV-10 progressively as it incorporated its capabilities. The additional time allowed the OV-10 program to identify and work through deficiencies and correct them without significant damage to the program's credibility. The programs continuing credibility was pivotal in that it enabled the OV-10 to reach its full potential and contributed to the expansiveness of its breadth and enduring use.

As in the previous case study, this chapter reviews the development of the OV-10 through the four factors which frame the development of niche aircraft: time of need, complexity, breadth, and endurance. Assessing the OV-10 program in this way allows for comparisons with other niche aircraft programs such as Credible Chase. This chapter highlights the unique challenges of developing a niche capability in a joint program. The next chapter, the Conclusion, summarizes the differences between the OV-10 and Credible Chase to draw implications which will benefit future niche aircraft acquisitions. To simplify the analysis, however, this chapter focuses primarily on the USAF's acquisition of the platform, drawing in lessons and comparisons from the other services as appropriate. It begins with a brief discussion of the strategic context in which the OV-10 requirement originated.

Background

The concept of a multirole COIN platform evolved as a result of lessons learned from previous wars. Following the Korean War the DoD focused its Close Air Support (CAS) role around the use of jet aircraft. Jet aircraft had proven their worth over propeller aircraft during the

Korean War. The intrinsic characteristics of jet aircraft, however, limited their ability to conduct CAS missions.[2] For example, jet aircraft were much faster than propeller driven aircraft and could carry more ordnance, but lacked performance at the low end of the flight envelope and the ability to loiter for long durations. Two US Marine Corps (USMC) Colonels with previous experience in WWII and Korea recognized this deficiency and designed a platform specifically to perform the CAS role. These Colonels, K.P. Rice and W.H. Beckett, developed their initial 1960 design with two primary goals in mind. Their stated intent was: "first to cover the lower end of the performance envelope for the capabilities that had made WWII CAS so effective, but which had been lost with the advent of jets; and second, to apply recently available technology for operations near the supported troops and a major improvement in synergy."[3] With these goals in mind, Rice and Beckett began building an aircraft in Rice's garage. Their intent was to create a purpose-built aircraft outside of the DoD system and free from its associated hindrances. This aircraft would provide the conceptual basis for the requirement that led to the OV-10. Made of fiberglass, composites, and parts from the aircraft boneyard at Naval Air Weapons Station China Lake, the OV-10 effort to build a niche platform "outside the system," began to take shape.[4]

Rice and Beckett's initial strategy was to pitch their creation to aircraft corporations outside the DoD. Their design, however, was turned down by every manufacturer they approached.[5] In addition to not having a commercial sponsor, Rice and Beckett's efforts to develop their COIN aircraft received a further blow: the Naval Bureau of Weapons

[2] Beckett, Rice, and King, "The OV-10 Story", http://www.volanteaircraft.com/ov-10.htm, (Accessed 10 March 2014). Jets occupy the high end of the performance envelope. Beckett believed that the services should develop a slower and more maneuverable aircraft which would be better suited for CAS.
[3] Beckett, 3.
[4] Beckett, 3. Construction utilized a fiberglass and end grain balsa sandwich. The first acquisition from the China Lake boneyard was the rudder pedals off of a Grumman F6F.
[5] Beckett, 5. The designers tried to sell to Douglas, Convair, and the Ryan aircraft companies

(BUWEPS) sent the designers a cease and desist order for their use of the Navy's China Lake facilities. As a result of these setbacks the new COIN aircraft would have to be developed through the system. Beckett began this endeavor by pitching the aircraft to men with the highest influence he could find: John Foster and Edward Teller, who were members of the President's Scientific Advisory Panel. For Rice the next logical step was to find a job within the system from which he could further the concept's development. Rice contacted a friend at the Tactical Air Warfare Program Office of the DoD's Research and Engineering Department (DDR&E), who was able to reassign him to work in his office.[6] Rice's assignment to DDR&E provided the perfect conduit for developing the official DoD COIN aircraft program from within the system.[7] Now an outside voice could be heard from within the aircraft acquisition system.

Time of Need

In today's acquisition language, the time of need for the OV-10 was driven by an emergent capability gap. That gap was identified by the needs of the services as well as those of their foreign military partners. Service representatives desired to replace their ageing OV-1, O-1, and O-2 aircraft with a more capable platform, and the DoD's International Security Affairs (ISA) Division, which controlled FMS, specified a need for a COIN aircraft to export to partner nations.[8] It is important for the reader to understand that the platform requirement was being driven, in large part, by increasing American involvement in Southeast Asia including Laos and South Vietnam. The requirement was specified in a letter sent on 20 Dec 1962 from DDR&E to the Service Secretaries which

[6] Beckett, 5.
[7] Beckett, 6.
[8] Office of Air Force History, *The Air Force in Southeast Asia: FAC Operations 1965-1970*. AFHRA: K168.01-43, 48. Document has been declassified.

identified the need for a "Light Armed Reconnaissance Aircraft (LARA)" to support DoD COIN operations in Vietnam.[9] Funding for the project was initially provided by the Advanced Research Projects Agency (ARPA) as ISA could only purchase aircraft that were already in the inventory or commercial market.

Fulfillment of the LARA requirement proceeded at a leisurely pace despite the identified need. Nine months after DDR&E sent their letter, the Navy's BUWEPS issued a Request for Proposal (RFP) to fill the requirement. Nine companies responded to the RFP, and after a competitive process, the design submitted by North American Aviation (NAA) was chosen. NAA received an initial contract for seven prototypes which could be evaluated for their ability to meet the needs of the Services.[10] The NAA aircraft chosen to meet the LARA requirement, now designated the OV-10, had its initial flight on 15 July 1965.

USAF leadership saw in the OV-10 an aircraft design that could fulfill a different need. Gen. John P. McConnell, the USAF Chief of Staff (CSAF), ordered 383 OV-10's to support Air Force's increasing COIN role in South Vietnam.[11] McConnell cloaked his request as a need for a multirole COIN platform. The actual Air Force requirement, however, was for a platform that could assume a FAC role. The method chosen by McConnell was not duplicitous but rather born of bureaucratic necessity. Secretary of Defense (SECDEF) Robert S. McNamara had issued budget

[9] Beckett, 6.
[10] "Nine companies submitted bids: Beech, Douglas, Convair, Goodyear, Helio, Hiller, Lockheed, Martin and North American. Ryan, one of our earlier contacts, had what I thought was a particularly good design, but declined to bid. Beech, Douglas and Lockheed had conventional single fuselage designs. Goodyear had an interesting design with a short wing and high mounted engines. Helio proposed a modification of their twin engine utility transport which was rejected early. Hiller, Convair, Martin and North American all had the twin boom configuration that KP had been pushing to eventually accommodate a recoilless rifle. Convair was notable because they were already building their entry. The Martin entry had an interesting inverted "V" tail design which featured exhaust gasses from the engines ducted through the booms to the "blown" ruddervator. North American, the ultimate winner, had a straightforward twin boom configuration and a notable helicopter-like canopy to promote visibility." Beckett, 9.
[11] Office of Air Force History, *The Air Force in Southeast Asia: FAC Operations 1965-1970. 38*

guidance to the Armed Services in what amounted to a fiscal austerity program. This guidance affected the acquisition programs of all the Services, and inhibited senior Air Force leaders from overtly acquiring an aircraft specifically designed for FAC.[12] McNamara, however, recognized the Air Force's need to replace the O-1 with an aircraft better suited to contemporary operations in South Vietnam. As a result, he approved the Air Force's request for the OV-10 and directed that the first 157 aircraft be sent to Southeast Asia (SEA) as quickly as possible into the theater of operation.[13] The backing of senior Air Force and DoD leadership did not mean that the OV-10 would be fielded immediately. As a reflection of the acquisition system of the day, the decision made by McNamara in 1965 directed that the USAF would receive the OV-10 in 1967, setting a two-year time of need for the development of the new platform.

Subsequent sections in this chapter explore the challenges experienced in the OV-10 program as it went from design and approval through testing and fielding. In terms of time of need, the most pressing factor was an increasingly acute capability gap identified in ongoing combat operations in Southeast Asia. The initial design produced by Colonels Rice and Beckett was driven by their perceived need for a light, simple and cheap solution to fulfill the following requirement: aiding the ground scheme of maneuver through a light, armed, and rugged reconnaissance aircraft. Rice and Beckett's vision was subsequently modified by a number of intervening factors during the design process. The most pressing factor, identified above but discussed in detail in the next section, was the Air Force's need to fill a FAC capability gap. Developing the LARA platform to meet this need would require heavy modification to the original design specifications. The LARA concept,

[12] Office of Air Force History, *The Air Force in Southeast Asia: FAC Operations 1965-1970*, McConnell's request framed the OV-10 acquisition as filling the USAF's need for a "armed reconnaissance, CAS, visual reconnaissance, and light cargo platform.

