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Future Tactical Unmanned Aircraft System Case History: A Tailored Approach to Acquisition Strategy

June 2025

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Prepared for the Naval Postgraduate School, Monterey, CA 93943

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ABSTRACT

This research project examines the Future Tactical Unmanned Aircraft System (FTUAS) program as a case study in adaptive Army acquisition. The study employs a case history methodology by analyzing the history of the RQ-7 Shadow and its eventual retirement, conducting stakeholder analysis for the new FTUAS program, and using structured decision tools to assess the most appropriate acquisition pathway to recommend an acquisition strategy. Central to the analysis are decision matrices and sensitivity analyses, which evaluate four courses of action: Urgent Capability Acquisition (UCA), Middle Tier Acquisition (MTA), Major Capability Acquisition (MCA), and a Hybrid approach. The analysis evaluates each possible pathway against the decision criteria of cost, schedule, performance, flexibility, manufacturing readiness levels (MRLs) and technical risk, applying weightings based on stakeholder preferences. This capstone research presents a decision-making framework for acquisition professionals to use to develop an appropriate acquisition approach based on the Service's priorities to balance risk, manage cost/schedule/performance requirements and deliver capability at the speed and scale of relevance.

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ABOUT THE AUTHORS

CPT Sean Dantonello is a native of Syracuse, New York. He commissioned as an Infantry Officer in 2016 after graduating from Syracuse University with a Bachelor of Science in Exercise Science. His initial assignments included serving as a Mechanized Infantry Platoon Leader and Company Executive Officer in Charlie Company, 1st Battalion, 9th Cavalry Regiment at Fort Hood, Texas, where he completed operational rotations to both the Republic of Korea and Lithuania in support of Operation Atlantic Resolve. He later commanded Echo Company, 3rd Battalion, 60th Infantry Regiment, and Headquarters and Headquarters Company, 120th Adjutant General Battalion (Reception) at Fort Jackson, South Carolina. During his time at Fort Jackson is when he assessed into the Acquisition Corps. CPT Dantonello has been married to his wife, Kahla, since 2017. They have two daughters, Alana (5) and Scottie (2). In his free time, he enjoys spending time with his family, running, lifting, cycling, and competing in local races. He is an avid reader and lifelong New York Mets fan. Upon graduation, he will report to Detroit Arsenal, MI where he will serve as the Assistant Product Manager for A4 Bradley Production under Program Executive Office Ground Combat Systems.

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LIST OF ACRONYMS AND ABBREVIATIONS

AAF	Adaptive Acquisition Framework
AAI	Aircraft Armaments Inc
ACAT	Acquisition Category
ACV	Amphibious Combat Vehicle
A-CDD	Abbreviated Capabilities Development Document
AMC	Army Materiel Command
AoA	Analysis of Alternatives
AFC	Army Futures Command
AI	Artificial Intelligence
APB	Acquisition Program Baseline
AROC	Army Requirements Oversight Council
BCT	Brigade Combat Team
CBA	Capability Based Assessment
CDD	Capabilities Development Document
CDR	Critical Design Review
CFT	Cross Functional Team
COA	Course of Action
COTS	Commercial off the Shelf
CPFF	Cost Plus Fixed Fee
CPIF	Cost Plus Incentive Fee
DA	Density Altitude
DAS	Defense Acquisition System
DCAPE	Director of Cost Assessment and Program Evaluation

DIU	Defense Innovation Unit
DoDI	Department of Defense Instruction
DoD	Department of Defense
DOT&E	Director of Operational Test and Evaluation
DOTmLPF-P	Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities, and Policy
DR	Directed Requirement
EFV	Expeditionary Fighting Vehicle
EO/IR	Electro-Optical / Infrared
EW	Electronic Warfare
FACE	Future Airborne Capability Environment
FARA	Future Attack Reconnaissance Aircraft
FAR	Federal Acquisition Regulation
FFP	Firm Fixed Price
FLRAA	Future Long Range Assault Aircraft
FTUAS	Future Tactical Unmanned Aircraft System
FVL	Future Vertical Lift
FYDP	Future Years Defense Program
GAO	Government Accountability Office
GCE	Ground Control Element
GMAUASPO	Ground Maneuver Unmanned Aircraft System Product Office
GOTS	Government off the Shelf
ICD	Initial Capabilities Document
INC	Increment
IOC	Initial Operational Capability
IOT&E	Initial Operational Test and Evaluation

ISR	Intelligence Surveillance and Reconnaissance
JAUS	Joint Architecture for Unmanned Systems
JEONS	Joint Emergent Operational Need
JROC	Joint Requirements Oversight Council
JUONS	Joint Urgent Operational Need
LSM	Landing Ship Medium
MCA	Major Capability Acquisition
MDA	Milestone Decision Authority
MDO	Multi-Domain Operations
MRL	Manufacturing Readiness Level
MOSA	Modular Open System Architecture
MTA	Middle Tier Acquisition
MTBSA	Mean Time Between System Aborts
NASA	National Aeronautics and Space Administration
NDAA	National Defense Authorization Act
NPS	Naval Postgraduate School
OIF	Operation Iraqi Freedom
ONS	Operational Needs Statement
OSD	Office of the Secretary of Defense
OSGCS	One System Ground Control Station
OSRVT	One System Remote Video Terminal
OTA	Other Transaction Authorities
OTM	On the Move
OUSD	Office of the Undersecretary of Defense
PEO	Program Executive Office

PdM	Product Manager
PBL	Performance Based Logistics
PPBS	Planning, Programming, and Budgeting System
PDR	Preliminary Design Review
PM	Program Manager
PoR	Program of Record
PO	Project Office
PPB&E	Planning, Programming, Budgeting, and Execution
PRR	Production Readiness Review
R&S	Reconnaissance and Surveillance
RFP	Request for Proposal
ROV	Remote Operated Vehicle
RSTA	Reconnaissance, Surveillance, and Target Acquisition
SA	Situational Awareness
T&E	Test and Evaluation
TRADOC	Training and Doctrine Command
TRL	Technical Readiness Level
TUAS	Tactical Unmanned Aircraft System
TUAV	Tactical Unmanned Aircraft Vehicle
UAS	Unmanned Aircraft System
UCA	Urgent Capability Acquisition
USD (A&S)	Undersecretary of Defense for Acquisition and Sustainment
USD(R&E)	Undersecretary of Defense for Research and Development
VTOL	Vertical Takeoff and Landing

I. INTRODUCTION

The Department of Defense (DoD) views unmanned systems as essential for sustaining and advancing military superiority (Office of the Secretary of Defense [OSD], 2014). These systems are intended to seamlessly integrate with manned platforms, compressing the warfighter's decision-making process and minimizing risks to human life (OSD, 2014). However, effectively integrating unmanned systems to achieve this vision remains challenging, particularly in the context of evolving threats, logistical support, supply, maintenance, employment considerations and technological advancements.

The RQ-7 Shadow Tactical Unmanned Aircraft System (TUAS) has provided the Army with critical intelligence, surveillance, and reconnaissance (ISR) capabilities for over 20 years (U.S. Army, 2024). Although its acquisition was ultimately considered a success, evident through its longevity and over 1 million flight hours, 85% being in combat scenarios, its acquisition and deployment were not without flaws (Lee, 2019). With its acquisition strategy focused on commercial-off-the-shelf (COTS) technology and rapid fielding due to Operation Iraqi Freedom in 2003, many issues went unidentified until fielding to Brigade Combat Teams (BCT) (U.S. Army, 2005). There was less emphasis on Doctrine, Organization, Training, materiel, Leadership and Education, Personnel, Facilities, and Policy (DOTmLPF-P) factors (Ground Maneuver UAS Product Office [GMUASPO], 2013).

Even with these flaws, the RQ-7 Shadow became a staple in the BCT's arsenal in providing crucial situational awareness (SA) without the need to put troops in harm's way (U.S. Army, 2024). However, as the threat landscape has changed, the capability gaps in the RQ-7 Shadow have led to the introduction of the Future Tactical Unmanned Aircraft System (FTUAS) program. This program seeks to create a more functional reconnaissance asset that is runway-independent, has an expeditionary Ground Control Element (GCE), emits a lower acoustic signature, can operate in more extreme environmental conditions, and integrates a modular-open-system architecture (MOSA) and open business approach (U.S. Army, 2022c). The Unmanned Aircraft Systems

(UAS) Project Office (PO) is meeting these requirements through an agile approach to the adaptive acquisition framework (AAF) and contracting processes (U.S. Army, 2022a).

A. PROBLEM STATEMENT AND RESEARCH PURPOSE

To address these challenges and support multi-domain operations (MDO), the acquisition community must develop a deeper understanding of how acquisition strategies can better facilitate the development and fielding of advanced unmanned platforms. Both the RQ-7 Shadow and FTUAS sought rapid acquisition of an uncrewed system due to operational capability gaps. The Army acquired the RQ-7 Shadow during Operation Iraqi Freedom. The Army is developing the FTUAS at the same time as the war in Ukraine, the Israel-Hamas conflict, and the tensions between China and Taiwan. The research seeks to evaluate how the project office tailored its approach to acquiring the FTUAS and if the innovative acquisition strategy provided better results than similar DoD acquisitions in meeting program office goals. Ultimately, this study seeks to offer valuable insights to guide future acquisition strategies for unmanned systems. This work will be particularly useful for military leaders and acquisition professionals seeking to apply agile principles in defense procurement.

B. RESEARCH QUESTIONS

This research's primary focus is on the FTUAS project office and how it tailored the adaptive acquisition framework (AAF) and contracting processes to meet the unique requirements of the FTUAS program. Secondary objectives include addressing how other transaction authorities (OTAs) were utilized as a non-federal acquisition regulation (FAR)-based contracting approach to incentivize vendor participation and foster innovation and the competitive process. Secondly, this research evaluates how the Army has modernized its acquisition approach from the acquisition of the RQ-7 Shadow to the current and ongoing acquisition of the FTUAS. Finally, this research seeks to consider the broader applicability of the FTUAS strategy to ascertain if insights from the FTUAS program could apply to other DoD program offices to improve acquisition outcomes. The specific primary and secondary research questions are: 1) How did the Army project office tailor the AAF and contracting processes to procure the FTUAS? 2) How were OTAs leveraged to encourage a robust response from vendors in the FTUAS program? 3) What institutional changes did the Army implement to modernize its acquisition process for FTUAS? 4) What insights can be drawn from the FTUAS program that could be applied to other DoD program offices to improve acquisition outcomes?

C. METHODOLOGY

This study employs a case history methodology to examine how the program office utilized the AAF and contracting processes in acquiring the FTUAS. Specifically, the case study evaluates the acquisition strategy of the FTUAS through the utilization of decision matrices and sensitivity analyses to determine if the program selected the most efficient and appropriate acquisition strategy. This approach enables the collection and evaluation of real-world data and program office documentation, providing a basis for determining the overall effectiveness of the strategy employed.

D. SCOPE AND LIMITATIONS

This study uses current and historical data derived from governmental reports and actual program and requirements documentation from the program office. The aim of using these reports is to assess the acquisition strategy of the FTUAS and determine if this strategy is a method that applies to other DoD programs as an effective way to use the AAF. However, this research must state some limitations. One is the research's utilization of qualitative measurements of effectiveness due to the minimal availability of statistical data, with the FTUAS only being in increment. Another limitation to address is the potential lack of generalizability of the acquisition strategy to other DoD programs outside of uncrewed vehicle acquisitions.

E. ORGANIZATION

Subsequent chapters of this study delve into the actual case history of the FTUAS. Chapter II provides background on the RQ-7 Shadow and what prompted the need for a new uncrewed aircraft system. It examines the FTUAS program, explains modernization efforts within U.S. Army acquisition, including Army Futures Command (AFC), the AAF, and OTAs. Chapter III is a review of relevant literature. Chapter IV is the case history of the FTUAS, placing the reader in the perspective of the program manager attempting to make the best acquisition strategy decision for the FTUAS. Chapter V provides a detailed analysis of the case history by evaluating potential acquisition strategy options based on the prioritization of specific evaluation criteria and finally provides the researcher's recommendations and conclusions.

II. BACKGROUND

This chapter consists of two distinct parts. The first part focuses on the RQ-7 Shadow as the predecessor of the FTUAS. It provides a background of the RQ-7 Shadow from its requirement/need generation, capability gaps, use, and retirement in early 2024 (Army Public Affairs, 2024). It also provides a detailed explanation of the FTUAS program and its actual acquisition strategy. The second part focuses on modernization efforts the DoD and Army implemented to update the acquisition process following the initial acquisition of the RQ-7 Shadow. Specifically, this part analyzes Big "A" acquisition composed of the Joint Capabilities Integration and Development System (JCIDS) that generates the requirements for major weapons systems, the Planning Programming, Budgeting, and Execution (PPB&E) that results in resources and funding of acquisition programs, and the Defense Acquisition System (DAS), which provides a framework to manage the development and purchase of products and services within the DoD (McGarry, 2022). It then continues by evaluating organizational changes implemented by the Army, including the establishment of Army Futures Command.

A. RQ-7 SHADOW

1. History

In the early 1990s, combatant commanders, especially at the brigade and lower level, recognized capability gaps in existing systems to provide critical situational awareness in a timely and responsive manner that prevented putting manned systems into hostile environments (U.S. Army Aviation Center of Excellence [USAACOE], 2017). Therefore, on January 5, 1990, the Chairman of the Joint Requirements Oversight Council (JROC) signed JROC Memo 003–90 stating a need for a short-range, long-endurance reconnaissance, surveillance, and target acquisition (RSTA) capability (USAACOE, 2017). Commanders believed that national intelligence collection systems could contribute to appeasing some of these needs. Still, they fall short of providing the continuous, responsive, timely, and detailed information that warfighters need in combat (USAACOE, 2017).

In November 1999, following the release of a request for proposal (RFP), the U.S. Army held a systems capability demonstration, a five-day flyoff that allowed industry to present their potential solutions to the significant intelligence gap (GMUASPO, 2013). Guidance to the program office and industry was to field commercial-of-the-shelf (COTS) technology, which would reduce overall costs and rapidly field a system to meet warfighter's needs (GMUASPO, 2013). This five-day flyoff resulted in the selection of Aircraft Armaments Inc. (AAI) Corporation's (now Textron Systems) Shadow Tactical Unmanned Aircraft Vehicle (TUAV) (Textron Systems, n.d.).

AAI's Shadow TUAV system, renamed RQ-7 Shadow after the contract award, consists of four aircraft that each have an electro-optical (EO)/Infrared (IR) payload with two also equipped with a laser range finder/designator capability (Director of Operational Test and Evaluation [DOT&E], 2010). The system also consists of a one-system ground control station (OSGCS), one portable ground control station, four one-system remote video terminals, and each aircraft also contains a single channel ground and airborne radio system that provides it the ability to relay communications (DOT&E, 2010). The system, operated by a platoon of 22 personnel, utilizes a hydraulic/pneumatic launcher to deploy the Shadow as can be seen in Figure 1 and an arresting cable and hook system to recover it along a runway post operation (DOT&E, 2010). The RQ-7 Shadow aircraft is transported by 2 HUMVEES and launched by a platoon from improvised runways throughout the operational environment (Army Technology, n.d.).

Figure 1. RQ-7 Shadow and launching mechanism Source: DOT&E (2010).