[13] Office of Air Force History, *The Air Force in Southeast Asia: FAC Operations 1965-1970*, "The Air Force pared this number to 109 in 1967, freeing the remainder for its worldwide COIN operations."

which began with the efforts of Beckett and Rice, gained momentum as a result of senior DoD leaders interest in meeting the requirements of ongoing combat operations. The LARA concept provided Air Force leaders with an option to fill an impending capability gap within their Service. The time horizon specified by the SECDEF to meet this emergent operational requirement allowed for a more thorough development and testing regimen than the Credible Chase program discussed in the preceding chapter.

Complexity

The two-year time of need seems excessive given that the LARA concept was based around a relatively simple platform. In reality, however, the subsequent development of the OV-10 was anything but simple. A number of the design modifications to the platform resulted from attempts by various Service stakeholders to improve the LARA design to meet their own specific requirements and needs that had emerged from combat experience in Southeast Asia. The developmental complexity of the OV-10 differed from Credible Chase largely as a result of joint requirements inputs. This portion of the analysis will examine the mounting complexity which resulted from the joint development of the OV-10 and also from the testing that accompanied its evaluation.

The complexity of the OV-10 acquisition process occurred largely as a result of inter-service competition and disagreement. According to the projects designers, needless complexity in the process occurred as soon as BUWEPS issued the initial RFP. In their estimation, which admittedly must be viewed with some caution, given their personal interest and involvement in the program, the Service-based acquisition "system" was to blame for the LARA concept drifting away from its original design requirement. According to Beckett, specific Service needs

increasingly began to influence the acquisition and fielding process and bureaucratic politics injected unnecessary complexity:

> The Air Force got into the program after the RFP primarily to control, and ultimately do away with the concept and pushed for an aircraft with a limited Forward Air Controller (FAC) role that wouldn't compete with their centrally controlled jet fighter. BUWEPS opposed it because they hadn't originated it. They felt that they were best qualified to tell the "user" what he should have.[14]

The negative results of these political shenanigans were evident in the additional requirements levied against the platform. For example, the Air Force added 1,000lbs of electronics to ostensibly meet the needs for its FAC requirement. The Navy similarly also set out, in Beckett's estimation, to specify the project into failure.[15] It accomplished this by requiring that the platform must have landing gear capable of operating from a highly unimproved surface, which also added another unnecessary 1,000 lbs.[16]

According to Beckett, his conceptualization of the ideal COIN platform design was being changed by needless Service competition. One can ascribe as much of Beckett's observation to his personal bias but this misses the broader point. DoD acquisition processes, historical or contemporary, are skewed in favor of adding as opposed to subtracting requirements. These added requirements, and the need to offset them with design changes, adds to its complexity. In short, acquisition processes favor addition as opposed to simplification even in the most basic of aircraft acquisitions.

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[14] Beckett, 8
[15] Beckett, 8
[16] Beckett, 8. BUWEPS started with an unprecedented requirement to demonstrate operations from two specially constructed runways with different frequency sine wave undulations. No other vehicle could negotiate these runways at more than 10-13mph.

Beckett's point becomes obvious when the bidding process is reviewed. The nine vendors who submitted bids for the RFP attempted to provide a light, simple, and cheap aircraft. Their bids, however, were hamstrung by the demands of the initial specifications which added significant complexity. Within the DoD, each of the services saw the potential of the OV-10 for meeting their own needs, which were realized in the incorporation of additional specifications into the RFP. As a result, the RFP comprised a "laundry list" of individual Service requirements, to meet their own capability needs, rather than a compromise agreement of the general specifications that would meet all of their requirements equally. The requirements list eventually included over 230 specifications, which added obstacles to the vendors' ability to produce a mission-specific product.[17]

Despite these obstacles, the experimental version of the aircraft developed by North American Aviation (NAA) still had great potential. The experimental aircraft had grown in complexity, but it still provided significant capability where the services were lacking: at the low end of the performance envelope.[18] Following the selection of the NAA OV-10 to meet the LARA requirement, the program progressed through what the Office of Air Force History described as "the most complete combat testing of any aircraft since WWII."[19]

The rigorous testing of the OV-10 was a key enabler in the establishment of the platform's reputation and ultimate success. The testing was accomplished in three phases. This section focuses specifically on the first two, and in particular, with regard to their impact on program complexity. The third phase of testing is covered in the

[17] Maj. Lawrence Reed USAF, *The OV-10A: It Can Perform the Airborne FAC Mission*, Air Command and Staff College, June 1968. 52
[18] Beckett, 10. The incorporation of full instrumentation, ejection seats, external store stations, and larger landing gear were the primary additions.
[19] Office of Air Force History, *The Air Force in Southeast Asia: FAC Operations 1965-1970.* 40.

subsequent section regarding the breadth of the program. The first stage of evaluation was conducted by an All Service Evaluation Group (ASEG) to evaluate the YOV-10's capabilities and to how they could be incorporated into combat operations.[20] The second stage of testing followed initial production of the aircraft and consisted of stateside testing to train crews and evaluate the aircraft's ability to provide for the capability requirements of the service.

The initial testing of the YOV-10 was accomplished in June 1965 by the ASEG to evaluate the aircraft's utility as a COIN platform.[21] The ASEG was comprised of a group of pilots representing each of the Services. The group was formed to demonstrate the aircraft's wide array of capabilities and develop new potential uses for the platform. Beginning their testing in July of 1967 at Eglin AFB, ASEG pilots evaluated the platform's performance in several mission sets: FAC, LARA, Air Drop, and helicopter escort.[22] Flying 60 missions throughout the evaluation, ASEG pilots found the prototype aircraft to be a very effective platform in performing all of the mission sets. In a FAC role, the ASEG judged that the YOV-10 could perform all of the same functions of the O-1 but with greater accuracy and safety for the pilot.[23] The evaluation of the YOV-10 in a LARA mission set was also a success as the platform's slower speeds enabled improved target acquisition and marking capability. The ASEG's assessment of the aircraft's ability to airdrop was also positive and added an unforeseen capability that would prove useful

[20] In the DoD aircraft designation system, and "X" preceding the mission designation refers to "Experimental" whereas a "Y" refers to a prototype. For details, see Department of Defense Directive 4120.15-L, "DoD 4120.15-L, 'Model Designation of Military Aerospace Vehicles'," (12 May 2004), available online http://www.dtic.mil/whs/directives/corres/pdf/412015l.pdf, accessed 21 April 2014.
[21] Reed, 74.
[22] Reed, 74-75.
[23] Reed, 85

in the implementation of the OV-10 as a COIN platform, by delivering both supplies and personnel.[24]

The ASEG evaluation of the YOV-10 was not universally positive. Critiques of the platform were reflections of the same factors that enabled it to perform well as a FAC and LARA asset. Those unfamiliar with small aircraft often mistake size for simplicity. In small aircraft, adding or augmenting one capability often disproportionally compromises another. For example, the huge bubble canopy of the YOV-10, which provided incredible visibility and contributed to positive reviews as a FAC and LARA platform, had the effect of superheating the poorly ventilated cockpit. Superheating of the cockpit increased to the point where sustained operations in extreme temperatures became hazardous for the aircrew.[25] The small size of the platform, which contributed to its tight turning radius and ability to keep eyes on friendly and enemy forces, also created problems with regard to the amount of bombs it could carry. In particular, the YOV-10 could only carry a limited amount of ordnance before reaching the maximum gross weight that the platform could support. Other factors that the ASEG deemed needing improvement were rear seat instrumentation, and an improved gun-sight to aid in the night acquisition of targets.[26] These critiques were tempered by the fact that the aircraft provided a significant advantage over other platforms for the COIN role. The recommended solution to the negative ASEG findings was to add additional equipment and size to the aircraft, which highlights a theme throughout this case study in the way that the

[24] Beckett, 10. The idea of dropping men and equipment from the OV-10 was a new technique to the original designers. The utility of this new mission set served to benefit the marines who utilized it extensively in combat.
[25] Reed, 97. One test airmen remarked that: "When operating the aircraft at low altitudes or in the traffic pattern the high temperatures and extremely poor ventilation caused both crew members to loose dangerously large amounts of body fluid. This could be a serious flying safety hazard due to dehydration and heat prostration."
[26] Reed, 88.

Services approach acquisition: To make something better, it has to become larger and more complex.

Niche aircraft are limited in the amount of additional equipment they can employ. The incorporation of additional systems is often a non-issue for larger aircraft which do not have comparable size and weight restrictions. Niche aircraft, by their nature, provide a specific capability and are often limited in the amount of additional equipment they can carry. In this case, the ASEG pilots saw that the aircraft would benefit with the addition of various bells and whistles. In the development of any niche platform, however, it must be realized that the addition of additional equipment and size not only drives the aircraft away from its original requirement but can also negatively affect the platform's other capabilities. For example, the addition of an aircraft air conditioning system to the OV-10 would solve the cockpit temperature issue, but would also add a significant amount of weight. This added weight, however, decreases the amount of munitions and fuel the aircraft can carry. The lesson from this example is: in the design of niche aircraft the capabilities desired must be prioritized. Prioritizing capabilities system allows program designers the ability to focus their efforts on maximizing what is needed at the expense of those capabilities which are not mission essential.

The ASEG's evaluation served the OV-10 program well by validating its ability to perform the capabilities desired by the services. In the words of one of the members: "the ASEG experience was extremely beneficial in determining USAF and USMC mission requirements, establishing training outlines, and recommending configuration to the OV-10A Project Manager to enhance mission capability, performance, and potential."[27] The ASEG also had the effect of making the aircraft

[27] Reed, 74.

more complex. Following their evaluation, the production model of the OV-10 became larger and more intricate; trading one capability for another.[28]

The first phase of testing for the YOV-10, conducted by ASEG, produced valuable feedback at a cost to the overall program. The reworking of the production model OV-10 led to delivery delays, and pushed the CONUS OT&E plan to early 1968.[29] The USAF's CONUS OT&E plan took place at Eglin AFB, Florida, and lasted from 15 March to 1 July 1969.[30] This second phase of testing had three primary objectives. The first objective was to determine operational usefulness of the aircraft and develop tactics, techniques, and procedures (TTP's) for its employment. The second was to discover any deficiencies and provide data for improvement. The third and last objective would verify that the platform would perform as specified.[31] To achieve these objectives, the YOV-10 was handed over to the special operators of the USAF's 4409th Combat Crew Training Squadron (CCTS), who were tasked with the evaluation.[32] The evaluation was broken down into five phases which evaluated every facet of the OV-10's performance over the course of their 310 hour testing regimen.[33]

The results of the second phase of evaluation of the YOV-10 provided a range of useful and informative feedback for the development

[28] Reed, 86. The YOV-10 tested by the ASEG had 34ft wings and 660shp engines. The production model possessed a 40ft wingspan and 715shp engines. This gave the aircraft more power and lift, but traded its ability to perform more tactical missions.
[29] Office of Air Force History, *The Air Force in Southeast Asia: FAC Operations 1965-1970. 40*
[30] Office of Air Force History, *The Air Force in Southeast Asia: FAC Operations 1965-1970. 40*
[31] Maj. Gearhart, Department of the Air Force, Headquarters USAF Special Operations Center, *Detailed Test Plan, OV-10 Category III OT&E*, 1968. H-2, AFHRA: IRIS 503031.
[32] For details on the 4409th CCTS, see Phillip Chinnery, *Air Commando: Inside Air Force Special Operations Command* (New York: St. Martins Press, 1994), p182.
[33] Gearhart, H-6. The phases of evaluation consisted of a transition phase to familiarize the crews with the aircraft. A weapons systems limitations portion to evaluate how the platform functioned with different weapons configurations. A tactics development phase that evaluated the optimum TTP's for employing the OV-10. An employment phase in which the aircraft flew mission profiles similar to those it would be performing in SVN. And finally a utility phase which evaluated the OV-10s ability to fly mobility, Short Take-off and Landing (STOL), and psychological operations missions.

process. Such feedback included expanded guidance on TTP's, validation of the platform's capability, and identification of problem areas in need of remediation. Flying combat mission profiles, the test crew developed TTP's for safe operation of the aircraft, procedures for harmonizing the propellers, and checklists for bore sighting the weapons the OV-10 was designed to carry.[34] Other testing included a myriad of sighting aids, additional communications equipment, and special mission equipment which could be used in Vietnam.[35] The wide range of equipment and mission profiles tested by the pilots of the 4409th CCTS included: Stabilized binoculars, night vision equipment, loudspeakers for psychological warfare missions, nozzles to spray defoliants in support of the Ranch Hand program, as well as an extendable antenna to turn the OV-10 into a mobile command relay platform.[36]

While the overall evaluation of the platform was exhaustive and successful, 4409th CCTS turned up a number of problems during this phase of testing. Although the superheating problem had been identified during the first phase of testing, cockpit cooling nevertheless remained a problem. Pilots from the 4409th CCTS still found the cockpit temperatures to be excessive when conducting long mission profiles. They proposed solutions including an improved aircraft air conditioning system from the engines bleed air, as well as an unconventional secondary option: wearing a water vest to reduce the physiological effects of the high temperatures.[37] A second deficiency noted by the test team was the extreme level of engine noise present in and out of the cockpit. Testing indicated that the average noise level in the cockpit was 59.7% above the acceptable military standard, which could cause permanent

[34] Gearhart, Annex C.
[35] Gearhart, Annex E-H.
[36] Gearhart, Annex E-H.
[37] Gearhart, Annex E.

hearing impairment in aircrew and maintenance personnel.[38] The 4409th's CCTS test team's recommendation was not surprising. They suggested that maintenance activities be limited to no more than eight hours, and that the crew should use noise suppressing headsets.[39] Such environmental considerations may seem minor, but they were far from trivial. They were important considerations given the high ambient temperature of the Vietnam, and the fact that although noise proofing headsets negated the noise problem, they would deny the crew's ability to hear hostile ground fire when conducting low-level operations.

The US-based OT&E proved the OV-10 to be a very capable platform with few negative characteristics adversely affecting its operation. The scope of the testing demonstrated the additional complexity that the aircraft would have to incorporate when performing a range of roles and missions in combat. While senior Air Force leaders were primarily interested in the OV-10 to replace its ageing FAC fleet, a mission for which the platform was well-suited, it nevertheless would be expected to perform a myriad of secondary mission sets to provide the best value for the acquisition dollar. Each set of secondary mission capabilities added to the YOV-10 not only added complexity to the acquisition program, but created new challenges which influenced the aircraft's primary capability.

The OV-10 suffered from a problem common to niche aircraft, conflating the small size of the platform with simplicity of development and acquisition. The continued development of the OV-10 in the first two phases had evolved considerably from its original intent. According to members of DoD's Advanced Research Project Agency, charged with maintaining American technological advantage, the OV-10 program was to have heralded a new era in defense acquisitions:

[38] Gearhart, Annex F.
[39] Gearhart, Annex F.

> DDR&E envisions this program to be a pilot project to reverse existing tendencies to long development time, high costs, and increased complexity now present in the development of new weapon systems. The reversal in this case is made possible by the inherent nature of the COIN airplane requirement that stresses simplicity on order to be utilized by the indigenous forces of [Military Assistance Program] countries.[40]

The OV-10 began as a low-cost solution to fill a COIN capability gap. Each step of testing, evaluation, and analysis within the service's acquisition system had expanded the size and complexity of the aircraft. The OV-10 that was sent to Vietnam in 1968 to begin its combat testing was a capable aircraft, but was also a great deal more complex than its designers had ever expected.

Breadth

Each of the Services championing the creation of the OV-10 utilized it in Vietnam to fill their particular niche capability requirements. This section analyzes the breadth of the OV-10 in terms of aircraft produced and the mission that they were allowed or able to fulfill. The aircraft had emerged from its initial testing in CONUS with a wide variety of capabilities at the cost of increased programmatic complexity. The third stage of the OV-10 testing took place "in country" and evaluated the OV-10's ability to function in a CAS and FAC role. The breadth and subsequent employment of the OV-10 however depended on each of the services willingness to explore these capabilities. The USAF's "in country" evaluations of the OV-10 consisted of an initial combat test

[40] Beckett, 7.

known as “Combat Bronco,” and a subsequent evaluation of the platform as an Armed FAC (AFAC) asset dubbed “Misty Bronco.”