AAI delivered the first RQ-7 Shadow systems to the Army in 2001 (Army Technology, n.d.). The Army fielded the RQ-7 Shadow to units at Fort Hood, TX, who completed the RQ-7 Shadow's initial operational test and evaluation (IOT&E). It received initial operating capability (IOC) in 2002 (Hawkins, 2016). Following IOC, the RQ-7 Shadow deployed to support Operation Iraqi Freedom (OIF) in March of 2003 (GMUASPO, 2013). Its first theater use was by the 104th Military Intelligence Battalion supporting the 4th Infantry Division where it flew over 2,000 flight hours through the course of 591 flights (Hawkins, 2016). Since then, the RQ-7 Shadow has been used worldwide by the United States and its allies, providing critical intelligence to combatant commanders. The RQ-7 Shadow has flown over 1 million hours, 85% of which have been spent in combat situations (Lee, 2019). Although there was a revolution in capability to the BCT, the RQ-7 Shadow was not without its flaws.

The RQ-7 system's capabilities evolved significantly over its years of use, reflecting advancements in operational capacity, endurance, and system integration. In 2010, it faced reliability challenges with a mean time between system aborts (MTBSA) of 14.4 hours which was significantly less than its user requirement of 20 hours (DOT&E,

2010). However, the RQ-7 achieved high availability due to subsystem redundancy (DOT&E, 2010). The aircraft's limited operational range also necessitated it to approach targets closely, increasing detection risk, and survivability remained constrained under electronic warfare threats (DOT&E, 2010).

By 2021, the Shadow had progressed to the RQ-7Bv2 Block III version, enhancing target acquisition, operational endurance, and reliability, reaching the MTBSA target of 20 hours, a 130% improvement from earlier models (DOT&E, 2021). Block III enabled manned-unmanned teaming (MUMT) with Apache helicopters, boosting tactical flexibility (DOT&E, 2021). However, high fuel consumption, engine reliability issues, and vulnerabilities in contested electronic and cyber environments posed new challenges to the use and validity of the RQ-7 (DOT&E, 2021). These updates aimed to provide greater support to commanders with improved situational awareness, though many survivability gaps persisted.

Despite its successes, the RQ-7 Shadow faced more pronounced limitations as military technology advanced. The system's reliance on a pneumatic launcher and recovery system restricted its flexibility compared to newer vertical takeoff and landing (VTOL) UAS platforms (Atherton, 2018). Furthermore, the growing demand for lower acoustic signatures in tactical operations highlighted the Shadow's relative noisiness (Eversden, 2022). Finally, the U.S. Army sought more modular designs that would allow easier upgrade and integration of ever-evolving UAS technology, preventing the fielding of already outdated equipment by completion of modifications (Marino, 2024).

To address these capability gaps, the U.S. Army initiated efforts to replace the RQ-7 Shadow in 2018, deploying prototypes to units for evaluation as early as 2019 (Gill, 2021). In 2021, the Army Requirements Oversight Council (AROC) approved an Abbreviated Capabilities Development Document (A-CDD) without modifications, signaling progress toward a next-generation solution (Sterenfeld, 2021). Demonstrating its commitment to modernization, the Army officially retired the RQ-7 Shadow in 2024, concluding more than two decades of distinguished service (Army Public Affairs, 2024).

2. Acquisition Strategy

The RQ-7 Shadow was an Acquisition Category (ACAT) II program (U.S. Army, 2005). The procurement plan leveraged a phased increment approach, utilizing block upgrades to improve or "grow" the system over time (U.S. Army, 2005). With an acquisition objective of 87 systems, the program office held a flyoff that allowed it to compare COTS systems that were mature and would be readily available (U.S. Army, 2005). The system required the utilization of a modular approach and bus architecture to allow for upgradability and compatibility with future systems (U.S. Army, 2005). Table 1 shows the critical requirements of the RQ-7 with threshold and objective values.

Table 1. TUAS Critical Requirements. Source: U.S. Army (2005).

AV Range	(T) 50 km, (O) 200 km
AV On-station Endurance	(T) 4 hrs at 50 km, (O) 3–4 hrs at 200 km
OPTEMPO	(T) 12 hours continuous coverage on station in a 24 hour period, surge to 18 hours in 24 hours for 72 hours of operation (O) 18 hours on station in a 24 hour period, surge to 24 hours in 24 hours for 72 hours of operation.
Payload, Performance *	(T) Day/night passive imagery (EO/IR) with auto-track, and capable of performing recognition given detection (EO Pr/Pd = 80%, IR Pr/Pd = 70%) and tracking of light wheeled and tracked vehicles (3.5m x 3.5m) at altitudes of greater than 8,000 ft (day) and 6,000 ft (night) and standoff ranges of 3 km (3866 m slant range, day; 3513 m slant range, night). (O) Recognition/detection (EO Pr/Pd = 90%, IR Pr/Pd = 90%) at 5 km standoff range km (5563 m slant range, day; 5324 m slant range, night). Wide-area surveillance and target classification and identification, with on-board sensor cross cueing and auto-search desired. SAR/MTI multi-mode radar payload is next priority payload after EO/IR. (Slant range derived from ORD requirements.)
Payload Weight	(T) 60 lbs., (O) 100 lbs.
System Transportability	Entire system and crew transported in 2 High Mobility Multi-purpose Wheeled Vehicles (HMMWVs) with shelters, 2 HMMWV troop transports and 2 trailers.
System Deployability	(T) 2 x C-130. One additional C-130 may be used for MMF (HMMWV & trailer) and fuel. (O) 2x C-130 for SHADOW 200 and MMF
Launch & Recovery	(T) Unimproved 100m x 50m area, (O) Automatic Launch/Recovery
Propulsion System *	(T) MOGAS Engine

& Generators	(O) Heavy Fuel Engine
Target Location Error	(T) 80 m, (O) 20 m
Command, Control, Communications, Computers and Intelligence (C4I) Interoperability *	(T) GCS's must be capable of interfacing with appropriate fire support and intelligence networks. GCS must be compliant with the JTA-A, DII-COE, and compatible with ABCS. Digital information transmitted and received by the GCS IAW VMF IPD-TE. Capable of passing NRT moving video to the ASAS RWS. Live imagery payload data passed from the GCS to collocated JSTARS ground station. (O) GCS compatible with the Force XXI Battle Command-Brigade and Below system. Pass live annotated imagery directly from the AV to the JSTARS CGS.

(T) Denotes Threshold Requirement (O) Denotes Objective requirement
* Denotes Key Performance Parameters

3. Contracting Strategy

The contracting plan for the Shadow leveraged a competitive process to select the most advantageous system (U.S. Army, 2005). The flyoff was weighted along with evaluation criteria, and vendors were required to provide a mature system with a roadmap for future upgrades (U.S. Army, 2005). Due to the nature of the COTS systems, the hardware acquisition was conducted under firm-fixed-price contracts, allowing the government to limit cost risk (U.S. Army, 2005).

Considering the significant maintenance and required operational readiness, the Army also implemented a performance-based logistics (PBL) contract. This held the contractor responsible for supply chain management, depot-level maintenance, and training (U.S. Army, 2005). The Army initiated the PBL on a cost-plus incentive fee (CPIF) contract based on mission readiness targets with a goal of converting to fixed-price contracts as actual costs were determined (U.S. Army, 2005). The PBL contract was a sole source contract with a justification for AAI Corporation (U.S. Army, 2005). This was due to the Army not owning a full technical data package (TDP), and market research indicated that no alternative supplier could match AAI's proprietary knowledge (U.S. Army, 2005). The Army determined that the time and cost needed for another vendor to meet an equivalent sustainment capability would be too significant in both cost and time (U.S. Army, 2005). However, in later phases of the PBL contract, the Army allowed for future competition as other vendors stood up sustainment capability (U.S. Army, 2005).

B. FUTURE TACTICAL UNMANNED AIRCRAFT SYSTEM (FTUAS)

The FTUAS is aimed at modernizing unmanned aerial reconnaissance and surveillance capabilities for BCTs. The program is a direct response to operational needs for a more agile, runway-independent, and rapidly deployable tactical unmanned aircraft system that can replace the RQ-7 Shadow (U.S. Army, 2021). The FTUAS is designed to improve battlefield situational awareness, enhance mobility, and reduce logistical burdens, aligning with the Army's modernization priorities under the future vertical lift (FVL) initiative (U.S. Army, 2022a).

1. Operational Need for FTUAS

The FTUAS requirement stems from several validated operational needs statements (ONS) submitted by various Army divisions which all emphasize the necessity for vertical takeoff and landing (VTOL), reduced logistical footprint, and the ability to execute reconnaissance and surveillance (R&S) missions in MDO (U.S. Army, 2022a). The RQ-7 Shadow, which has served the Army for over two decades, suffered from critical limitations, including the requirement for a fixed runway for launch and recovery, a large logistical footprint, and the inability to conduct operations on-the-move (U.S. Army, 2021).

In response, the Army conducted a 12-month "buy, try, inform" demonstration, assessing four non-developmental UAS solutions across five BCTs (Department of Army, 2022). This effort included over 1,500 flight hours and extensive Soldier feedback and helped informed the final FTUAS requirements (U.S. Army, 2021). The lessons learned from this demonstration highlighted the need for a Group 3 UAS with improved mobility, survivability, and autonomy, as well as compatibility with Army rotary-wing transport assets like the CH-47 (U.S. Army, 2022b). Table 2 describes the different UAS groups.

Table 2. UAS Group Descriptions. Source: Gettinger (2024).

Unmanned Aircraft Systems Categorization Chart

UA Category	Maximum Gross Takeoff Weight (lbs)	Normal Operating Altitude (ft)	Speed (KIAS)	Representative UAS
Group 1	0-20	< 1200 AGL	100 kts	WASP III, TACMAV RQ-14A/B, Buster, Nighthawk, RQ-11B, FPASS, RQ16A, Pointer, Aqua/Terra Puma
Group 2	21-55	< 3500 AGL	< 250	ScanEagle, Silver Fox, Aerosonde
Group 3	< 1320	< 18,000 MSL	< 250	RQ-7B Shadow, RQ-15 Neptune, XPV-1 Tern, XPV-2 Mako
Group 4	> 1320		Any Airspeed	MQ-5B Hunter, MQ-8B Fire Scout, MQ-1C Gray Eagle, MQ-1A/B/C Predator
Group 5	> 1320	> 18,000 MSL	Any Airspeed	MQ-9 Reaper, RQ-4 Global Hawk, RQ-4N Triton

Legend

AGL	above ground level
FPASS	force protection aerial surveillance system
ft	feet
KIAS	knots indicated airspeed
kts	knots
lbs	pounds
MSL	mean sea level
TACMAV	tactical micro air vehicle
UA	unmanned aircraft
UAS	unmanned aircraft system

2. Acquisition Strategy

The acquisition of the FTUAS follows a structured incremental approach to ensure both immediate operational capability and long-term technological evolution. The Army's strategy is centered on a rapid acquisition framework that integrates commercial and military technological advancements while maintaining flexibility to adapt to emerging threats (U.S. Army, 2021). Given the critical role of unmanned aerial systems (UAS) in modern MDO, the FTUAS program is structured to transition from increment 1

(INC 1), an interim solution, to increment 2 (INC 2), the full-capability program of record (U.S. Army, 2022b). Figure 2 depicts how the program office will increment capabilities over INC 1 and INC 2. Figures 3 and 4 provide the initial schedules for INC 1 and INC 2 of the FTUAS program respectively highlighting the incremental approach by the program office.

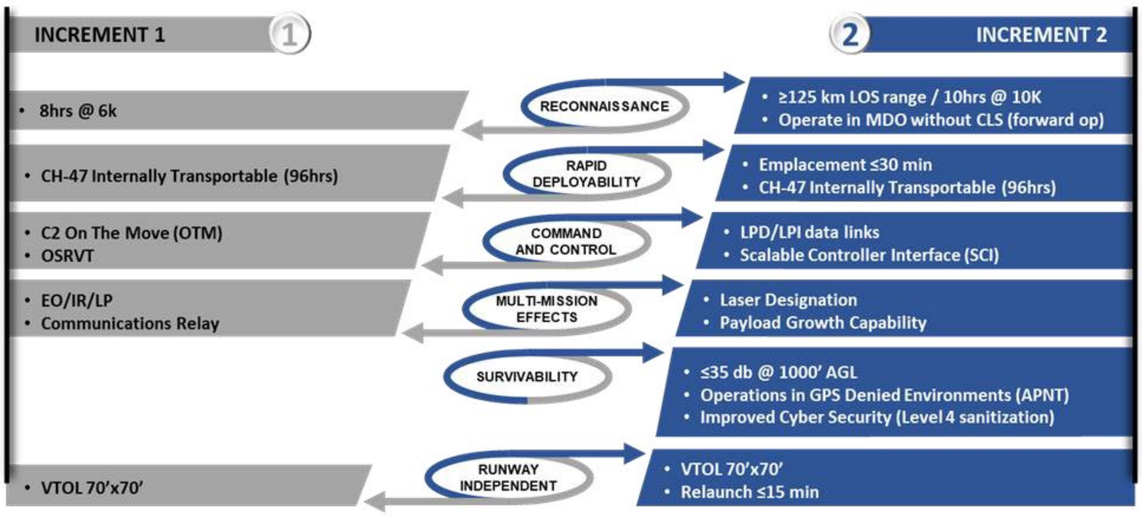

Figure 2. FTUAS Increment Capabilities. Source: U.S. Army (2022c).

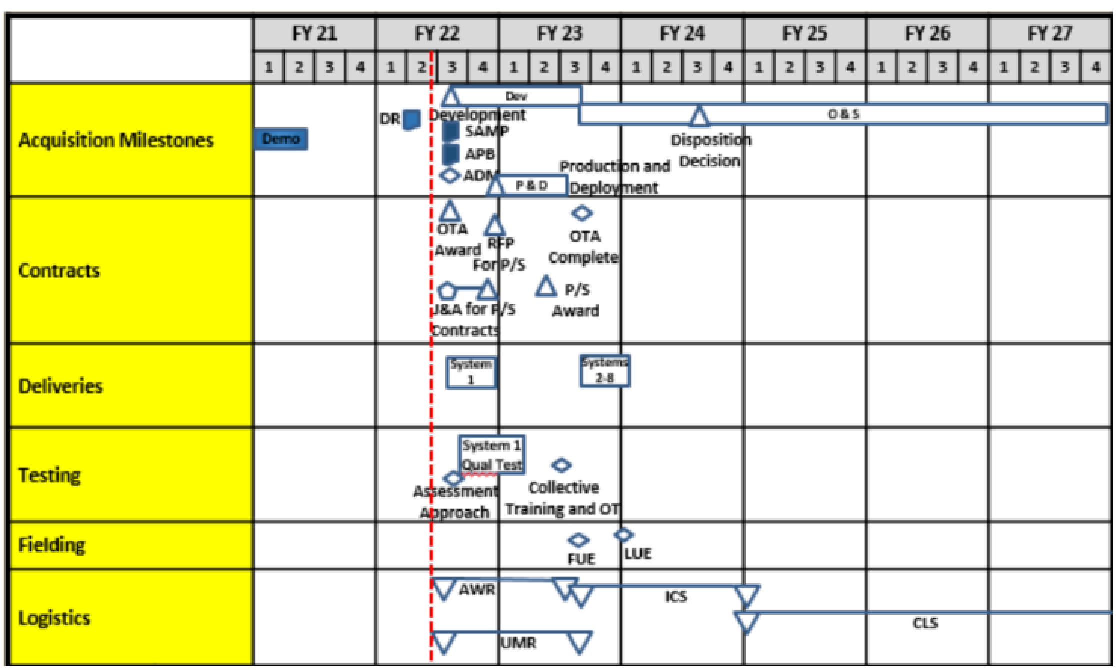

Figure 3. FTUAS Increment 1 Schedule. Source: U.S. Army (2022a).