Image 3: The OV-10 Bronco making its maiden flight in SEA in August 1968 during its 90-day period of combat evaluation with the 19th Tactical Air Support Squadron.[41]

Five months after the OV-10 production model had been delivered to Eglin for CONUS testing six aircraft were shipped to Vietnam to begin Combat Bronco.[42] Disassembled and shipped via C-133 transports, the USAF OV-10’s were deployed to Bien Hoa, SVN to be integrated into the FAC operations of the 19th Tactical Air Support Squadron (TASS).[43] The crews selected to perform the Combat Bronco test were chosen from a wide variety of backgrounds to reduce the effect of bias within the

[41] US Air Force Museum, retrieved from http://www.nationalmuseum.af.mil/shared/media/photodb/photos/090617-F-1234P-031.jpg , Accessed 15 March 2014.
[42] Joseph Potter, Capt USAF, *OV-10 Operations in SEAsia*, HQ PACAF Directorate of Tactical Evaluation, CHECO Division, 15 September 1969. 1. AFHRA: K717.0413-60. Document is now declassified.
[43] Beckett, 11.

evaluation.[44] Over the period 10 August – 30 October 1968 the Combat Bronco team flew over 1,000 combat hours and 552 sorties without an accident. The results of the test were overwhelmingly positive and set the stage for the continued expansion of the OV-10 program.

The Combat Bronco testing put the OV-10 through an entire spectrum of FAC tests and also enabled evaluation of the airframe in the environment for which it was built.[45] Testing in Southeast Asia specifically allowed for the OV-10 to be evaluated in austere forward operating locations (FOL) where runway length, maintenance support, and operating conditions were all marginal. This test also allowed the team to evaluate the OV-10's performance under hostile fire, as well as its ability to integrate with other Air Force platforms in combat. Its improved power and handling led all of the Combat Bronco test pilots to rate the OV-10's performance as outstanding or excellent.[46] The few critiques of this test mirrored those of identified during US testing.[47]

While an objective analysis of the Combat Bronco demonstrates the utility of conducting a combat test of niche aircraft programs, it also raises several questions as to why the OV-10's combat testing failed to employ the weapons that were functionally proven in the US.[48] Failure to test all of the platform's niche capabilities occurred for several reasons. First, politics limited Tactical Air Command's (TAC) ability to utilize the full breath of the OV-10's capabilities. TAC was restricted by

[44] "Five FAC's selected from 7th AF had a combined total of more than 1000 FAC missions in both O-1 and O-2 aircraft; all were TET offensive veterans. The five selected from CONUS resources included a combat experienced F-105 pilot, a T-28 veteran of out-country operation, and A-1 instructor pilot and two pilots without FAC experience." Potter, 1.
[45] The missions included "day and night airstrike control, gunship control, bomb damage assessment, visual reconnaissance (VR), artillery adjustment, and helicopter escort." Potter, 2.
[46] "Without exception, the CB pilots rated maneuverability, response, visibility, and other capabilities of the OV-10's as either outstanding or excellent." Potter, 3.
[47] The disadvantages found in the Combat Bronco test were: Poor cockpit environment (high temperatures), Rear Cockpit lacked adequate instrumentation, limited Starlight Scope capability from the rear cockpit, placement of the front intercom panel required the pilot to switch hands to operate the radio. Potter, 17.
[48] Of the 552 sorties flown the OV-10's machine guns were only fired on nine sorties - for test and evaluation purposes only. Potter, 5.

the “Line,” a DoD restriction which capped TAC’s combat aircraft in theater to 4,000. Beckett explained the importance of this limitation, noting that “if the OV-10 was denied a combat function it did not count toward the limit. If they were armed, however, and allowed to use their weaponry, they had to be counted in the 4,000 and would replace F-4’s on a one to one basis.”[49] Another factor that limited the scope of the OV-10’s missions derived from misperceptions among senior leaders within the Air Force. Their concern was that armed OV-10’s would make FAC pilots overly aggressive, leading to excessive weapons use and increased encounters with enemy ground fire.[50] The result of this assumption was that the employment of the OV-10’s Armed FAC (AFAC) was delayed until a subsequent combat test, named “Misty Bronco,” was directed to explore the use of the aircraft as an AFAC.

[49] Beckett, 11.
[50] Richard Sandborn, Armed FAC (OV-10) Evaluation RVN: Jun-Sep 1969, Operational Analysis Headquarters USAF, July 1970. MSFRIC: M-30905.2-U

Image 4: An OV-10A firing a smoke rocket in the area north of Saigon in February 1969 to show where the F-100 should drop its bombs.[51]

In the period between the Combat and Misty Bronco tests the USAF's integration of the airframe into SEA operations proceeded as scheduled. Following the deployment of the initial six OV-10s for the Combat Bronco test, a delivery schedule was created around the expectation of the factory's ability to produce 10 aircraft per month. Follow-on aircraft were sealifted to Cam Ranh Bay and then flew to their respective Main Support Bases (MSB) in theater (Table 2).[52] The MSB's selected for the OV-10 were Bien Hoa, Da Nang, Nakhon Phanom and Phang Rang (Image 5).[53] From these MSB's the USAF OV-10's were able to move in and out of their respective FOL's as required by the ground units they were supporting.[54]

[51] U.S. Air Force photo, FAC OV-10, http://www.nationalmuseum.af.mil/search/imagesearch.asp?q=OV-10&st=%2Fsearch%2Fimagesearch.asp&site=Museum&btnG.x=0&btnG.y=0, (Accessed 25 March 2014).
[52] Potter, 7.
[53] Potter, 7.
[54] FOL's serving the US Army units in and around Bien Hoa were located at Cu Chi, Di An, Lai Khe, Phuoc Vinh, Dau Tieng, Tay Ninh and Quon Loi. Army units in the vicinity of Da Nang relied on the support of the FOL's at Quang Tri, Chu Lai, and Pleiku. Similarly the units at Nakon Phanom used

	Nakon Phanom	*Bien Hoa*	*Da Nang*	*Phan Rang*	*Total*
Nov 1968	2	16	--	3	21
Dec 1968	--	18	--	4	22
Jan 1969	1	32	--	4	37
Feb 1969	--	34	16	3	53
Mar 1969	1	36	8	4	49
Apr 1969	4	43	15	4	66
May 1969	11	38	24	4	77

Table 2: Distribution of OV-10 Aircraft[55]

During the period between the Combat and Misty Bronco tests the OV-10 was utilized on both "out-country" and "in-country" operations. Out-country operations were run by the 20th and 23rd TASS out of Da Nang, Vietnam and Nakhon Phanom, Thailand, respectively. These operations fell within the standard FAC/VR mission profile of the OV-10, but were typically fragged (tasked to support) classified missions.[56] "In-country" operations were primarily FAC missions in support of CAS sorties, but did allow for the OV-10 to expand upon the breadth of its

Ubon as their FOL. Phang Rang served as the OV-10 training schoolhouse and consequently had no associated FOL. Potter, 8.

[55] This table shows the initial distribution of the OV-10 throughout the period between the Combat Bronco and Misty Bronco tests. Potter, 7.

[56] Potter, 8. The OV-10's out of northern SVN and Thailand supported classified "out-country" operations such as Igloo White, Prairie Fire, Daniel Boone, and other special operations. Monthly sorties in support of these efforts averaged around 200. For details on these operations, see Richard J. Shultz, Jr., *The Secret War Against Hanoi: Kennedy's and Johnson's Use of Spies, Saboteurs, and Covert Warriors in North Vietnam*, (New York: HarperCollins, 1999); Reginald Hathorn, *Here There Are Tigers: The Secret Air War in Laos, 1968-69,* (Mechanicsburg, PA: Stackpole, 2008); and Bernard Nalty, *The War against Trucks: Aerial Interdiction in Southern Laos, 1968-1972* (Washington, DC: Air Force History and Museums Program, 2005).

secondary capabilities such as: “radio relay, convoy escort, artillery adjustment, and CS gas-expenditure missions.”[57] No aircraft were lost on the “out-country” missions, and only one was lost to hostile fire during this period of operations within Southeast Asia.

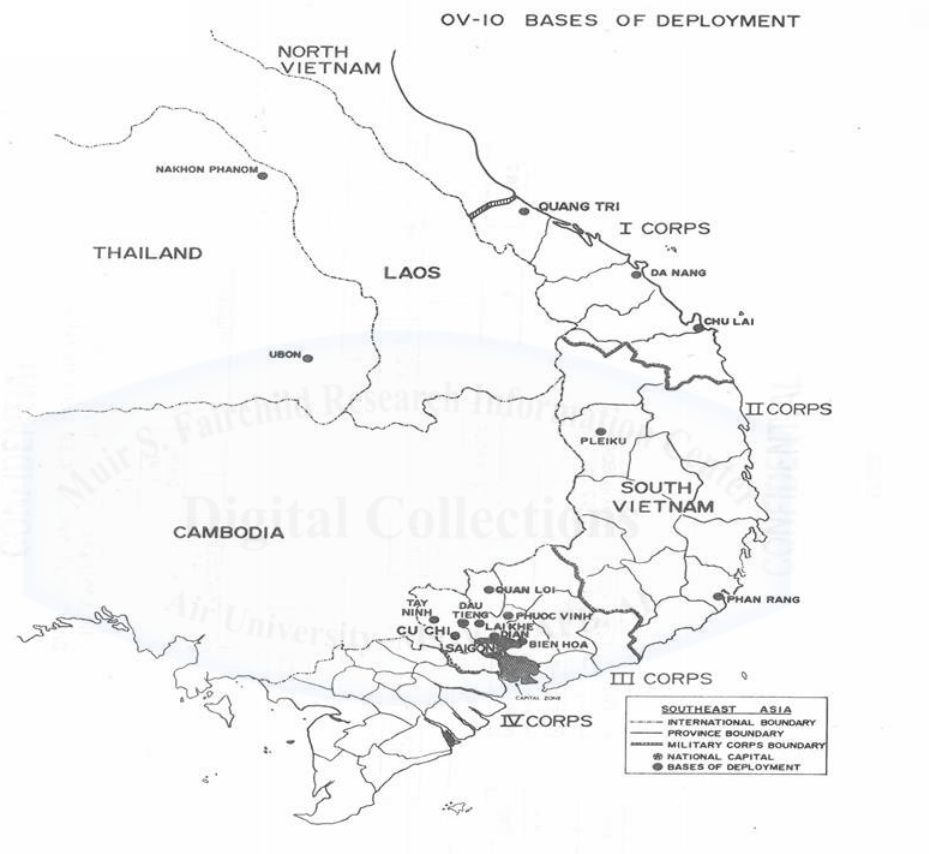

Image 5: OV-10 Bases of Development[58]

Crew training also progressed as planned during this period. The Air Force estimated that 262 pilots per year were required to fully man the program. With the addition of pilots from the O-1’s, which the OV-10 was replacing, the Air Force was able to maintain a 92.1% combat readiness rate of the 127 pilots trained in the first seven months of the

[57] The breadth of the OV-10’s mission set was allowed to expand… so long as this expansion did not include the use of its direct action capabilities. Potter, 9.
[58] Potter, 8.

program.[59] The training program facilitated the expansion of the breadth of the OV-10's employment by providing five courses, each tailored to the particular background of the student pilot. This training regimen produced pilots who were able to fly all of the OV-10's mission sets equally well. Their only limitation derived from the restrictions imposed upon TAC, as well as negative perceptions of some senior Air Force leaders surrounding the AFAC concept. With the growth of able crews and aircraft it became evident that the restrictions on the OV-10's employment needed to be reevaluated, leading to the subsequent Misty Bronco combat test of the OV-10.

The Misty Bronco evaluation confirmed the viability of the OV-10 as an AFAC platform. The test team described their two objectives as: evaluating the capability of the OV-10 to "provide limited but highly responsive airstrike capability to support US Army forces requesting immediate CAS," and to strike FAC-acquired targets prior to the arrival of heavy fire support.[60] Ordinance for the test was limited to 2,000 rounds of 7.62-mm and high explosive rockets, but this restriction did not hinder the OV-10 pilots from showcasing the aircraft's capability as an AFAC platform. Two mission summaries from the Misty Bronco test missions illustrate this point:

> *(26 April) During the course of a normal preplanned strike at XT55290, VC began to scatter from bunkers in the target area. The FAC requested immediate TAC Air at 1430 after completion of his preplanned strike. From 1430 t0 1505 the FAC contained the enemy until Boxer 01 (2 F-4's) flight arrived on station. The FAC expended 14 HE rockets and 1975 rounds of 7.62-mm and was credited with 2 KBA, 1 secondary explosion and 1 secondary fire.*

[59] Potter, 10. The training of OV-10 pilots from Nov '68 – May '69 proceeded in parallel with the arrival of new OV-10's. From an initial 39 combat ready pilots, the crew compliment grew to 127.
[60] Potter, 12.

TAC Air accounted for an additional 3 KBA and 6 secondary explosions.[61]

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(5 May) Issue 25, on CAP for ground forces, saw 2 VC run into a military structure at XT4999272. The ground commander requested the FAC to expend at 1530. Strike clearance was received through the division TACP at 1540. Issue 25 was on target at 1545, off at 1555, expending 14 HE rockets. Ground fire was received but no aircraft hits were sustained. Issue 25 was credited with one military structure destroyed, two secondary fires, and two VC KBA (emphasis in original).[62]

These examples show the utility in allowing the OV-10 to expand upon its breadth of capabilities. The success of the OV-10 in the Misty Bronco evaluation resulted in the Commander of the Seventh Air Force's decree: "that all OV-10 FAC aircraft assigned for in-country operations be armed."[63] This decision did not change the basic mission for the OV-10 FACs, but instead gave the DoD a highly responsive niche aircraft that could provide time-sensitive airstrike capability. Data gathered in 1970, following sustained employment of the AFAC OV-10, proved that the assumptions made by senior Air Force leaders, which had initially limited arming the OV-10, were incorrect. Of the 2,047 sorties flown following the Misty Bronco evaluation, only 318 or 15.5% expended ordinance.[64] Reports also indicated: "the in-country AFAC encountered ground fire at a rate similar to that experienced by tactical fighters.

[61] Potter, 13.
[62] Potter, 14.
[63] Potter, 15.
[64] Sandborn, 13.

Thus the data indicates that the initial concern in these two areas was not justified."[65]

The examination of the breadth of the OV-10 is not complete without a brief examination of its use by the Navy and Marines. Like the Air Force, the Marines had originally received six aircraft to test in SEA. Their aircraft flew operational missions within two hours of delivery and had amassed 500 combat hours in the initial six weeks of their employment.[66] Compared to the USAF the Navy and Marines were less restrictive on the issue of arming the aircraft. In 1968 Admiral Elmo Zumwalt, Jr., acquired a squadron of OV-10s to support riverine forces in the Mekong Delta. Operating on a waiver from the JCS, these OV-10s, known as the Black Ponies, were armed with 7.62-mm guns, HE rockets, and CBU-55 cluster bombs.[67] The Black Ponies were credited with: "generating more target damage than the rest of 7th Fleet combined."[68] The Marines, likewise, experimented with different types of ordinance, such as their incorporation of a 106mm recoilless rifle on the OV-10.

While the other Services were quicker to use the OV-10 as an armed platform they were not immune to the effects of politics. Following the demonstrated success of the OV-10, the Marines were asked by the Navy to trade some of their F-4s for OV-10s. Beckett notes: that the Marine Commandant, Gen [David] Shoup went along with this proposal, but it was turned down by the CNO, Adm. Arleigh Burke.[69] He recognized that if the Navy could provide for the fighters needed by the Marines, there was no need for organic Marine air at all… and then what

[65] Sandborn, 1.
[66] Beckett, 11. The US Marine squadron VMO-2 flew the initial Marine OV-10 missions with a 100% utilization rate over their initial 250 sorties.
[67] Beckett, 11. The waiver from the JCS allowed the Black Ponies to operate without incurring a trespass dispute from the Air Force. The missions of the Black Ponies are described in the context of the riverine war in Vietnam in Thomas Cutler, Jr., *Brown Water, Black Berets: Coastal and Riverine Warfare in Vietnam* (Annapolis, MD: Naval Institute Press, 1988), 195-199.
[68] Sandborn, 3.
[69] Beckett, 11.

was the difference between them and the Army."[70] The idea that the Marines would be done away with, if they ceded their jet aircraft to the Navy, seems far-fetched. For Gen Shoup, however, it was a very serious concern. This example demonstrates how the breath of the OV-10 within the Department of the Navy was also subject to political limitations.