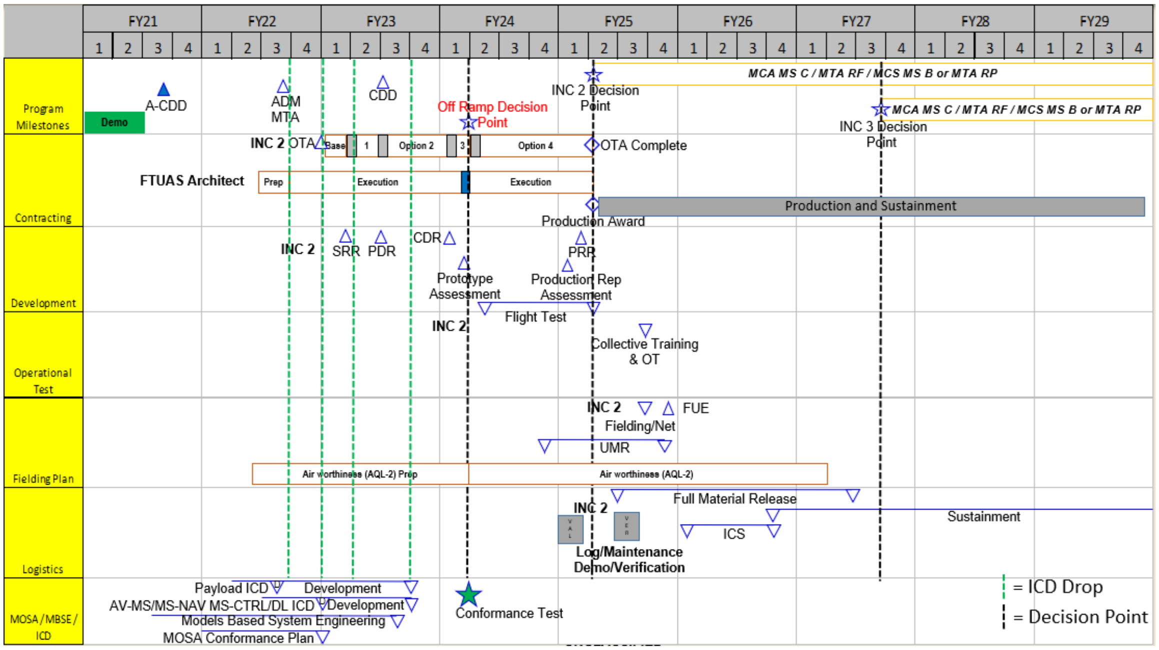

Figure 4. FTUAS Increment 2 Schedule. Source: U.S. Army (2022c).

a. Increment 1: Interim Capability for Immediate Fielding

Increment 1 was initiated as a directed requirement (DR) from Army Futures Command to rapidly procure and field a Group 3 UAS with high technology readiness level (TRL) to BCTs (U.S. Army, 2022a). This urgent procurement was validated due to the limitations of the RQ-7 Shadow, particularly its large operational footprint, dependence on a fixed runway, and lack of on-the-move (OTM) control capabilities (U.S. Army, 2021). The buy-try-inform methodology, which involved the testing of four non-developmental UAS solutions across five BCTs, directly informed the specifications for INC 1 (U.S. Army, 2021). The acquisition objective for this increment was 8 systems with an expected IOC of quarter 3 of fiscal year 2023 (U.S. Army, 2022a).

The INC 1 solution incorporates VTOL capability, allowing for operation in confined and austere environments while reducing the logistical footprint. Additional requirements include a single-Soldier portable control system, a minimum of eight hours of endurance at 6,000 feet density altitude (DA) with a 25-lb payload, and the ability to integrate with existing Army networks, including the one-system remote video terminal (OSRVT) (U.S. Army, 2022a). Transportability is another key consideration, with INC 1 systems designed to be internally transported on CH-47 helicopters (U.S. Army, 2022a).

To meet these aggressive timelines, the Army employed other transaction authorities (OTA) as a non-FAR-based contracting strategy (U.S. Army, 2022a). OTAs enable faster contracting processes and encourage participation from both traditional defense contractors and innovative commercial technology firms. The INC 1 prototype phase will deliver four aircraft, four portable ground controllers, and necessary maintenance equipment (U.S. Army, 2022a).

b. Increment 2: Full-Capability Program of Record

While INC 1 serves as an interim solution, increment 2 (INC 2) represents the Army's long-term program of record (PoR) for tactical Unmanned Aircraft Systems. The goal of INC 2 is to fully replace the RQ-7 Shadow fleet as well as phase out INC 1 systems by FY 2028 (U.S. Army, 2021). The acquisition objective of this increment is 76 systems with IOC expected in fourth quarter of fiscal year 2025 (U.S. Army, 2022c). The critical requirements for the replacement are listed in Table 3. This transition allows the Army to refine its operational requirements and leverage emerging technological advancements in autonomy, payload integration, and battlefield networking.

Key focus areas for INC 2 include:

- Increased endurance and payload capacity to support longer ISR and communications relay missions.
- Enhanced autonomy and artificial intelligence (AI) integration, reducing cognitive workload on operators and enabling multi-aircraft control from a single ground station.
- Improved survivability features, such as low acoustic and visual signature and advanced electronic warfare (EW) protection to operate in contested environments.
- Modular open systems architecture (MOSA), allowing for interoperability with future payloads and mission equipment (U.S. Army, 2021).

Table 3. FTUAS Critical Requirements. Adapted from U.S. Army (2021), U.S. Army (2022a), U.S. Army (2022c).

AV Range	(T) Support BCT-level R&S over extended ranges (O) Maximize standoff range for persistent surveillance in dispersed operations
AV On-station Endurance	(T) Endurance sufficient for cross-domain RSTA mission profiles (O) Extended loiter time for deep area coverage and long-duration surveillance
OPTEMPO	(T) Operate forward with limited/no CLS, sustainable for 96-hour windows (O) Sustain high-frequency tasking with autonomous diagnostics and rapid turnarounds
Payload, Performance *	(T) Modular payloads (EO/IR, SAR, SIGINT, EW, comms relay), MOSA-compliant (O) Rapid plug-and-play capability, autonomy-enhanced sensors, multi-mission configs
Payload Weight	(T) <250 lbs (O) <160lbs
System Transportability	(T) Internally transportable on one CH-47 (O) Configurable for transport with minimal setup time via other platforms
System Deployability	(T) Single Soldiers portable GCS, fielded from austere conditions (O) Fully autonomous setup, support for disaggregated control stations
Launch & Recovery	(T) VTOL in 70x70 ft area surrounded by 150 ft obstacles (O) VTOL in same area surrounded by 250 ft obstacles
Propulsion System * & Generators	(T) Use of DLA-available batteries or heavy fuel (O) Quiet/hybrid-electric system with reduced thermal/ acoustic signature
Target Location Error	(T) Target accuracy sufficient for RSTA and call-for-fire missions (O) Precision geolocation for precision strike and sensor-to-shooter linkage
Command, Control, Communications, Computers and Intelligence (C4I) Interoperability *	(T) Secure digital C2, SCI integration, compatible with Joint systems (O) Multi-domain control from dispersed platforms, including AI-enabled tasking

* Denotes Key Performance Parameters (T) Denotes Threshold requirement
(O) Denotes Objective requirement

The acquisition pathway for INC 2 follows a middle tier acquisition (MTA) strategy, as outlined in DoD Instruction 5000.80 (U.S. Army, 2021). Middle tier acquisition programs enable rapid prototyping and fielding, allowing for iterative development and refinement of new capabilities. Instead of committing to a single vendor, the Army plans to engage in multiple prototyping efforts (U.S. Army, 2021).

3. Contracting Strategy

The contracting strategy for the FTUAS focuses on OTAs and employing these non-FAR-based contract types to balance speed, competition, and risk. The program plans to transition from OTA-based prototyping to a hybrid production contract, combining Firm Fixed Price (FFP) and cost-type elements (U.S. Army, 2022c). By leveraging these streamlined approaches, the Army fosters competition, encourages innovation, and maintains adaptability as system requirements evolve.

a. Phase 1: "Buy-Try-Inform" Prototyping and Evaluation

The initial phase of the FTUAS program involved a "Buy-Try-Inform" strategy, where four vendors were competitively selected and awarded an OTA agreement to deliver non-developmental Group 3 UAS prototypes for field evaluations across five BCTs (U.S. Army, 2022a). Each vendor's system underwent operational testing, with over 1,500 flight hours accumulated. This phase provided direct Soldier feedback on system performance, ease of use, mobility, and maintainability, which served as the foundation for informed down-select decisions (U.S. Army, 2022c).

b. Phase 2: Increment 1 (INC 1)

Following the demonstration phase, the Army applied structured evaluation criteria including technical performance, cost, schedule, and operational suitability to down-select from four vendors in the "Buy-Try-Inform" phase to a single vendor for increment 1 fielding (U.S. Army, 2022a). To facilitate rapid fielding, the Army employed an OTA agreement for prototyping, with the potential transition to a hybrid FAR-based contract that would combine Firm Fixed Price (FFP) and Cost-Plus-Fixed-Fee (CPFF) elements for sustainment and additional procurement (U.S. Army, 2022a).

c. *Phase 3: Increment 2 (INC 2)*

In parallel, the Army launched planning efforts for increment 2 which will act as the full-capability PoR. INC 2 awards vendors with an initial OTA base contract with four options (U.S. Army, 2022c). Each option will have a down-selection based on performance at specific milestone in the acquisition process.

- Option 1: Preliminary Design Review (PDR).
- Option 2: Critical Design Review (CDR).
- Option 3: Flight demonstrations and MOSA verification.
- Option 4: Production Readiness Review (PRR) (U.S. Army, 2024c).

Once the final vendor is selected, INC 2 will transition from OTA agreements to a FAR-based full-rate production contract (U.S. Army, 2022c). The Army will use a competitive acquisition model for production and sustainment to incorporate a mix of FFP contracts for procurement and CPFF contracts for logistics and sustainment (U.S. Army, 2022c). The final contract structure will integrate lessons learned from fielded systems to minimize acquisition risk while ensuring long-term warfighter readiness (U.S. Army, 2022c).

C. ARMY ACQUISITION MODERNIZATION EFFORTS

1. Big "A" Acquisition

The concept of "Big A" acquisition in the Department of Defense (DoD) encapsulates the overarching framework of decision support systems that guide the requirements, resource allocation, and acquisition processes essential for defense operations. As seen in Figure 5, "Big A" integrates three primary systems: the Joint Capabilities Integration and Development System (JCIDS), the Planning, Programming, Budgeting, and Execution (PPBE) process, and the Defense Acquisition System (DAS) (Defense Acquisition University, 2022). Each of these systems serves a distinct role, yet they collectively ensure that defense acquisition aligns with strategic objectives and fulfills the operational needs of the warfighter.

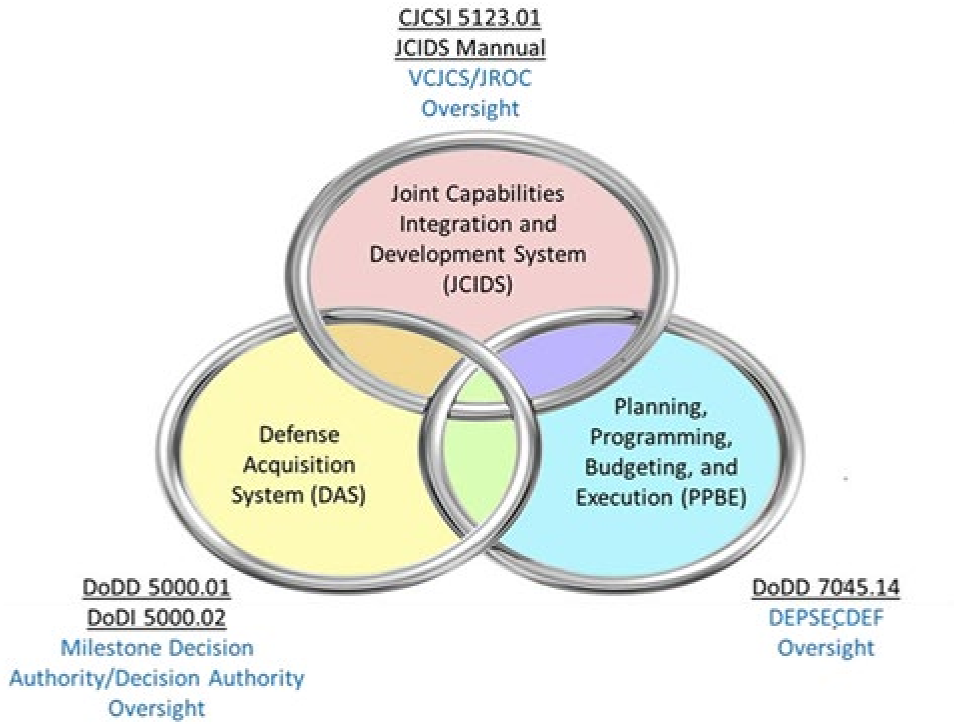

Figure 5. DoD Decision Support Systems. Source: Defense Acquisition University (2022)

2. JCIDS

The JCIDS process is a framework employed by the U.S. Department of Defense (DoD) to identify, assess, and prioritize joint military capabilities to address gaps in national defense strategy. JCIDS was originally established following a 2002 directive from the Secretary of Defense, with the goal of creating a more efficient and uniform process for assessing and addressing capability needs across the various branches of the military (Defense Acquisition University, 2014). The JCIDS process (Figure 6) is critical in ensuring that the DoD allocates resources efficiently and effectively to address operational needs while fostering interoperability among joint forces.

JCIDS operates through a structured decision-making process managed by the Joint Requirements Oversight Council (JROC). The JROC is responsible for reviewing and validating requirements based on their alignment with strategic goals and potential to enhance joint warfighting capabilities. Established under Title 10 of the U.S. Code, this council ensures that capability development efforts are consistent with the overarching national defense strategy and emerging threats (JCIDS Manual, 2021).