Objective analysis of the breadth of the OV-10 program indicates that its growth was dependent on the proclivities of the service employing it. The potential scope of mission sets for which the OV-10 had proven capable during its stateside testing was limited by the Services once it entered combat. Only after successive evaluations did the aircraft garner enough confidence among different Service leaders that its mission set was allowed to expand. In the minds of OV-10 pilots, the failure to exploit the full range of the platforms capabilities had been "very wasteful."[71] For example, the OV-10's ability to carry 4,000lb of cargo had been sidelined by the USAF. According to one Air Force pilot: "the students were never instructed in cargo handling of delivery, not even to the extent of giving them a weight and balance problem to work on. Given its capacity, a fine capability of the aircraft was not being exploited."[72]

The examples framing the scope of the OV-10's employment have a common lesson. Overcoming institutional resistance to program development requires confidence building measures such as testing and time. The Air Force procured the OV-10 to fill its FAC capability gap. Instead of giving the OV-10 program the flexibility to employ its full range of capabilities, the service limited the platform to only the capabilities for which it saw a need to fill. The breadth of the OV-10's employment was

[70] Beckett, 12. If the Marines had no air than the Army would be expected to ask what the difference was between the Army and the Marines. Why have the Marines at all.
[71] Capt. Robert C. Erler, Interview by USAF Oral History Program, 23 June 1970. 3. AFHRA: K239.0512-376, IRIS: 00904366.
[72] Erler, 4.

allowed to expand as leaders gained confidence from progressive combat testing and the additive success of the program.

Endurance

The enduring use of the OV-10 was complimented by the nature of the capability gap it filled, and its successful employment in Southeast Asia. The OV-10 had added unique niche capabilities in support of COIN operations in Vietnam. The developmental and combat testing which the program underwent expanded the breadth of its capabilities and also solidified its reputation. As a result, the OV-10 continued its service within the DoD until it was divested shortly after its use in Operation DESERT STORM.[73] The OV-10's excellent record in Southeast Asia also made the aircraft a perfect fit for other nations who were conducting COIN against internal threats or needed a platform with the utility of the OV-10. The enduring nature of the niche capability filled by the OV-10 continues today, as it is under consideration in the DoD's recent push to acquire a multi-role COIN aircraft to fill current operational capability gaps.[74]

Following the Vietnam War, OV-10 purchases increased considerably to fill the Services' identified capability gaps. The enduring nature of the DoD's need for a LARA resulted in the further expansion of the OV-10 program. By 1977 NAA had produced 332 OV-10 aircraft for the DoD and FMS.[75] Accordingly, the OV-10 became the mainstay of the USAF's and USMC's respective FAC and light attack capability. In 1983,

[73] Employment statistics and losses for the OV-10s (USMC) and OA-10s (USAF) are available in Eliot Cohen, ed., *Gulf War Air Power Survey, Volume V: A Statistical Compendium and Chronology* (Washington, DC: Government Printing Office, 1993), 361-362; 641.
[74] Robert Dorr, "Combat Dragon II Demonstrates OV-10G+ Bronco Capabilities," Defense Media Network.com (13 June 2013), available online at http://www.defensemedianetwork.com/stories/combat-dragon-ii-demonstrates-ov-10g-bronco-capabilities/, accessed 7 May 2014.
[75] Maj Frank Anderson USAF, *History Air Force Contract Management Division, 1983*, (Air Force Systems Command, 31 October 1984), 75. AFHRA: Call: K243.07 A9-2, IRIS: 1062208.

as the aircraft reached the end of their service life (7,500 hrs,) a Service Life Extension Program (SLEP) feasibility study was undertaken by Air Force Systems Command to examine if revitalizing the DoD's OV-10 fleet was practical.[76] The SLEP substantiated the utility of revitalizing the OV-10's and directed which actions must be undertaken to do so.

The Air Force SLEP study validated that the need and feasibility of extending the service life of the OV-10. a decision with which the DoD concurred. Updates and modifications were incorporated into this effort through a Conversion in Lieu of Procurement (CILOP) program, which as the title suggests, would refit existing aircraft instead of purchasing new ones.[77] DoD Contracting summarized the desirability of refitting OV-10s in the following way: "the SLEP/CILOP combined program provided a cost effective alternative to satisfy a still-existing mission requirement for the USAF, USMC, and foreign services."[78]

Aside from an improved engine, which increased its horsepower by 25 percent, the improvements that resulted from the SLEP/CILOP were different for each of the services. The requirements generated by each of the Services directly correlated to the respected capability gap for which they needed the OV-10 to fill. The Marines, for example, developed revitalization requirements that supported its need for both a LARA and FAC platform. The result was the addition of improved navigation, Electronic Countermeasures, a 20mm gun turret, and improved ordinance carrying capability.[79] The Air Force, on the other hand, utilized the OV-10 primarily as a FAC aircraft and limited its

[76] Anderson, 75.
[77] Anderson, 75. The CILOP updated the aircraft to a Night Observation System (NOS) through the incorporation of Forward Looking Infra-Red (FLIR), updated avionics, and added ordinance-carrying capabilities.
[78] Anderson, 75.
[79] Anderson, 75. The improved ordinance carrying capabilities added the ability for USMC OV-10 to carry both hellfire and sidewinder missiles.

improvements to avionics and increased fuel capacity.[80] The SLEP/CILOP revitalization solidified the enduring role of the OV-10 and enabled the platform to continue providing niche capabilities in the DoD until 1995.

Air force leaders in other nations also appreciated the OV-10's unique capabilities. The leaders in countries such as Venezuela, Indonesia, Thailand, The Philippines, Columbia, and Korea all used the OV-10 to add COIN capabilities to their air forces. The German Air Force also acquired the OV-10 for use as a target tug. The platforms sold through FMS, which increased sales domestically and expanded American access and influence in the countries which purchased them, were variants of the OV-10A used in Vietnam. In a number of cases, the aircraft were modified to suit the user's needs. The Philippine OV-10 variant, for example, was modified with a four-bladed propeller to improve climb performance, and the German version incorporated a turbojet engine for improved target towing.[81] The international proliferation of the OV-10 highlighted the universal need for a low-cost aircraft with multi-role capabilities.

The enduring nature of this need is also underscored by the role that the OV-10 still plays in the inventory of U.S. agencies. Although the military divested itself of the OV-10 following Desert Storm, many of the aircraft were subsequently transferred to domestic agencies which could utilize its niche capabilities. A summary of the OV-10's wide adoption by and use in various US government departments and agencies demonstrates its enduring value:

[80] Anderson, 76.
[81] "The Rockwell North American OV-10 Observation/Light Attack aircraft," 29 August 2013, http://www.militaryfactory.com/aircraft/detail.asp?aircraft_id=147 (accessed 1 April 2014). The German tug model integrated a J85-GE-4 series auxiliary turbojet in the upper fuselage.

1. "**National Aeronautics and Space Administration (NASA)**
   NASA uses both A- and D-model Broncos for aeronautical research, taking advantage of the large cargo area and the ability to switch engines from side to side to facilitate aero-acoustical and voice-recognition research.
2. **Bureau of Land Management (BLM)**
   The BLM flies OV-10As as firefighting lead aircraft, using the built-in smoke system to mark the proper path for tanker aircraft to fly over the fire. The BLM also experimented with using Broncos for aerial surveying work.
3. **California Department of Forestry and Fire Protection (CDF)**
   The CDF flies OV-10As in a firefighting role similar to the BLM.
4. **U.S. Department of State (DOS)**
   The State Department inherited a large number of OV-10Ds formerly owned by the Bureau of Alcohol, Tobacco, and Firearms (BATF) and actively flies them on illegal drug crop spraying missions in Central and South America, as well as in the Caribbean. This agency is currently involved in an ongoing program to refurbish ex-military Broncos for this role."[82]

The continued utilization of the OV-10 by US departments and agencies demonstrates the enduring utility of light multirole aircraft with niche capabilities. One might argue the utility of the OV-10 was limited to the permissive and semi-permissive environments in which these departments and agencies operate. Recent American involvement countering insurgents and terrorists in Iraq, Afghanistan, and elsewhere have taken place largely in semi-permissive environments. As such, the need for an aircraft with the LARA/FAC capabilities of the OV-10 has reemerged within the DoD.

[82] "U.S. Non-Military Broncos," http://ov-10bronco.net/us-other.cfm (accessed 1 April 2014).