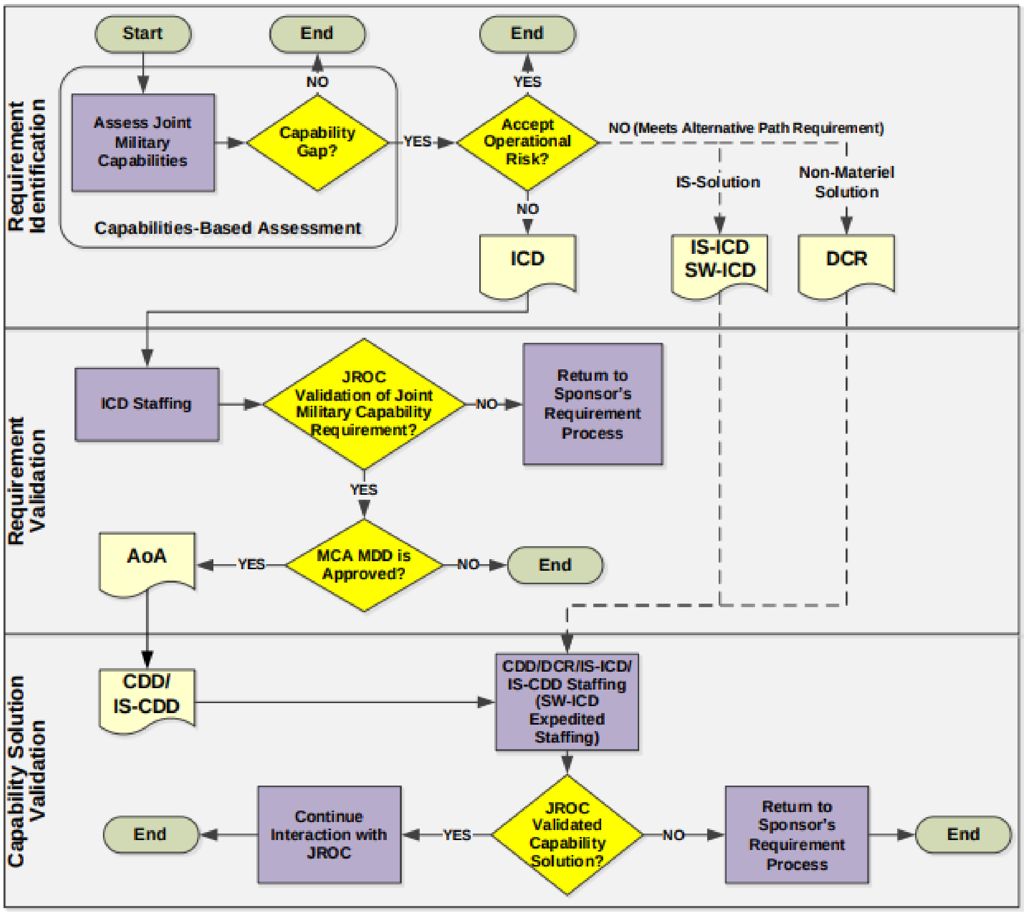

Figure 6. JCIDS Process Overview. Source: JCIDS Manual (2021)

JCIDS documents, including Initial Capabilities Documents (ICDs) and Capability Development Documents (CDDs), serve as critical tools in documenting and validating these requirements (Main et al., 2014). Central to the JCIDS framework is the Capability-Based Assessment (CBA), which provides a structured approach to identifying capability gaps, assessing potential solutions, and recommending materiel or non-materiel solutions. This process incorporates a holistic view of Doctrine, Organization, Training, materiel, Leadership and Education, Personnel, Facilities, and Policy (DOTmLPF-P) factors to ensure comprehensive capability development (GAO, 2008).

The JCIDS process has undergone continuous refinement to enhance responsiveness and support alignment with rapidly evolving technological and operational environments. Updates to the JCIDS Manual in 2021 emphasized digital modernization and improved data-driven decision-making to mitigate cyber and operational risks (JCIDS Manual, 2021).

The JCIDS process has three primary lanes: deliberate, urgent, and emergent requirements which align with different operational timelines and risk profiles (JCIDS Manual, 2021). The urgent lane addresses immediate warfighter needs that could result in loss of life or mission failure if unmet. These requirements are typically supported by the UCA pathway under the AAF (JCIDS Manual, 2021). The emergent lane responds to anticipated near-term operational demands requiring accelerated fielding and is commonly aligned with the MTA pathway (JCIDS Manual, 2021). The deliberate lane supports long-term capability development with full documentation (JCIDS Manual, 2021). This lane is typically aligned with the MCA pathway (JCIDS Manual, 2021). By organizing requirements based on urgency and operational risk, JCIDS enables tailored acquisition strategies that correspond with AAF pathways, to support capabilities are fielded effectively across the full spectrum of military needs (JCIDS Manual, 2021).

By integrating rigorous analysis and joint oversight, JCIDS ensures the military maintains a decisive operational advantage in complex and dynamic threat landscapes. Its structured approach to capability development supports informed resource allocation, streamlined acquisition, and enhanced interoperability across joint forces.

3. PPB&E

The Planning, Programming, Budgeting, and Execution (PPBE) process is a critical resource allocation framework used by the U.S. Department of Defense (DoD) to align military spending with strategic objectives. Established in 1961 by then-Secretary of Defense Robert McNamara, PPBE aims to provide an effective mix of forces, equipment, manpower, and support within fiscal constraints (Defense Acquisition University, n.d.; Office of the Under Secretary of Defense [OUSD], 2024). Initially known as the Planning, Programming, and Budgeting System (PPBS), the process was renamed in 2003 to emphasize better management of budget execution authority provided by Congress.

PPBE is one of the DoD's primary decision support systems, alongside JCIDS and the DAS (OUSD, 2024). The process has four phases: planning, programming, budgeting, and execution. The planning phase focuses on aligning defense priorities with strategic objectives, while the programming phase translates these priorities into a five-year resource allocation plan known as the Future Years Defense Program (FYDP). The budgeting phase develops a detailed budget request for the first year of the FYDP, and the execution phase ensures that allocated funds achieve the intended outcomes (Defense Acquisition University, n.d.; OUSD, 2024).

4. Adaptive Acquisition Framework

The Adaptive Acquisition Framework (AAF), as outlined in the Department of Defense Instruction (DoDI) 5000.02, is designed to streamline defense acquisition by tailoring pathways to the specific needs and risks of different types of programs. The AAF is part of the broader Defense Acquisition System (DAS) aimed at supporting the National Defense Strategy by delivering practical, sustainable, and cost-efficient solutions (DoDI 5000.02, 2020).

The AAF provides six distinct acquisition pathways: Urgent Capability Acquisition, Middle Tier of Acquisition, Major Capability Acquisition, Software Acquisition, Defense Business Systems Acquisition, and Defense Acquisition of Services (DoDI 5000.02, 2020). Figure 7 depicts each of the six pathways. Each pathway addresses different operational requirements and development timelines. For instance, the Urgent Capability Acquisition pathway focuses on rapid response to immediate operational needs, typically fielding solutions within two years (DoDI 5000.02, 2020). Conversely, the Major Capability Acquisition pathway emphasizes structured development and integration processes suitable for more complex and enduring military capabilities, involving phases like Technology Maturation and Risk Reduction as well as Engineering and Manufacturing Development (DoDI 5000.02, 2020).

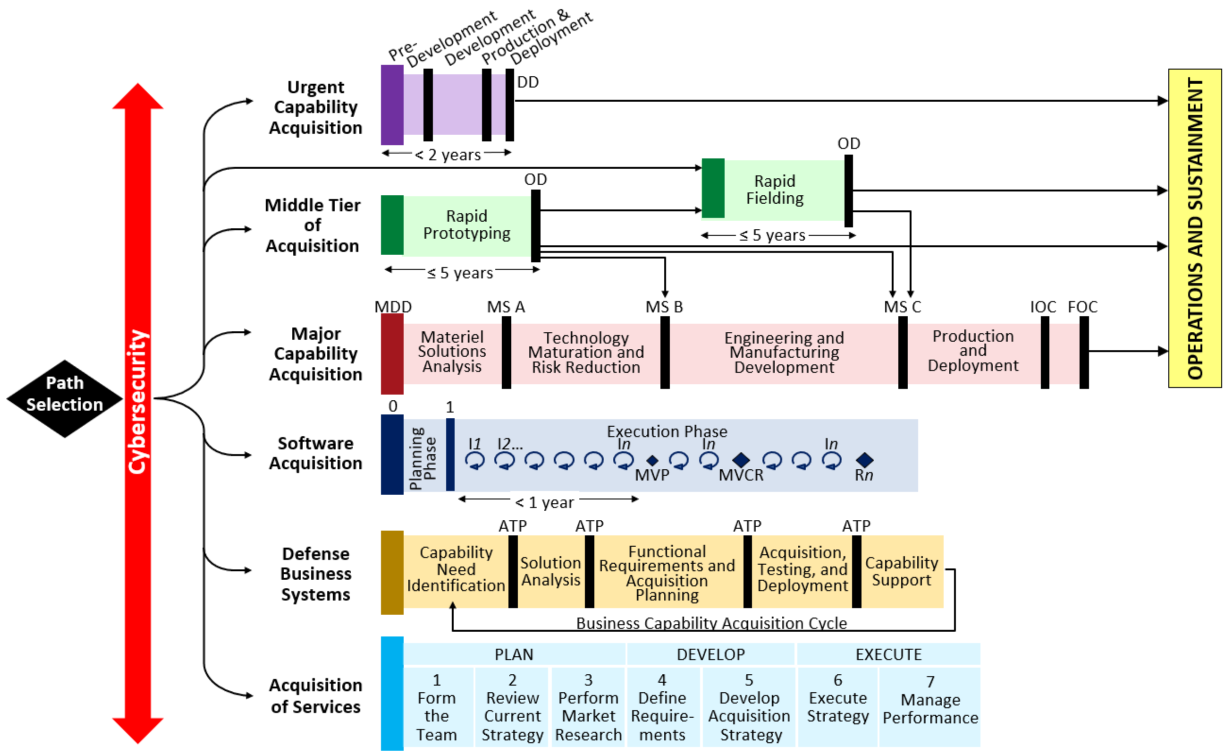

Figure 7. The Adaptive Acquisition Pathway. Source: Defense Acquisition University (n.d.).

In line with adaptive policies, the AAF encourages program managers (PMs) to use multiple pathways when beneficial, ensuring a tailored acquisition approach that aligns with program requirements and mitigates risks effectively (DoDI 5000.02, 2020). The AAF also assigns specific responsibilities to key acquisition roles, including the Under Secretaries of Defense for Acquisition and Sustainment (USD(A&S)) and Research and Engineering (USD(R&E)), as well as the Component Acquisition Executives and other DoD officials who oversee various aspects of program approval and management (DoDI 5000.02, 2020).

The Adaptive Acquisition Framework represents a fundamental shift in the Department of Defense's approach to acquisition by prioritizing flexibility, speed, and alignment with specific program needs. Through its diverse pathways, the AAF allows the DoD to respond dynamically to varying operational demands, from rapidly deploying urgent capabilities to developing complex, enduring systems. The framework's tailored approach empowers program managers to leverage multiple pathways when necessary, balancing speed with comprehensive risk management to deliver effective, sustainable solutions to warfighters. By establishing clear roles and responsibilities across the acquisition landscape, the AAF not only enhances the efficiency of the Defense Acquisition System but also reinforces the DoD's strategic objective of maintaining technological and operational superiority (DoDI 5000.02, 2020). This adaptive model enables the DoD to remain responsive to immediate and long-term defense challenges, ensuring acquisition processes supporting mission success and optimal resource use (DoDI 5000.02, 2020).

a. *Urgent Capability Acquisition*

The Urgent Capability Acquisition (UCA) pathway (Figure 8) within the AAF addresses immediate operational needs by delivering critical capabilities to warfighters rapidly within two years (DoDI 5000.81, 2019). Established by DoD Instruction 5000.81, this pathway is to overcome unforeseen threats and operational gaps by expediting the traditional acquisition process, allowing for rapid fielding without compromising essential safety and effectiveness evaluations (DoDI 5000.81, 2019).

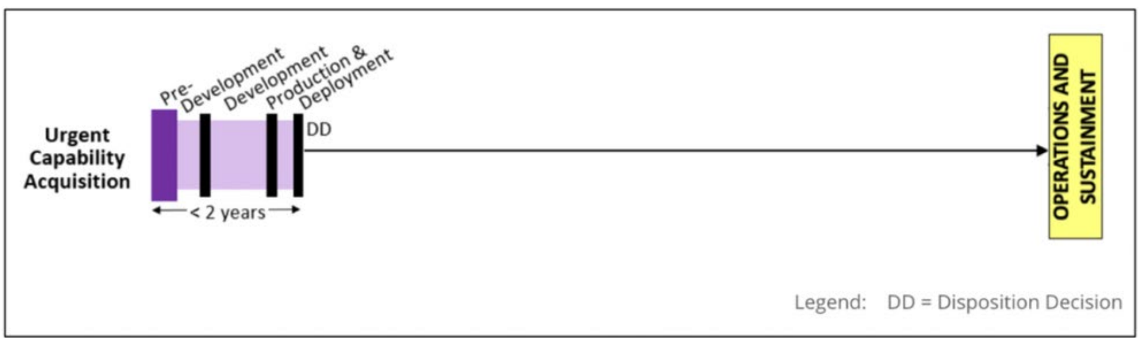

Figure 8. Urgent Capability Acquisition. Source: Defense Acquisition University (n.d.).

UCAs typically involve the use of Joint Urgent Operational Needs (JUONs) and Joint Emergent Operational Needs (JEONs), which are validated by the Joint Staff and assigned to a DoD component for execution (DoDI 5000.81, 2019). The process entails streamlined documentation, minimal regulatory requirements, and tailored strategies, enabling acquisition and deployment to proceed in parallel rather than sequentially (DoDI 5000.81, 2019). The UCA pathway sets spending caps for acquisition programs addressing urgent operational requirements, limiting costs to no more than $525 million for research, development, and testing, and $3.065 billion for procurement, based on

Fiscal Year 2020 constant dollars (DoDI 5000.81, 2019). This financial cap enables the DoD to align urgent capability acquisitions with budgetary constraints while responding to immediate demands (DoDI 5000.81, 2019).

Under the UCA pathway, the milestone decision authority (MDA) can authorize production, development, and fielding decisions based on an abbreviated test and evaluation process. This flexibility helps address critical capability gaps effectively and in alignment with DoD's overarching goal to prioritize the readiness and agility of U.S. forces in response to urgent demands (DoDI 5000.81, 2019).

In conclusion, the UCA pathway exemplifies the DoD's commitment to rapid, flexible acquisition processes that directly address the immediate needs of the warfighter. By expediting traditional acquisition steps, the UCA pathway enables the Department of Defense to field essential capabilities in response to unforeseen threats and operational demands, ensuring readiness and adaptability in high-stakes environments. Through streamlined documentation and tailored evaluations, this pathway mitigates the risks associated with rapid deployment while safeguarding mission effectiveness and safety. Ultimately, the UCA pathway supports the DoD's strategic objective of maintaining a responsive, resilient force capable of quickly adapting to and overcoming emerging challenges (DoDI 5000.81, 2019).

b. Middle Tier of Acquisition

The DoD introduced the MTA pathway to address the need for a more agile and responsive acquisition framework. MTA was established under Section 804 of the National Defense Authorization Act (NDAA) for Fiscal Year 2016, the MTA pathway provides a tailored approach which is designed to accelerate the delivery of critical capabilities. By bypassing the Major Capability Acquisition pathway, the DoD can rapidly address emerging technological opportunities and threats. This initiative is aligned with the National Defense Strategy's objective to maintain a decisive and sustained military advantage (U.S. Department of Defense, 2019; 2020).

The MTA pathway is depicted in Figure 9. The pathway is specifically structured to meet urgent or emerging operational needs and focuses on two key components: rapid prototyping and rapid fielding. Rapid prototyping uses innovative technologies to create fieldable prototypes that address specific military challenges (U.S. Department of Defense, 2019; 2020). These prototypes must demonstrate operational effectiveness within five years of the program's initiation and provide a residual operational capability. Similarly, rapid fielding leverages proven technologies to produce and deploy new or upgraded systems. Unlike rapid prototyping, rapid fielding requires minimal development work, with production beginning within six months and completion occurring within five years (U.S. Department of Defense, 2019; 2020).

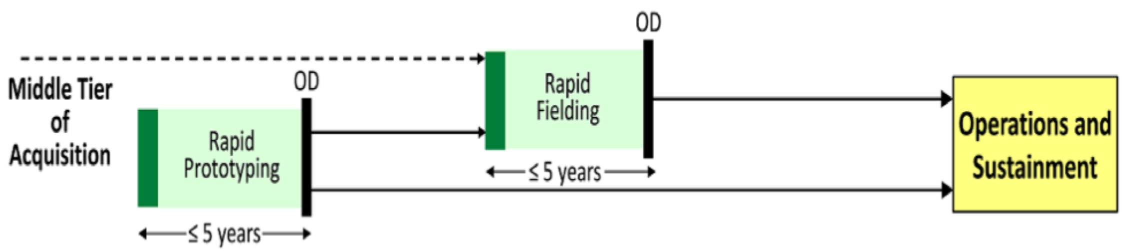

Figure 9. Middle Tier of Acquisition. Source: Defense Acquisition University (n.d.).

According to DoD instruction 5000.80 governance of the MTA pathway is overseen by the Under Secretary of Defense for Acquisition and Sustainment (USD(A&S)), who establishes policies and approves programs. Supporting the USD(A&S) are key offices, including the Under Secretary of Defense for Research and Engineering (USD(R&E)), the Director of Operational Test and Evaluation (DOT&E), and the Director of Cost Assessment and Program Evaluation (DCAPE). These offices contribute to policy formulation, program oversight, and evaluation metrics. They ensure that MTA programs adhere to streamlined processes while maintaining accountability and alignment with statutory requirements (U.S. Department of Defense, 2019; 2020).

The MTA pathway offers numerous benefits such as speed and flexibility, particularly for programs with a high level of technological and manufacturing maturity. By the MTA pathway focusing on streamlining documentation and tailoring acquisition strategies, it accelerates the deployment of critical capabilities. This adaptability ensures the pathway meets specific program needs while maintaining efficiency. However, limitations exist. The pathway is unsuitable for programs requiring extensive technology and manufacturing development activities, complex integration efforts, or involving significant international collaboration. Additionally, programs that exceed major defense acquisition thresholds require explicit written approval to proceed under the MTA framework (U.S. Department of Defense, 2020).

In summary, the MTA pathway reflects a significant shift in the DoD's approach to acquisition. By emphasizing rapid prototyping and fielding, it provides a mechanism to deliver operational capabilities effectively and efficiently. This approach aligns with the growing demand for agility in defense acquisition, ensuring the military's operational readiness and technological superiority in an increasingly dynamic threat environment (U.S. Department of Defense, 2020).

D. OTHER TRANSACTION AUTHORITIES

Other Transaction Authorities (OTAs) have emerged as a vital mechanism for military innovation, enabling the DoD to effectively collaborate with industry and academia in the pursuit of advanced technologies and cutting-edge solutions. Unlike traditional acquisition methods governed by the FAR, OTAs offer a more flexible, streamlined, and commercially friendly approach. This makes them particularly advantageous for engaging non-traditional defense contractors and supporting the rapid development and prototyping of novel capabilities (Dobriansky & O'Farrell, 2018; Office of the Under Secretary of Defense for Acquisition and Sustainment [OUSDAS], 2023).

OTAs were first introduced by the National Aeronautics and Space Administration (NASA) under the National Aeronautics and Space Act of 1958 to enable innovative space exploration efforts beyond the constraints of traditional government contracting (Dobriansky & O'Farrell, 2018). The DoD adopted similar authority in 1989 to enhance its research and development capabilities in areas critical to national defense (OUSD, 2023). In 1994, Congress strengthened this authority through Section 845 of the National Defense Authorization Act, allowing for the use of OTAs in prototype development, which has since been codified and expanded in Title 10 of the U.S. Code (Dobriansky & O'Farrell, 2018; OUSD, 2023).

This evolution has enabled the DoD to address emerging military threats more swiftly and efficiently. OTAs are particularly well-suited for rapid experimentation and fielding of technologies in areas such as unmanned aerial systems, cybersecurity, and next-generation weapons platforms. They facilitate the development of dual-use technologies, bridging the gap between defense and commercial innovation to ensure broader applicability and impact (Dobriansky & O'Farrell, 2018; OUSD, 2023).

OTAs are classified into three categories: research, prototype, and production. Research OTAs support basic and applied scientific work, while prototype OTAs enable the development and testing of demonstrable solutions in operational settings. When a prototype is successfully completed, a follow-on production OTA can be awarded without additional competitive procedures, thereby expediting the transition from concept to capability. This agility is essential for maintaining a technological edge in today's fast-paced security environment (OUSD, 2023). By capitalizing on the inherent flexibility of OTAs, the DoD enhances its operational readiness and its ability to respond to evolving challenges across domains.

E. ARMY FUTURES COMMAND

The establishment of the Army Futures Command (AFC) marks a pivotal evolution in the Army's approach to modernization, addressing decades of inefficiencies and delays that left the U.S. Army at risk of losing its technological and operational edge (Congressional Research Service, 2018). The Army's previous modernization efforts spread across multiple commands such as Forces Command (FORSCOM), Training and Doctrine Command (TRADOC), and Army Materiel Command (AMC). This fragmentation contributed to prolonged development cycles, with some systems taking as long as 15 years from concept to deployment (Congressional Research Service, 2018). Meanwhile, potential adversaries accelerated their advancements, enabling battlefield parity or superiority in critical areas such as long-range fires, air defenses, and armored combat vehicles (Congressional Research Service, 2018).

The Army created the AFC as a unifying entity to streamline these processes. By centralizing authority under a single four-star command headquartered in Austin, Texas, which was a location chosen for its access to academic, industrial, and technological hubs, the Army aims to expedite decision-making and capitalize on innovation (Congressional Research Service, 2018). Austin's thriving technology scene enables the

AFC to work closely with top specialists in cutting-edge fields like artificial intelligence, robotics, and cybersecurity, areas that are critical to the future of warfare. The command reached its initial operational capability in July 2018 and became fully operational by the summer of 2019, staffed by around 500 military and civilian personnel (Congressional Research Service, 2018).

Cross-functional teams (CFTs), established under the Army Futures Command in 2018, are a central component of the U.S. Army's modernization strategy, designed to streamline capability development by uniting experts from various fields (U.S. Army, n.d.). Initially focused on six core priorities: long-range precision fires, next-generation combat vehicles, future vertical lift, network modernization, air and missile defense, and soldier lethality, CFTs have accelerated development timelines and enhanced collaboration (U.S. Army, n.d.). As warfare grows more complex, the Army has begun restructuring and expanding CFTs to address emerging areas like contested logistics, deep sensing, AI, and human-machine integration (Judson, 2023a). This evolution, coupled with partnerships across industry, academia, and international allies, reflects a broader push to maintain technological superiority (Judson, 2023b; U.S. Army, n.d.). However, challenges such as avoiding bureaucratic growth, securing funding, and fostering a culture of innovation remain critical to the long-term success of the CFT model (Judson, 2023b).

Despite its promising potential, AFC faces several challenges that could impact its effectiveness. First, integrating AFC with existing Army structures, such as TRADOC and AMC, requires significant organizational alignment without creating redundant layers of bureaucracy. Second, funding sustainability is critical, as the command manages a portfolio valued between $30 and $50 billion annually while operating on a budget of $80 to $100 million per year (U.S. Army, n.d.). These constraints raise questions about whether other Army programs may need to divert resources to support AFC operations (Congressional Research Service, 2018).

In addition, AFC faces the challenge of managing cultural changes that come with modernizing an organization as large and deeply rooted in tradition as the U.S. Army. Success will depend on developing innovative technologies and the ability to rapidly test, refine, and deploy these systems in operational environments support (Congressional Research Service, 2018). Metrics to measure AFC's impact will be vital in demonstrating progress to Congress and ensuring continued support (Congressional Research Service, 2018).

Army Futures Command is poised to reshape the Army's modernization landscape by addressing long-standing inefficiencies and fostering innovation (Feickert, 2018). By consolidating efforts under one command and focusing on cutting-edge priorities, the AFC seeks to ensure that the U.S. Army remains prepared to face evolving threats and maintain its global military superiority (Feickert, 2018). However, its long-term success will hinge on its ability to integrate with existing structures, secure adequate funding, and implement a results-driven culture prioritizing rapid capability delivery and operational relevance.

F. CONCLUSION

The development and eventual retirement of the RQ-7 Shadow provides a critical lens through which to evaluate the evolution of Army UAS acquisition strategies. Initially procured through a competitive, performance-based approach leveraging commercial off-the-shelf technology, the Shadow filled a significant capability gap in tactical reconnaissance, surveillance, and target acquisition. However, its limitations in mobility, survivability, and adaptability prompted the Army to pursue a next-generation solution. The FTUAS program reflects a modernized, flexible acquisition approach grounded in rapid prototyping, modularity, and open systems architecture. By employing both urgent capability and middle-tier acquisition pathways, the Army has sought to balance speed with sustainability while incorporating operational feedback through soldier-centric evaluations.

The evolution of UAS acquisition in the Army has not occurred in isolation. It is part of a broader transformation in defense acquisition processes, defined by the adoption of the Adaptive Acquisition Framework, the emergence of the use of OTAs, and organizational reforms such as the establishment of Army Futures Command. These changes reflect the DoD's effort to address long-standing challenges in speed, flexibility, and responsiveness, ensuring that future capabilities are delivered at the pace of technological change and battlefield necessity. Having examined the historical trajectory of the RQ-7 Shadow and the strategic, programmatic, and organizational factors shaping the FTUAS acquisition effort, the next chapter turns to a review of the literature that frames this study.

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III. LITERATURE REVIEW

This chapter reviews documentation that either involves or impacts the FTUAS acquisition program. It evaluates strategic documents across the U.S. Army that affect the modernization of the warfighting force and contextualize the need for the FTUAS. This chapter also examines RAND Corporation reports that address the Defense Acquisition System and the importance of it being flexible and tailorable to provide warfighting capabilities to the force at the speed of relevance. This chapter assesses the Government Accountability Office (GAO) reports that examine the FTUAS program under the Future Vertical Lift initiative. This initiative seeks to replace current aircraft in the Army's fleet with new ones capable of VTOL (GAO, 2023). Finally, this chapter examines previous studies conducted on defense acquisitions to identify key themes, challenges, and gaps relevant to the FTUAS procurement framework.

A. STRATEGIC DOCUMENTS

Approved by the Assistant Secretary of Defense for publication in 2017, the Unmanned Systems Integrated Roadmap 2014–2042 outlined the path forward for unmanned systems to 2042. The roadmap looks at key attributes all future unmanned systems must incorporate to integrate seamlessly into the Army's strategic vision. The criteria include interoperability, autonomy, cybersecurity, and collaboration between humans and machines (Department of Defense, 2014). These four items are crucial to the long-term success of the Army's unmanned system mission and vision to drive research and development and improve lethality. Associated with these four items are corresponding challenges and ways ahead, outlining how industry needs to overcome certain aspects that currently serve as limiting factors for present technology. As of the time of the publishing of this roadmap, technological limitations hinder UAS procurement.

Eight years after this roadmap's publication, the world has seen a significant rise in unmanned system technology, innovation, and lethality. In 2022, when the Russo-Ukrainian War began, unmanned systems, primarily aerial hunter/killer systems, were employed on a small scale. Off-the-shelf systems and devices being manufactured in

Ukraine are employed daily to success for reconnaissance, anti-personnel, and anti-armor work (Department of Defense, 2014). The shift and growth in knowledge have not necessarily rendered the roadmap obsolete; however, potential updates and revisions could provide more precise direction for the industry on a path forward. Additionally, with the prevalence of unmanned systems in modern large-scale combat operations, it would be imperative to link the development of unmanned systems with other R&D initiatives such as personal protective measures, Counter-UAS systems, towed artillery development, and tracked vehicle UAS countermeasures. Much can be said about working in unison with such efforts to develop counters to the innovative systems employed by future UAS. This traces to three of the four key facets of the roadmap: Interoperability, Network Security, and Human-Machine Collaboration. To reiterate, the published roadmap served as a starting point for research and development initiatives within the defense industry.

The Unmanned Systems Integrated Roadmap 2014–2042 has played a pivotal role in shaping the FTUAS by emphasizing key technological advancements essential for its development. These developments—interoperability, autonomy, network security, and human-machine collaboration—enhance the overall performance and effectiveness of the system (Department of Defense, 2014). Interoperability ensures seamless integration with manned and unmanned systems within the Joint Force, highlighting the necessity of common architecture and modular designs to enhance adaptability across various mission sets (Department of Defense, 2014). Additionally, the roadmap underscores the importance of autonomy, with artificial intelligence and machine learning driving efficiency, reducing operator workload, and enabling autonomous mission execution capabilities (Department of Defense, 2014). Network security remains a fundamental consideration, focusing on secure data transport and cyber resilience to protect against electronic warfare threats, ensuring FTUAS operations in contested environments (Department of Defense, 2014). Moreover, human-machine collaboration is crucial, ensuring that FTUAS enhances, rather than replaces, human decision-making through advanced user interfaces and decision-support systems that maintain operational effectiveness (Department of Defense, 2014). By aligning with the strategic guidance of the roadmap, the FTUAS seeks to address future operational challenges and strengthen the Army's unmanned aviation capabilities.

The government can optimize the procurement and deployment of Unmanned Aircraft Systems (UASs) by leveraging acquisition strategies and initiatives outlined in Appendix C of the Unmanned Systems Integrated Roadmap 2014–2042. A key approach involves implementing alternative acquisition methods to enhance agility and accelerate procurement timelines, including the use of OTAs, which enable the DoD to collaborate swiftly with industry and academia for prototype development, streamlining the transition from prototype to production (Department of Defense, 2014). Additionally, DoD's Third Offset Strategy ensures the effective integration of UAS technology into operational constructs by emphasizing doctrine, training, and exercises that maximize the advantages of unmanned technologies (Department of Defense, 2014). Investments in test and evaluation (T&E), training, and infrastructure are essential to support this expansion, ensuring effective deployment within current and future military frameworks. Furthermore, the roadmap underscores the necessity of open systems and interoperability to guarantee long-term sustainability and flexibility in UAS acquisitions. Initiatives such as the Unmanned Aircraft System (UAS) Control Segment (UCS) Architecture, Joint Architecture for Unmanned Systems (JAUS), and Future Airborne Capability Environment (FACE) promote standardization and seamless integration of modern technologies across platforms (Department of Defense, 2014). These open standards are crucial in maintaining interoperability and enabling UASs to adapt to evolving mission requirements. The roadmap also highlights the significance of innovative life cycle management strategies, including advancements in the maintenance, sustainment, and disposal of UAS technologies. Condition-based maintenance (CBM) and prognostic health monitoring enhance reliability and cost-effectiveness throughout their operational lifespan (Department of Defense, 2014). By adopting these acquisition strategies, the government can optimize UAS procurement and deployment, ensuring technological superiority and operational efficiency.