In 2008, Air Force Chief of Staff, Gen Norton A. Schwartz, pushed to acquire a smaller, cheaper, and more nimble aircraft that could deliver niche capabilities for ongoing COIN operations. Under a concept designated OA-X, the USAF planned to invest $2 billion into the purchase of 100 aircraft to meet a new Light Attack Armed Reconnaissance (LAAR) aircraft requirement.[83] The DoD's Aeronautical Systems Center began soliciting in July of 2009 when it issued a Capability Request for Information (CFRI) for the LAAR concept.[84] One of the proposed solutions for this "new" capability requirement was, not surprisingly, a variant of the Bronco dubbed the OV-10X, manufactured by Boeing Aircraft.[85] While the LAAR concept has morphed since its inception, into what is now the Light Air Support (LAS) aircraft concept, it underscores the enduring nature of the capability need which the OV-10 has filled for the past 50 years.[86]

Conclusion

The OV-10 was developed by the services to meet an emerging capability gap in Vietnam. The time allowed by the emerging nature of its need allowed the services more time to test and improve the airframe but also created a unique set of challenges. The OV-10 differed from

[83] Robert Dorr, "The LAAR Lightweight Combat Aircraft Is Coming to the Air Force," 25 Jan 2010, http://www.defensemedianetwork.com/stories/the-laar-lightweight-combat-aircraft-is-coming-to-the-air-force/ (accessed 1 April 2014).

[84] Air Combat Command (ACC) Light Attack/Armed Reconnaissance (LAAR), 27 July 2009, https://www.fbo.gov/index?s=opportunity&mode=form&tab=core&id=b30065477e7b9159bb2687f2cc2a3667&_cview=0, (accessed 2 April 2014), This document stated: "ASC is issuing this CAPABILITY REQUEST FOR INFORMATION (CRFI) to explore cost-effective acquisition options to provide this Light Attack/Armed Reconnaissance (LAAR) capability for Air Combat Command (ACC) starting in fiscal year (FY) 12.

[85] For Boeing's pamphlet regarding their conception of the next generation OV-10 see: http://www.ov-10bronco.net/Technical/boeing_ov-10(x)_super_bronco_info_card_2009_01.pdf

[86] Air Force Material Command, "Light Air Support (LAS) Aircraft Solicitation Change 20," 30 May 2012, https://www.fbo.gov/index?s=opportunity&mode=form&tab=core&id=56eeccacf84c1e24cf8a9f72047f2299&_cview=0 (accessed 1 April 2014). Reference Section L for new expectations regarding the use of the LAS. This proposal requests the delivery of 20 aircraft to be integrated into the Afghan Air Force at Shindad and Kandahar for the COIN effort in Afghanistan.

most aircraft in that it was conceived originally by two innovators who saw an impending capability gap and designed an aircraft to meet it. Their concept was taken and modified by the Services and the vendor to fill their particular needs, but in the end the platform maintained many of the niche attributes that the projects founders had identified.

The extra time derived from the emergent nature of the requirement was, in many ways, a dual-edged sword. On one hand it had allowed for rigorous testing in both the experimental and production phases of development, which helped to convinced Service leaders of the utility of the OV-10's capabilities. On the other hand, however, additional time allowed these same leaders to add size, weight, and expense to an aircraft whose utility derived from being small, light, and cheap. The rigorous testing of the platform also allowed for the expansion of the breadth of the OV-10's employment, helping it to overcome the limitations inherent in bureaucratic politics. Combat testing also gave proponents of the program, ammunition to disprove the negative assumptions surrounding the aircraft and allowed it to expand its mission capabilities to include AFAC. The subsequent employment of the platform established its credibility as a cost effective, multirole, COIN aircraft, which led to the OV-10's expansion and use by foreign countries and US civilian departments and agencies.

The final lesson provided by this analysis of the OV-10 is that the enduring nature of a niche capability aircraft depends on its ability to fill the capability gap, a reflection perhaps of the nature of the gap itself. The OV-10 was successful in both respects. Its multi-role capabilities and exceptional performance made it the ideal fit for applications at the lower end of the aircraft performance envelope. Likewise, the enduring nature of insurgencies and terrorist campaigns, in which the US will be involved, combined with the need for CAS in permissive to semi-permissive environments, ensures an enduring need for this type of

platform into the future. The OV-10's success in meeting and exceeding these needs proved pivotal to its enduring success.

Chapter 5

Conclusions

The United States will face a range of threats tomorrow and in the future. In response to these threats, senior leaders will look to acquire niche aircraft to deal with niche threats. This study offers a number of lessons drawn from historical niche aircraft acquisitions programs, as well as recommendations based on those lessons, to provide guidance for those leaders. Niche aircraft provide the DoD with the ability to fill current or impending capability gaps in a relatively rapid fashion, and in this respect, they will continue to be a useful tool for senior leaders who seek to meet the demands of the modern and future military to achieve the goals set for them by policy makers.

This thesis began by analyzing the current framework used by the DoD to identify capability gaps and develop relevant solutions based on time of need. Following this analysis, this thesis then examined two case studies which provided examples of niche aircraft development program: the unsuccessful Credible Chase mini-gunship program, and the OV-10 Bronco light armed reconnaissance aircraft. Each of these programs offered lessons and unique insights on niche aircraft acquisitions. To assist in the analysis and comparison of the programs, this thesis developed a methodology based around four variables which are common to modern aircraft development and acquisition. These variables are: time of need, complexity, breadth, and endurance. The utility of this methodology is that it enables the analysis of past programs in the context and using the terms of modern military procurement. As such, this chapter will examine the lessons provided by the case studies and their applicability to the Department of Defense's (DoD's) current procurement process.

The nature of the capability shortfalls which drive the acquisition of niche aircraft requires an expedited procurement process to facilitate rapid employment. The reason the process needs to be expedited is that niche aircraft are typically developed to fill an urgent current capability gap or one that is likely to emerge in the near future. The Joint Capabilities Integration Development System (JCIDS) process can facilitate rapid acquisition through its urgent and emergent staffing lanes, but defense leaders must be realistic in their expectations regarding the fielding of niche aircraft. Despite the simple nature of these platforms, relative to other platforms in the US Air Force's inventory or under development, niche aircraft acquisition is by no means simple or less complicated.

There are many reasons why niche aircraft acquisition programs can become complicated. The first reason is that the assumptions senior leaders make regarding the expected time of need for niche aircraft acquisition are sometimes unrealistic or fail to account for obstacles which can arise during the aircraft's development. The case studies explored in this analysis provide examples of niche aircraft development through processes similar to those used currently for urgent and emergent acquisitions. In the case of Credible Chase examined in Chapter Three, the outcome of the program was tied to its ability to meet an urgent capability gap. Senior DoD leaders assumed that the aircraft could be rapidly produced, modified, and employed because it was a small and simple platform. These assumptions did not account for the setbacks that can arise during aircraft development and led to the Credible Chase program being overcome by events. Had the time of need, which drove Credible Chase, been tied to an emergent capability gap, the endeavor would have had a greater chance of filling its intended role. The development of the OV-10, the subject of Chapter Four, demonstrates the benefits that result from matching the operational need

with a feasible timeline for development and acquisition. The OV-10 was developed based on an emergent time of need, which consequently gave both the Armed Services and vendor enough time to produce an aircraft capable of filling the identified capability gap.

The second reason relates to how time of need is conceptualized. The conceptualization of "time of need" is vitally important to the development of niche aircraft. When evaluating if a niche platform is the correct solution for a capability gap, senior leaders must take into account the temporal limitations that accompany the development of any aircraft, no matter how simple it may appear to be. As in the case of Credible Chase, it may be that the desired solution cannot be developed in the needed time, despite the use of Commercial Off-the-Shelf (COTS) technology and the expedited Urgent Operational Need (UON) staffing process. Senior leaders must therefore temper their expectations accordingly, either giving the platform the time to be put through its paces or accepting the risk that the platform may not be completed in time to fill the capability gap for which it was built.

The third, and perhaps most important reason niche aircraft programs become needlessly complicated starts at their very beginning with the assumption that the size of the platform equals simplicity of development and acquisition. The assumption that niche aircraft acquisition is a simple endeavor can lead to numerous negative effects during the development and testing process. The complexity surrounding the acquisition of any aircraft, but for niche aircraft in particular, must be accounted for in terms of systems and personnel. The DoD acquisition process allows for the use of COTS technology in order to develop a product in a rapid fashion. Senior leaders, however, must understand that the modifications for combat which COTS technology often requires can add significantly disproportionate amounts of complexity to a seemingly simple project. Not only do aircraft

modifications require additional time for engineering and systems integration, they also have the effect of increasing the amount of training that aircrews have to complete to master the additional systems.