In conclusion, the Unmanned Systems Integrated Roadmap 2014–2042 continues to serve as a critical framework for guiding the development, acquisition, and integration of unmanned systems within military operations. The rapid evolution of unmanned technology highlights the need for continuous updates and refinements to ensure alignment with emerging threats and technological advancements. By fostering collaboration between the Department of Defense, industry, and academia and leveraging key acquisition strategies, the roadmap ensures that unmanned systems remain at the forefront of military capability. The future of unmanned systems relies on maintaining interoperability, enhancing autonomy, strengthening network security, and optimizing human-machine collaboration. Through sustained investment and strategic oversight, the U.S. military can continue to lead in unmanned system innovation, ensuring mission success and operational superiority in the years to come.

B. RAND CORPORATION REPORTS

The RAND Corporation has continually worked alongside the DoD to develop ways to adapt and improve the Defense Acquisition System. A research report conducted in 2022 titled “Improving Defense Acquisition” evaluated trends that affect defense acquisitions and the challenges they present in providing rapid capabilities to the warfighter. The report looks at the effects of globalization, national priorities, geopolitical changes, and commercial technology on the Defense Acquisition System and how these have impacted program offices across the DoD (Wong et al., 2022). These trends have created a need for flexibility and modularity within programs and systems while adding additional requirements to be considered, such as cybersecurity, interoperability, and the use of external sources outside the “traditional” defense industrial base (Wong et al., 2022). To help combat these complications, the report emphasizes “tailorability” (Wong et al., 2022).

Since the adoption of the AAF and before, “tailoring” has been emphasized so that acquisition strategies meet and accommodate the individualistic nature of defense acquisition programs. RAND published a report in 2015 titled “Tailoring the acquisition process in the U.S. Department of Defense,” which also advocated for “tailorability” but identified gaps that prevent its effective use. Training and institutional barriers are significant inhibitors to tailoring acquisition processes within program offices (McKernan, Drezner, Sollinger, 2015). One of those institutional barriers is a lack of support from senior leadership (McKernan, Drezner, Sollinger, 2015). Although regulation and doctrine emphasize its importance, reluctance to deviate from traditional methods has prevented program offices from fully embracing "tailorability" not just in reducing documentation requirements but also in procurement methods, contracting strategies, decision-making, and technical processes (McKernan, Drezner, Sollinger, 2015).

C. GOVERNMENT ACCOUNTABILITY OFFICE

The GAO plays a critical role in ensuring accountability and efficiency in government programs, particularly in large-scale defense acquisitions. Its oversight helps identify risks and inefficiencies, providing recommendations to improve program management and resource allocation. In its 2023 report on Future Vertical Lift (FVL) aircraft, the GAO examines the Army's efforts to modernize its vertical lift capabilities by replacing aging helicopters with next-generation aircraft designed for enhanced range, payload capacity, and survivability. The Future Attack Reconnaissance Aircraft (FARA), the Future Long-Range Assault Aircraft (FLRAA), and the Future Tactical Unmanned Aircraft System (FTUAS) form the core of this modernization initiative (GAO, 2023). Table 4 provides a description of each aircraft within the FVL portfolio.

Table 4. FVL Systems. Adapted from GAO (2023).

	FLRAA	FARA	FTUAS
Primary Mission	Long-range assault and multi-role transport	Armed aerial reconnaissance	Reconnaissance, surveillance, intelligence, and light attack
Intended Replacement	UH-60 Black Hawk	AH-64 Apache	RQ-7B Shadow
Crewed/Uncrewed	Crewed	Crewed	Uncrewed
Speed	~2x Black Hawk's speed	~1.5x Apache's speed	Comparable to current UAS
Range	~2x Black Hawk's range	~1.5x Apache's range	Extended loitering capability
Payload	Troops, cargo, Air Launched Effects	Modular Effects Launcher, precision munitions	ISR payloads, electronic warfare, armaments (optional)
Acquisition Pathway	Middle Tier Acquisition	Major Capability Acquisition	Urgent and Middle Tier Acquisition

	FLRAA	FARA	FTUAS
Contract Type	Fixed-Price Incentive + Cost-Reimbursement	Competitive prototyping via OTA	OTA-based competitive selection
Critical Technologies	Fly-by-Wire controls, Drive System/Gear Box	Improved Turbine Engine (ITE), Digital Backbone, Modular Effects Launcher	Runway-independent takeoff, reduced acoustic signature
Prototyping Approach	Virtual prototype + single vendor selection	Competitive flyable prototypes (Bell & Sikorsky)	Incremental prototyping with multiple vendors
Planned Fielding Date	2030	2030	Increment 1: 2025 Increment 2: TBD
Procurement Estimate	~600 aircraft	~300 aircraft	~76 systems
Key Risks	Immature virtual prototyping, schedule risks	Engine development delays, schedule risk	Vendor selection delays, unclear technology maturity

The Army is employing multiple acquisition pathways to accelerate the development of these aircraft. FARA follows the Major Capability Acquisition process, FLRAA utilizes the Middle Tier of Acquisition (MTA) pathway, and FTUAS takes a hybrid approach (GAO, 2023). Although these frameworks intend to streamline the acquisition process, the GAO identified cost estimation and schedule risk concerns. The cost estimates for FLRAA and FTUAS lack comprehensive risk analysis, and FARA faces delays in its Analysis of Alternatives (AoA) and cost projections (GAO, 2023). These shortcomings create uncertainty about the overall affordability and feasibility of the various programs.

While the FVL initiative presents a significant opportunity to enhance military aviation capabilities, GAO recommends that the Army improve cost modeling, schedule risk identification, and technology assessments to ensure successful deployment and avoid historical acquisition pitfalls.

D. PREVIOUS CASE STUDIES

Recent case studies at the Naval Postgraduate School (NPS) have examined acquisition programs throughout the DoD. Each has provided valuable insights into best practices and pitfalls that need to be considered and avoided in defense acquisitions.

One of the most common themes across multiple acquisition programs is the challenge of managing cost growth and schedule delays. A case study written by Alexis Delgado called CH-53K Heavy-Lift Helicopter Program Acquisition Case History (2020) looked at the CH-53K helicopter program. This case history determined that the program experienced significant cost overruns due to performance setbacks and underestimated technical challenges (Delgado, 2020). Another case study about the Columbia-class submarine program depicted how that program faced delays because of software development issues and an overburdened industrial base (Field, 2022). The Expeditionary Fighting Vehicle (EFV) program for the Marines also highlighted the extent to which unbalanced cost and schedule increases drastically affected performance goals (Pierce, 2022). Each of these cases emphasizes the importance of realistic budgeting and disciplined program management.

Another commonality among case studies evaluated was the positive impact incremental and agile approaches had on programs. A case study evaluated on the P-8A Poseidon program employed iterative development that allowed the program office to integrate enhancements over time rather than waiting for a fully matured system before deployment (Sherrell, 2023). Andrew Cassity's case study, "Navy Explosive Ordnance Disposal Maritime Expeditionary Standoff Response Case History," described an acquisition program that leveraged the MTA pathway, rapid prototyping, and OTAs. These techniques allowed the program to deploy an advanced remote-operated vehicle (ROV) technology faster to fill capability gaps for the warfighter (Cassity, 2024). These cases highlight the effectiveness of modularity and phased development in reducing risk and improving adaptability.

Case studies evaluated also emphasized the importance of the industrial base and supply chain resilience and how the defense industrial base is crucial to acquisition success. A Navy Auxiliary Systems case study identified that vendor lock and supply chain fragility can increase costs and procurement risks (Belko, 2022). The previously mentioned Columbia-class submarine program also faced supply chain constraints that affected production timelines displaying the need for a diversified supply network and resilient logistics plan (Field, 2022). Future acquisition strategies should prioritize supplier competition which can drive down costs and conduct robust supply chain assessments early in the procurement process to help predict or identify future programmatic risks.

The NPS student research using a case study-based approach to assess acquisition programs highlights the importance of stakeholder engagement and how that can help in defining realistic requirements. This engagement is important because a major challenge in defense acquisitions is ensuring system capabilities align with operational requirements. A case study on the Landing Ship Medium (LSM) revealed a misalignment between the Marine Corps and Navy regarding survivability and capability requirements causing major increases in expenses and prolonged timelines (Irvine, 2023). The EFV case study also showed how a program failed due to overly ambitious performance goals that did not justify the associated costs (Pierce, 2022). The same case study also highlighted the Amphibious Combat Vehicle (ACV) which succeeded by prioritizing cost-effectiveness over cutting-edge capabilities (Pierce, 2022).

To continue, the analysis of NPS student research also showed that programs that conducted thorough risk assessment and management as well as integrated prototyping were more likely to succeed. For example, the CH-53K program suffered from unforeseen technological challenges which could have potentially been mitigated through earlier testing (Delgado, 2020). On the contrary, the Navy EOD program successfully employed iterative prototyping to validate system capabilities before full-scale production (Cassity, 2024). The contradiction between these cases shows that future acquisition programs should emphasize early risk identification and rigorous prototyping to prevent costly redesigns in later phases of development and procurement.

Finally, the analysis of prior case studies depicted how integrating COTS and government off-the-shelf (GOTS) solutions can reduce costs and accelerate deployment at potential risk to performance. The P-8A Poseidon program capitalized on commercial Boeing 737 technology and demonstrated how military systems can benefit from existing commercial platforms (Sherrell, 2023). The Navy EOD case study similarly highlighted utilizing commercial market technologies through OTAs and the Defense Innovation Unit (DIU) (Cassity, 2024). Therefore, future acquisition strategies should explore commercial capabilities to optimize cost and program efficiency whenever feasible while understanding risks that can be accrued over the use of purely COTS.

E. CONCLUSION

This chapter provides a foundation for understanding the FTUAS program by examining strategic guidance, acquisition frameworks, and historical lessons from defense procurement. The strategic documents emphasize key priorities such as interoperability, autonomy, and network security, which shape FTUAS development. RAND Corporation reports highlight the need for flexible, tailorable acquisition strategies, while GAO assessments of the Future Vertical Lift initiative reveal risks in cost estimation, schedule adherence, and technological maturity. Lessons from past defense acquisition programs reinforce the importance of incremental development, early prototyping, and commercial technology integration to mitigate cost overruns and delays. Ultimately, this literature review has been critical in justifying the need to examine the FTUAS program within the broader context of Army modernization and defense acquisition reform. The program represents an opportunity to implement lessons learned from past acquisition challenges while advancing an agile and adaptable approach to unmanned systems procurement.

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IV. CASE STUDY

A. INTRODUCTION

COL Joseph Anderson, Project Manager for Unmanned Aircraft Systems (PM UAS), was in his office facing a critical challenge late 2023. Next to him sat a directed requirement he had just received from Army Futures Command to procure and field the Future Tactical Unmanned Aircraft System (FTUAS). As the senior leader responsible for delivering the FTUAS, COL Anderson understood the urgency behind the Army's need for a next-generation unmanned aerial system to replace the aging RQ-7 Shadow. FTUAS had to provide Brigade Combat Teams (BCTs) with an organic, runway-independent airborne reconnaissance and surveillance (R&S) capability, enabling them to operate in dynamic, contested environments (Department of the Army, 2022).

That afternoon, COL Anderson had just concluded a briefing with LTC Olin Walters, Product Manager for Tactical Unmanned Aircraft Systems (PdM TUAS), who had just conveyed to him the latest updates regarding the FTUAS program. Senior Army leaders had made it clear that the need for FTUAS was immediate. Commanders across the force had expressed operational concerns about the RQ-7 Shadow, citing its reliance on fixed infrastructure, high logistical footprint, and vulnerabilities in contested environments (Atherton, 2018). The Army could no longer afford to field a system that was slow to deploy, cumbersome to operate, and detectable by enemy forces.

In response to pressing operational demands, the Army had conducted a "Buy, Try, Inform" assessment, where Soldiers tested competing Unmanned Aircraft Systems in real-world training scenarios (Department of the Army, 2022). Feedback reinforced the need for an expeditionary vertical takeoff and landing (VTOL)-capable UAS with on-the-move command-and-control, reduced acoustic signature, and increased survivability (U.S. Army, 2021). Senior leaders, including those at Army Futures Command and the Program Executive Office (PEO) Aviation, had emphasized that any delays in fielding FTUAS would leave units at a severe disadvantage in future conflicts.

As COL Anderson sat reviewing the latest reports, one question dominated his thoughts: How could the Army acquire and field the FTUAS as quickly as possible without compromising its operational effectiveness? The pressure was mounting. Soldiers needed this capability now, not years from now, and the challenge lay in determining the best acquisition path to meet this urgent requirement while balancing long-term cost, schedule, and performance risks.

B. BACKGROUND

In the early 1990s, the U.S. Army recognized a critical need for an organic reconnaissance, surveillance, and target acquisition capability at the brigade level to enhance situational awareness while minimizing risks to manned aircraft (USAACOE, 2017). This need for capability and desire for reduced warfighter risk led to the development of the RQ-7 Shadow (Figure 10), a short-range, long-endurance unmanned aerial system designed to provide BCTs with real-time intelligence. Since its first deployment in 2003 during Operation Iraqi Freedom, the Shadow has logged over one million flight hours, offering vital support to combatant commanders worldwide (Lee, 2019).

Figure 10. RQ-7 Shadow. Source: DOT&E (2021).

However, as the operational environment evolved, the Shadow's limitations across the DOTmLPF-P spectrum became increasingly apparent. The system's reliance on runways for launch and recovery restricted its flexibility, making it difficult to operate in austere or rapidly changing battlefield conditions. Its high acoustic signature made it vulnerable to detection, while its susceptibility to electronic warfare and cyber threats raised concerns about survivability in contested environments. Additionally, the logistical footprint required to operate and maintain the Shadow limited its responsiveness and adaptability in expeditionary operations.

Recognizing these shortfalls, in 2018 the Army initiated efforts to identify a next-generation solution, culminating in the 2021 approval of an Abbreviated Capabilities Development Document (A-CDD) outlining the requirements for the FTUAS (U.S. Army, 2021). The urgency behind this modernization effort was clear: the Army needed a UAS to provide the same intelligence-gathering capability as the Shadow while eliminating its key operational constraints. The Army officially retired the RQ-7 Shadow in 2024, marking the end of an era and the beginning of a new chapter in tactical unmanned aviation (Army Public Affairs, 2024).

C. RQ-7 SHADOW ACQUISITION PROGRAM BASELINE

The acquisition program baseline (APB) for the RQ-7 Shadow was signed and approved by Claude M. Bolton, Assistant Secretary of the Army (Acquisition, Logistics, Technology) in 2000 (Department of the Army, 2002). This serves as the baseline that was utilized by the FTUAS program office for comparison of an acquisition of a Group 3 unmanned aerial system. Table 5 provides the cost summary, Table 6 a schedule summary, and Table 7 a performance summary of the key performance parameters of the RQ-7 Shadow.

Table 5. Cost Summary. Adapted from Department of the Army (2002).

Cost Element	Objective	Threshold
Total RDT&E (Then-Year $M)	171.6	
Total Procurement (Then-Year $M)	411.1	
Total RDT&E (Base-Year FY99 $M)	163.2	181.3
Total Procurement (Base-Year FY99 $M)	368.2	409.1
Operation and Support Cost (Base-Year FY99 $M)	1346	1682.5
Total Ownership Cost (Base-Year FY99 $M)	1877.4	2272.9
Average System Unit Procurement Cost (FY99 $M)	9.2	10.2
8th System Cost (FY99 $M)	3.6	4
Total RDT&E Quantities	4	4
Total Procurement Quantities	40	40

Table 6. Schedule Summary. Adapted from Department of the Army (2002).

Milestone	Objective	Threshold
System Capabilities Demo		
Milestone II	Dec-99	Jun-00
Contract Award – EMO LRIP	Dec-99	Jun-00
Contract Award – FY01 LRIP		
Initiate IOT&E	May-01	Nov-01
IOT&E		
Milestone III	Sep-01	Mar-02
Contract Award – Production	Sep-01	Mar-02
Initial Fielding (LRIP System)	Aug-01	Feb-02
Initiate Follow-on Limited User Test	Aug-02	Feb-03
First Unit Equipped (FUE)	Oct-02	Apr-03
Initial Operating Capability (IOC)	Dec-02	Jun-03

Table 7. Cost Summary. Adapted from Department of the Army (2002).

Key Performance Parameters	Objective	Threshold
Fuel	Heavy Fuel	MOGAS
C4I Interoperability	ABCS, FBCB2, Live imagery from AV to CGS	ABCS, Live imagery from GCS to collocated CGS
Modular Mission Payload	EO/IR and SAR/MTI, CRP, COMINT, Comm EA, Non-Comm EA ELINT, LD/LRF, Minefield Detection, NBC, HSI/MSI, SIGINT, UAV Decoys	EO/IR
Mission Duration (Hrs. @ Range)	3-4 Hr. @ 200 KM	4 Hr. @ 50 KM

The RQ-7 Shadow was classified as an Acquisition Category (ACAT) II program and followed a phased increment acquisition strategy that emphasized modular upgrades over time (U.S. Army, 2005). With an acquisition objective of 87 systems, the program office executed a competitive flyoff between mature COTS solutions, selecting the most advantageous offering based on weighted evaluation criteria (U.S. Army, 2005). The selected system required modular bus architecture to enable future growth and integration of emerging technologies (U.S. Army, 2005).

Contracting for the Shadow was structured to balance cost risk and life cycle performance. Initial hardware procurement was conducted through firm-fixed-price contracts to control cost exposure, while sustainment was managed through a performance-based logistics (PBL) contract (U.S. Army, 2005). The PBL contract, awarded on a cost-plus-incentive-fee basis, held the contractor responsible for readiness outcomes, with plans to transition to fixed-price terms once actual costs were better understood (U.S. Army, 2005). Due to the Army's lack of a full technical data package and AAI Corporation's proprietary knowledge, the PBL was sole source (U.S. Army, 2005).

D. FTUAS ACQUISITION PROGRAM BASELINE

The initial APB for the FTUAS INC 1 was drafted by PEO Aviation, the milestone decision authority, in July 2022 to support the DR received from Army Futures Command. The APB established cost, schedule, and performance constraints for the PM to manage. Tables 8, 9, and 10 depict the FTUAS program's cost, schedule, and performance summaries.

Table 8. Cost Summary. Source: U.S. Army (2022b).

FTUAS ($ in Millions)	Base Year 2021		Then Year		
Appropriation	Objective	Threshold	Objective	Threshold	Comments
RDT&E	$16.915	$18.607	$17.585	$19.344	
Procurement	$73.000	$80.300	$78.562	$86.418	
MILCON	0.000	0.000	0.000	0.000	
ACQ Operations & Maintenance	$1.410	$1.551	$1.507	$1.658	
Acquisition Cost	**$91.325**	**$100.458**	**$97.654**	**$107.420**	
Operations & Support	$111.826	$123.009	$122.835	$135.118	
Program Lifecycle Cost	**$203.151**	**$223.467**	**$220.489**	**$242.538**	

Quantity					Comments
Directed Requirement Quantity:	8				
APA Quantity:	7				
RDT&E Quantity:	1				PM UAS will field this system as a residual capability
Total Quantity:	8				Aligned with total program and subject to change based on funding position.
Unit Cost ($ in Millions)		Base Year 2021	Then Year		
APUC:					
	Objective:	10.429	11.223		
	Threshold:	11.471	12.345		
PAUC:					
	Objective:	11.416	12.207		
	Threshold:	12.557	13.428		

Table 9. Schedule Summary. Source: U.S. Army (2022b).

Schedule Milestone	Objective	Threshold
Directed Requirement	7 JAN 22	7 JAN 22
ADM Urgent Capability Acquisition	26 MAY 22	26 MAY 22
Development Milestone	30 JUN 22	14 SEP 22
Production and Deployment Milestone	16 AUG 23	16 NOV 23
First Unit Equipped	14 SEP 23	15 MAR 24
Last Unit Equipped	22 MAR 24	23 SEP 24
Disposition Decision	23 AUG 24	21 FEB 25

Table 10. Performance Summary. Source: U.S. Army (2022b).

Future Tactical Unmanned Aircraft Systems – Increment 1	
Characteristics	**Directed Requirement**
Launch	Vertical launch and recovery to/from an area 70 x 70 feet surrounded by 150-foot obstacles No external components for launch and recovery (such as a catapult or Soldier physical assistance)
Controller	Expeditionary single-Soldier portable control system with an on-the- move capability to allow operation of the UAS from a moving ground vehicle
Endurance	Launch and recover with eight (8) hours flight endurance at 6,000 feet density altitude (DA) with a 25 lb. mission payload
Payload	Possess a payload package on each unmanned aircraft (UA) with electro- optical/infrared/laser pointer (EO/IR/LP) and a communications relay payload Provide full motion video (FMV) and metadata viewable on Army One System Remote Video Terminal (OSRVT)
Transportability	Transportable internally on Army rotary wing aircraft (CH-47)
Sustainment	Provide enough repair components to support rapid deployment to austere locations and operate for 96 hours with 24-hour continuous coverage Capable of operating with limited contractor logistics support (CLS)
Environmental	Operate in rain of .25" per hour

E. PROGRAM RISKS AND CONSTRAINTS

There were many interrelated dilemmas affecting cost, schedule, and performance constraint balancing that would impact the fielding of the FTUAS. Senior Army leaders made it clear that the operational need for FTUAS was urgent. Yet, the complexity of acquiring and fielding a next-generation system under tight time constraints raised significant challenges across the triple constraint. Schedule uncertainty, technical/manufacturing risk, cost credibility, and performance tradeoffs were issues that weighed on the program.

Schedule uncertainty loomed large over the FTUAS program. The Army's desire to rapidly deliver the FTUAS underlined a broader modernization imperative, but according to a recent GAO report the program had not yet conducted a full schedule risk assessment, even as it approaches major milestones (GAO, 2023). FTUAS officials acknowledged that plans continued to progress and that a risk focused schedule analysis would occur after contract award (GAO, 2023). Without this analysis, GAO believed that Army leadership lacked insights into potential delays or the feasibility of delivering a residual operational capability (GAO, 2023). Delays in vendor selection, integration of modular systems, or testing derailed the Army's aggressive timelines and impact operational units expecting to divest from the RQ-7 Shadow by FY2025 (GAO, 2023).

Technical risk represented another critical hurdle for the FTUAS program. While the FTUAS would provide a transformational leap over the legacy Shadow system including runway independence, lower acoustic signature, and open systems architecture, officials had not yet completed a technology risk assessment as of late 2023 (GAO, 2023). Unlike the Future Attack Reconnaissance Aircraft (FARA) or Future Long-Range Assault Aircraft (FLRAA) programs, which had some known technology maturation timelines, FTUAS officials justified the lack of an assessment on the basis that its components were commercially available (GAO, 2023). However, this assumption appeared optimistic, as even mature systems carry hidden integration and performance risks when fielded in operational conditions. GAO emphasized that failing to assess these risks upfront reduces decision-makers' ability to anticipate cost growth or schedule slips and undermines confidence in the program's feasibility (2023).

Cost credibility was also in question within the FTUAS program. The Army's life cycle cost estimate for FTUAS exceeded $4 billion, but the GAO found it only minimally met the standard for a "credible" estimate (GAO, 2023). For clarification, this $4 billion estimate accounted for the entire program and insinuated an incremental approach. However, per the program APB, the initial INC 1 life cycle cost had a threshold of $223 million (U.S. Army, 2022b). To continue, the Army had not performed comprehensive sensitivity or uncertainty analyses. According to GAO (2023), uncertainty was assessed for only five inputs, which together made up less than 8% of the total development cost. Additionally, no independent cost estimate occurred, and key elements lacked cross-checks using alternate methods. These omissions left the program vulnerable to unforeseen cost drivers, particularly as requirements evolve or if technical maturity assumptions prove inaccurate. A credible cost estimate was essential to ensure stable funding, avoid overrun surprises, and make informed trade-offs under budget constraints.

Performance trade-offs were yet another area of ambiguity for the FTUAS program. Soldier feedback from early risk-reduction demonstrations made the requirements clear: BCTs wanted VTOL capability, low signature, expeditionary command-and-control, and increased survivability (U.S. Army, 2021). However, because not all prototypes delivered these capabilities in equal measure, determining which trade-offs—payload vs. range, endurance vs. acoustic signature—are acceptable, and how they align with evolving operational concepts, was a non-trivial task. Without clearly prioritized requirements and performance benchmarks, the Army risks either under-delivering on operational needs or selecting a vendor solution that requires costly redesign down the line.

Ultimately, the issues above left the FTUAS program at a crossroads. Although senior leaders wanted the system fielded with urgency, the absent rigorous application of industry accepted and recognized project management best practices, especially in risk assessment, cost credibility, and performance evaluation, the Army risked repeating the pitfalls that derailed prior modernization programs.

F. CONSIDERED ACTIONS

Given the complexity of replacing the BCT's primary ISR asset for the last twenty years and each major stakeholder's focus, COL Anderson had to balance each concern with the cost, schedule, performance (triple constraint), and flexibility of the FTUAS program.

With speed being a significant concern, especially with the continuous evolution of uncrewed systems and the DR from Army Futures Command, schedule decisions are a crucial part of the acquisition strategy of the FTUAS. Leveraging the extensive industrial base for Group 3 UAS systems, COL Anderson could push for a rapid acquisition of a COTS item that can be fielded to BCTs to meet the requirements laid out in the DR and would provide a "revolutionary" capability without much development effort needed (Judson, 2021). Rapid acquisition would provide capability to the warfighter as soon as possible, filling the operational need. However, emphasis on rapidity provides risks that can balloon either one of the aspects of the triple constraint. Rapid acquisition can lead to cost growth from expedited production contracts and potentially limited competition stemming from the inability to meet timelines. Life cycle costs can also increase because modular-open-system architecture (MOSA) is challenging to implement with limited time, creating issues when updates are required. The same concern can prevent mature life cycle logistic plans before fielding. Speed can also have an impact on performance objectives. Fielding COTS systems may require trade-off decisions amongst the requirements and inhibit interoperability because of the limited developmental activities conducted. Finally, rapid acquisition provides new capability but little ability to address DOTmLPF-P considerations for a smooth and efficient transition.

Emphasizing performance offers its own benefits and downfalls when considering requirements achievement, MOSA integration, and operational risk. Pursuing a more deliberate process of acquiring the FTUAS would enable the Army to validate that the final product met requirements within the A-CDD, was tested and evaluated to identify potential issues, and allowed for the integration of MOSA techniques to provide upgradability as technology matures. However, the deliberate process would require the costly continued use, maintenance, and support of the RQ-7 Shadow and did not provide any mitigation for the already identified and documented capability gaps for the duration of the development.

The program management team also considered the possibility of keeping the RQ-7 Shadow in operation instead of pursuing a materiel solution to the capability gaps. RQ-7 Shadow demonstrated it could handle the workload, and the Army already had the logistical and maintenance infrastructure to support it and the training pipeline for RQ-7 Shadow operators. However, the RQ-7 Shadow required a significant overhaul to meet the operational need statements that borderline on a completely new acquisition program. These modifications could cost more than developing and fielding a new system altogether.

Ultimately, COL Anderson knew that depending on the assessed importance of his criteria, either one of these choices or even another could be valid for fulfilling the capability gaps identified by combatant commanders. He had to get with his team and decide how to best move forward.

V. ANALYSIS

A. INTRODUCTION

To determine the best method to develop and procure the FTUAS, the PM must evaluate the acquisition context for the FTUAS. This process requires the PM to evaluate key constraints and considerations when making the acquisition strategy. This includes identifying and analyzing key stakeholders to assess their critical concerns for the program and identifying the central issue and root causes that the Army have for seeking a new ISR asset at the BCT level. Once the PM team understands this information, they can define options and criteria to evaluate the options. Finally, the PM must develop a sound and reasonable acquisition recommendation.

B. KEY CONSTRAINTS / CONSIDERATIONS

When evaluating the acquisition environment of the FTUAS, there are some significant constraints and considerations to consider when making an acquisition strategy decision. The urgency of the need, the significant workload and retirement of the RQ-7 Shadow and how that provides expectations of the FTUAS, the informed requirements from the “Buy, Try, Inform” phase (VTOL, MOSA, etc.), and the ever-changing threat landscape that can change or evolve requirements over time.

The first constraint for the Army is the urgency and demand to field capability to the warfighter rapidly. The Army and combatant commanders have identified critical capability gaps that the RQ-7 Shadow has left in the BCTs. This urgency stems from the increasing pace and complexity of modern warfare, with evolving threats from peer and near-peer adversaries such as those observed in Ukraine and the Indo-Pacific. As a result, senior leaders demand the program manager prioritize speed without sacrificing performance or sustainability.

Compounding this urgency is the retirement of the RQ-7 Shadow in 2024 after unprecedented use. Not only is there now an intelligence and capability gap in the BCTs, but the program must also consider how the use of the Shadow far surpassed initial expectations. Therefore, not only does the program office have to move rapidly, but it also must field a new system that can handle extensive use over time.

A critical consideration also comes from the "Buy, Try, Inform" demonstration phase, where Soldier feedback directly informed key FTUAS requirements such as VTOL and MOSA. These features are essential to enabling rapid deployment, survivability, and long-term adaptability. Therefore, the acquisition strategy must consider and address these tradeoffs and prioritize capabilities that provide the most operational value while remaining within program constraints.

Finally, the dynamic and evolving threat of landscape adds further complexity to the acquisition environment. As adversaries adapt their capabilities and tactics, the United States must learn and adapt with them. This adaptation by the U.S. may demand requirements for the FTUAS to evolve. This volatility requires an acquisition approach that is both flexible and iterative and can allow for incremental development, feedback-driven refinement, and modular upgrades. Selecting a rigid or overly traditional acquisition pathway risks fielding a system that is outdated upon arrival or misaligned with emerging operational needs. As such, program leadership must balance urgency with deliberate planning, weigh technical and cost risks against mission impact, and ensure that the chosen strategy supports both immediate readiness and long-term modernization goals.