The case studies of Chapters Three and Four both demonstrated the dramatic effects modification had on the Credible Chase and OV-10 programs. The modification of the Credible Chase aircraft, for example, appeared to Air Force leadership to be as simple as adding a gun and sensor to an uncomplicated commercial platform. In reality, pilots training to operate the short take-off and landing (STOL) platforms required considerable skill and training. In other words, STOL flying required a skill sets which were difficult for even the most experienced pilots to master. The addition of mission equipment—a mini-gun and sensors—had the effect of increasing the training time for the U.S. and RNAF operators who were expected to master all aspects of its combat mission sets. The OV-10 program similarly became progressively complex, but for a different reason. The joint nature of the OV-10's development, and subsequent lack of consensus between the Services, led to the incorporation of a vast number of requirements into the DoD's Request for Proposal (RFP). The results of these additional requirements were evident in the final production model of the OV-10, which grew into a much larger and significantly more complex platform than its original designers had intended. The consequence was that as the airframe grew in size and complexity, it progressively lost some of the niche capabilities which it had originally been intended to provide.

A comparative analysis of the Credible Chase and OV-10 programs provides future leaders, designers, and acquisitions managers with three significant lessons. First, the acquisition and employment of seemingly simple aircraft becomes progressively complex as modifications are added to the airframe and new mission sets are expected of the aircrews. Second, the DoD acquisition framework favors adding as opposed to

simplifying requirements, even in the most basic of aircraft acquisitions. The final lesson is perhaps most significant: in small aircraft design, size and weight are at a premium and the addition of new capabilities comes at a grossly disproportionate cost usually in the least affordable commodity, time. Every proposed modification or increase in size must therefore be expected to come at the cost of the niche capabilities intrinsic to small aircraft. The current JCIDS framework simplifies the processes for the acquisition of urgent and emergent operational needs, but the onus of ensuring niche aircraft retain their simplicity still remains in the hands of senior leaders. This final lesson can and should be applied as follows: Service leaders charged with developing niche capabilities should add requirements, and increase the complexity of niche platforms, only when they are required to meet the specific capability gap for which the aircraft is being produced. In this way, the advantages intrinsic to small niche platforms can be preserved.

The breadth and scope of the niche aircraft examined in this thesis also provide significant lessons for those who would seek to develop such capabilities. Breadth is dependent, in part, on time of need as this dictates the timeframe in which the aircraft can be developed, tested, and employed. Within JCIDS, UONs provide little margin of error for vendors to deliver their aircraft in a timely manner, and also for aircrews to test and employ the platform to meet the capability shortfall. The effects of this are apparent in the analysis of the Credible Chase program. In this instance, senior Air Force leaders took for granted the vendor's ability to meet the needs of the Service. Put simply, the acquisitions managers trusted the vendors' promise to deliver but did not verify their ability to do so. The vendor's failure to meet the delivery timeline had a negative and cascading effect within the program, consequently reducing the scope of training for USAF and Vietnamese aircrews. The assumption that the use of COTS platforms would speed the process was misplaced

as neither vendor could deliver enough aircraft to meet the Air Force's needs in time to meet the capability gap. Had the vendors been given a more flexible timeframe, the breadth of the project arguably would have been more substantial.

The development of the OV-10 was based upon meeting an emergent operational need and consequently allowed greater flexibility in establishing its breadth over time. Designed within a timeline similar to that of the current JEON framework, the OV-10 had years to refine and test its capabilities as opposed to the months allowed for Credible Chase. This extra time proved to be a dual-edged sword. On one hand it led to the modification of the aircraft to the point where it lost some of its niche capabilities. On the other hand, the additional time led to the aircraft being put through its paces and allowed it to validate its remaining niche capability sets through progressive testing. Limitations of the breadth of the OV-10's employment were subsequently self-imposed as opposed to temporal. Although the OV-10's testing within the U.S. had validated its capability to perform the armed force air controller (AFAC) mission, its initial combat employment over South Vietnam was limited strictly to FAC missions. These constraints were placed upon it by Service Leaders—based upon faulty assumptions and political restrictions—which were only lifted following successive, successful combat tests.

The lesson from this specific example is that even when given ample time to develop and employ a niche capability, its utility can be adversely affected by the predispositions of senior leaders and impact of bureaucratic politics. These constraints can be overcome by those advocating for niche airpower capabilities through the use of institutional "confidence building measures," such as combat testing, to establish credibility in the weapon system.

The final portion of this analysis evaluated the enduring nature of aircraft developed to meet niche capability gaps. Both of the case studies demonstrated that the endurance of a niche aircraft is dependent on the enduring nature of the capability gap itself and the institutionalized processes which facilitate the transition of niche aircraft into long term programs or their distribution via Foreign Military Sales (FMS). While the Credible Chase program was unable to fill the capability gap for which it was created, its capabilities were sold to and effectively utilized by friendly foreign nations. The export of the Credible Chase aircraft through FMS enabled its niche capability to endure overseas within partner nations, such as Thailand and Cambodia. The OV-10 was similarly exported through the FMS program, but also continued to fill an enduring niche capability for the DoD in the years following the Vietnam War. The prolonged endurance of the OV-10 was due to the DoD's recognition of the enduring nature of the capability gap for which the aircraft had been procured, and the use of institutional processes to facilitate the extension of the OV-10's service life.

The current acquisitions framework possesses similar processes which enable niche platforms, developed to meet urgent or emergent operational needs, to transition into an enduring capability. The benefit of an institutionalized process, to facilitate this transition, is that it enables the DoD to continue to utilize niche aircraft beyond the conflict for which they were developed. The analysis of the two case studies points to two relevant applications in future acquisitions. If a niche aircraft is developed to meet a capability gap which has been overcome by events, such as Credible Chase, it may be utilized to fill other similar capabilities for the DoD or partner nations. Conversely, a niche aircraft which fulfills its intended purpose should continue filling the operational capability gap until the aircraft can no longer meet it, due to changes in mission sets, operating environments, threats, or the dissolution of the

gap. Niche aircraft are an essential component of modern military operations and their utility is enduring, given the desire or necessity of our enemies to use asymmetric means and avoid direct competition with the U.S. military. How long such aircraft fill their niche depends on the nature of the capability gap itself and the ability of senior leaders to recognize and provide for the enduring use of the platform.

The objective of this analysis is to serve as a stepping stone for those who seek to develop niche capabilities. While every niche capability gap is unique, the presence of gaps in future conflicts is not. Senior leaders charged with developing niche aircraft must understand the significance of the process which they are undertaking. The perceived simplicity of the airframe must not be confused with the level of difficulty inherent to niche acquisitions. With this understanding, senior leaders will be more accurate in their conceptualization of the time of need and consequently be more apt to integrate the niche acquisition correctly within JCIDS. Throughout the development of these aircraft, it is also incumbent upon leadership to ensure that complexity is only added to the system when absolutely necessary to retain the advantages inherent to small niche platforms. The successful employment of niche aircraft is dependent on the ability of leadership to foresee and overcome the obstacles that inhibit the optimum utilization of the platform and use the tools that exist within the system to overcome them.

Above all, this analysis proves that leadership is the most crucial part of niche aircraft acquisition. In every part of the process, leaders have the ability to enhance or inhibit the successful development of a niche capability. Leaders desiring to fill operational capability gaps with niche aircraft must do three things to be successful: frame the processes, use the system to their advantage, and have a vision for the use of the platform. Framing the problem allows leaders to recognize that the development of a seemingly simple solution will be a complicated

endeavor and consequently lead them to make more accurate assumptions. The acquisition system, while not conducive to maintaining simplicity within platform development, is an essential part of any acquisition. Leaders have the ability to choose how the aircraft will enter the system and constrain it from adversely affecting the development of the platform along the way. Finally, leaders must have a strategic vision for the role the niche aircraft will play in modern conflict, as well as the possibilities that lie beyond the immediate need. Vision allows leaders to foresee and overcome obstacles to niche acquisition and provides them the ability to shape the platforms enduring utility to meet future capability shortfalls. Niche aircraft present the DoD with an outstanding tool to fill their operational capability gaps. Success requires leaders who understand the nature of the capabilities these platforms present, a knowledge of the system used to acquire them, and the vision to employ and sustain them to meet the capability gaps of modern conflict.

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