C. CENTRAL ISSUE / ROOT CAUSE

The central issue driving the development of the FTUAS is the operational inadequacy of the RQ-7 Shadow, which no longer meets the evolving requirements of the U.S. Army's BCTs in Multi-Domain Operations (MDO) (Department of the Army, 2022). The Shadow has served as the Army's primary TUAS for over two decades but suffers from significant limitations. Most notably, it requires a fixed runway for launch and recovery, lacks on-the-move (OTM) command-and-control capabilities, and has a large logistical and operational footprint (Department of the Army, 2022). These factors limit its deployment flexibility, particularly in austere environments or rapidly changing battlefield conditions. Additionally, its loud acoustic signature increases its vulnerability to detection and targeting by adversaries (Department of the Army, 2022).

The root cause of the problem lies in the Shadow's outdated design, which is inconsistent with the speed, agility, and survivability required in the modern battlefield. As warfare becomes increasingly multi-domain and sensor-driven, legacy platforms like the RQ-7 fail to provide commanders with the rapid situational awareness and responsiveness necessary for decision dominance (U.S. Army, 2021). Several critical capability gaps underscore the need for FTUAS. Army Aviation Gap #1 highlights the deficiency in conducting reliable aerial reconnaissance and security missions in extreme conditions, limiting the Army's ability to deliver timely, actionable intelligence (U.S. Army, 2021). Army Gap #6 reflects the lack of capability to operate in highly contested and complex airspace, which hinders synchronization of joint and Army manned-unmanned systems and impedes precision strike coordination (U.S. Army, 2021). Additionally, Army Aviation Gap #10 addresses interoperability challenges, where current aircraft lack seamless digital connectivity with ground networks, restricting the flow of mission-critical data across the force (U.S. Army, 2021).

The transition from the RQ-7B Shadow to the Future Tactical Unmanned Aircraft System is both a strategic necessity and a response to the evolving demands of modern warfare. The Shadow's limitations—its dependency on fixed infrastructure, lack of mobility, and insufficient survivability—highlight the urgent need for a more agile and adaptable solution (Department of the Army, 2022). FTUAS is designed to close critical capability gaps by enabling vertical takeoff and landing, enhancing on-the-move operations, and supporting seamless integration with joint and Army networks (U.S. Army, 2021). By addressing these deficiencies, FTUAS positions the Army to maintain tactical superiority and operational flexibility in complex, multi-domain environments (U.S. Army, 2021).

D. STAKEHOLDER ANALYSIS

Table 11 captures key stakeholders for the FTUAS and their critical concerns for the FTUAS program. The concerns center around the PM's triple constraint of cost, schedule, and performance.

Table 11. Stakeholder Analysis.

Stakeholder	Concern(s)
Congress	Cost/Schedule
PEO Aviation	Flexibility/Performance/TRLs/MRLs
Army Futures Command (FVL CFT)	Schedule/Performance/Technical Risk
Vendors	Cost/Schedule/TRLs/MRLs
Brigade Combat Teams (End Users)	Schedule/Performance

E. DECISION CRITERIA

After analyzing the stakeholders, the PM must establish criteria in which to evaluate potential courses of action. The stakeholders' concerns were assessed based on the PM's triple constraint of cost, schedule, and performance; therefore, those will be assessment criteria. Cost focuses on the life cycle cost of the system. A good rating in cost would be a procurement strategy that reduces or minimizes the life cycle cost while fielding a system that meets all desired capabilities. The schedule is fielding timelines. Considering the urgency of the requirement and the retiring of the RQ-7 Shadow, an optimal ranking would be a procurement strategy that rapidly fields capability to the BCTs for operational employment and fills the ISR capability gap. Performance is the operational capability and effectiveness. A high rating in performance would be a procurement strategy that delivers a VTOL ISR capability that meets all requirements to operate in a contested and austere modern battlefield.

Outside of the triple constraint the PM should also consider flexibility when adopting a procurement strategy. This criterion should account for assessing a strategy's ability to adapt to evolving requirements and a dynamic threat landscape, as well as consideration of emerging technologies to ensure the fielding of a state-of-the-art capability. Essentially, it defines an acquisition strategy that is tailorable and adaptable over time and can respond to requirements evolution and prevents program cancellation. Additionally, the PM must consider TRLs and MRLs as indicators of maturity. However, based on the "Buy, Try, Inform" approach taken early on by the program office, it is assessed that TRLs would be non-discriminatory because all options have been tested in operational environments and likely involve systems with mature, high-TRL technologies. Therefore, the PM should only consider MRLs and an optimal rating in

MRLs is a strategy that leverages or results in higher MRLs, reducing production risk, and establishing mature manufacturing processes for timely fielding. Finally, technical risk must be evaluated for each acquisition pathway. This criterion depicts the challenge of maturing and integrating new technologies together and with existing Army equipment throughout the development and duration of the acquisition path selected.

F. COURSES OF ACTION (COA)

Once the PM understands the constraints and considerations for the program, has conducted a stakeholder analysis, and has determined his evaluation criteria, the PM must develop possible courses of action. Utilizing the AAF, the FTUAS program can leverage multiple pathways depending on each evaluation criterion's assessed importance and the stakeholders' concerns. Each of the COAs presented manages at least one part of the triple constraint, and each has its own benefits and pitfalls.

1. COA 1: Urgent Capability Acquisition (UCA)

Utilization of the UCA pathway significantly alleviates the schedule concerns of the major stakeholders. Statutory requirements mandate that using the UCA requires fielding of capability within two years of program initiation (DAU, n.d.). With the significant known capability gaps identified with the RQ-7 Shadow, the added complication of the Shadow's retirement in 2024, and the directed requirement from AFC due to multiple operational need statements, a UCA offers the potential of fielding capability rapidly to the warfighter. By leveraging systems with high technology readiness levels (TRLs) and manufacturing readiness levels (MRLs), a UCA takes advantage of the robust commercial unmanned industry by considering systems already developed to meet the Army's needs.

2. COA 2: Middle Tier Acquisition (MTA)

The FTUAS program could also consider the MTA pathway. Although not as rapid as the UCA, an MTA would field capability relatively quickly with a maximum duration of only five years (DAU, n.d.). This pathway also offers the advantage of leveraging competition through competitive prototyping. Through the potential use of OTAs, the FTUAS program would attract industry partners who would provide a certain level of capability for the FTUAS program to mature throughout the prototyping process. The program office would evaluate these partners against one another to select the value option that best meets the performance parameters. The program office would then award that option a production contract to provide the new VTOL unmanned system for the warfighter.

3. COA 3: Major Capability Acquisition (MCA)

Another consideration for the FTUAS program is the use of the MCA pathway. The standard pathway considered when referencing DoD acquisition offers the benefit of significant consideration to life cycle cost. The more deliberate process develops logistical and sustainment plans that ensure a more robust maintenance strategy, ultimately providing an enduring capability. The MCA also enacts a significant test and evaluation process that validates requirements and verifies adherence to those requirements, ensuring a system that meets all performance specifications when delivered to the warfighter. An MCA allows for adequate competition that, when leveraged appropriately, can drive down acquisition costs and improve performance outcomes. The MCA pathway also allows the PM to better account for upgradability. By using an incremental approach, the PM can utilize blocks or increments with MOSA to mature and integrate capabilities. This method would provide an adaptable system that can continually meet the evolving threat landscape. Finally, by utilizing MOSA, the PM has the advantage of not being locked into a single vendor, which can allow the PM to leverage competition throughout the entire life cycle of the FTUAS, again driving down life cycle costs.

4. COA 4: Hybrid Model

The final option the FTUAS PM can consider is a hybrid approach that leverages multiple pathways. Due to the significant need for an ISR asset that fills the capability gaps left by the RQ-7 Shadow, the PM can use the UCA. This pathway would allow the program office to "provide immediate uncrewed aircraft capability to select units" (GAO, 2023). By leveraging high TRL and MRL COT systems within the unmanned market, the PM can ensure that, at a minimum, component 1 BCTs receive an interim ISR capability immediately. Following the rapid fielding of the COTS, the PM could then transfer to an

MTA, which would allow the program, similar to COA 2, to leverage OTA strategies to compete with vendors for a replacement of the RQ-7 Shadow. This COA also allows the program office to transfer the MTA to an MCA pathway for continued life cycle support if necessary.

G. DECISION MATRIX AND SENSITIVITY ANALYSIS

1. Initial Decision Matrix

To ensure that all COAs are considered fairly and to determine the right approach to acquisition strategy, the researchers created a decision matrix. The decision matrix assists in comparing COAs against one another based on established criteria. As previously stated, those criteria are cost, schedule, performance, flexibility, MRLs, and technical risk. Each COA is given a numerical value between 1 and 4 based on their assessed ranking in each criterion. 1 being the most advantageous option in that criterion and 4 the least. If two options are considered equivalent in a specific criterion then, they will be given an average score between their two subsequent rankings. After all COAs are ranked for each criterion, their scores will be summed up and captured in the unweighted column. Based on the above method, the lowest score in the unweighted column would annotate the best option when all criteria are considered equal to stakeholders. Table 12 depicts the initial, unweighted decision matrix.

Table 12. Initial Decision Matrix.

Decision Matrix (Qualitative Ranking of Options)							Option Scores (lower is better)
	Cost	Schedule	Performance	Flexibility	MRLs	Technical Risk	Unweighted
COA 1 UCA	3	1.5	4	4	4	4	20.5
COA 2 MTA	2	3	3	3	3	2.5	16.5
COA 3	1	4	1.5	2	1	1	10.5

Decision Matrix (Qualitative Ranking of Options)							Option Scores (lower is better)
MCA							
COA 4 Hybrid	4	1.5	1.5	1	2	2.5	12.5

a. Cost Justification:

In terms of cost, COA 3: MCA was ranked the most favorable (1) due to its comprehensive approach to managing life cycle costs. The MCA process includes detailed planning for life cycle sustainment, logistics, and support. It emphasizes competition, which can drive down FTUAS procurement prices and ensure long-term affordability. It also better allows for the incorporation of MOSA, allowing for easier upgrades and avoidance of vendor lock, which further contributes to cost efficiency over the FTUAS' life. COA 2: MTA was ranked second (2), as it offers competitive prototyping through OTAs and encourages innovation from vendors, which can result in better cost-value trade-offs when acquiring the FTUAS. However, MTA may not provide the same depth of life cycle cost planning as MCA, and the compressed timeline can limit some cost controls. COA 1: UCA was ranked third (3) in cost, due to its focus on rapid fielding using COTS systems, which often leads to higher total ownership costs. The urgency-driven nature of UCA is not conducive to competition or deliberate sustainment planning. This lack of competition of sustainment planning can then increase the likelihood of vendor lock, limited upgradability, and expensive support structures over time. Finally, COA 4: Hybrid model was rated least favorable (4), recognizing that while it attempts to balance short-term urgency with long-term sustainability, the initial fielding of interim systems under UCA conditions may drive up early costs. Moreover, transitioning between pathways may introduce inefficiencies or duplicative spending before settling into a longer-term acquisition strategy.

b. Schedule Justification:

COA 1: UCA and COA 4: Hybrid were ranked the most favorable (1.5) pertaining to schedule, as they both offer the fastest means to field an operational capability. UCA, by design, mandates the delivery of a solution within two years of program initiation, making it ideal for addressing the immediate ISR capability gap identified with the RQ-7 Shadow. Similarly, the Hybrid model incorporates UCA in its initial phase to quickly field COTS solutions to priority units, ensuring minimal delay in getting assets to the warfighter. COA 2: MTA was ranked the next best for schedule (3), as it enables relatively fast capability delivery, typically within five years, but not as rapid as UCA or the Hybrid. While faster than traditional acquisition models, MTA still requires a degree of development and prototyping that extends its timeline beyond immediate needs. COA 3: MCA was rated least favorable (4) in terms of schedule because it is the most deliberate and time-consuming process. The MCA consists of rigorous requirements development, testing, and evaluation. This pathway prioritizes thoroughness over speed, making it poorly suited for programs with urgent fielding needs.

c. Performance Justification:

COA 3: MCA and COA 4: Hybrid were tied and ranked the most favorable (1.5) in performance due to their structured and deliberate approach to developing and delivering an FTUAS that fully meets operational requirements. Both pathways include extensive developmental and operational testing, rigorous requirements validation, and comprehensive integration planning, ensuring that the final product performs effectively in contested and austere environments. Each of these approaches also allow for phased incrementation to FTUAS capability delivery. COA 2: MTA was ranked third (3) as it enables competitive prototyping and rapid iteration, which can yield a capable system relatively quickly. However, due to limited timeframes and reduced emphasis on comprehensive test and evaluation compared to MCA, the effectiveness and suitability of the capability may not be as thoroughly validated. COA 1: UCA was rated least favorable (4) in performance because it relies on quickly fielding COTS or near-ready systems that may not meet all the Army's desired operational requirements for the FTUAS. While this approach fills immediate gaps, it may lack the depth of performance, battlefield resilience, and customization needed for long-term effectiveness in evolving operational environments.

d. Flexibility Justification:

COA 4: Hybrid was ranked the most favorable (1) in terms of flexibility because it blends and tailors acquisition pathways. This tailoring of acquisition strategy allows the PM to adjust the methods based on evolving requirements and emerging technologies. By starting with UCA to meet urgent needs and transitioning to MTA for a longer-term FTUAS solution, the hybrid approach maximizes adaptability. It also enables the integration of MOSA, which supports future upgrades and avoids vendor lock. COA 3: MCA was ranked second (2), as its structured and deliberate framework is well-suited to long-term flexibility through incremental development and MOSA. MCA allows for upgrades over time and supports continuous modernization to counter dynamic threats, though it lacks the agility to shift quickly in response to short-term changes. COA 2: MTA was ranked third (3) because it allows some flexibility through OTAs and rapid prototyping, but it is somewhat constrained by its short duration and less emphasis on life cycle planning. While MTA can pivot during development phases, it may not support long-term modularity and adaptability as effectively as MCA or the Hybrid model. Finally, COA 1: UCA was ranked least favorable (4) in flexibility due to its rigid focus on rapid fielding and limited scope for future upgrades or adjustments. Once a COTS solution has been fielded under UCA, the PM may face challenges adapting the system to evolving mission requirements or technological advancements, especially if the system lacks modularity or is tied to a single vendor.

e. MRLs Justification

In terms of MRLs, COA 3: MCA was ranked the most favorable (1) due to the deliberate acquisition process that ensures manufacturing is mature before full-rate production. MCA emphasizes early pilot production, tooling validation, and quality assurance, helping programs reach MRLs of 8–10 by the time systems are fielded. This level of preparation supports long-term scalability, consistent output, and stable supply chains. COA 4: Hybrid ranks second (2) because it begins with rapid UCA fielding, which may lack fully mature manufacturing processes, but transitions into MTA or MCA pathways that emphasize production readiness. While the initial phase may introduce inefficiencies, the structured follow-on ensures manufacturing maturity improves over time. COA 2: MTA was ranked third (3), as it advances manufacturing maturity through competitive prototyping and early production efforts. While MTA fosters innovation and industry engagement, its accelerated timeline may limit the full development of robust, scalable manufacturing lines before transition. COA 1: UCA was rated least favorable (4) for MRLs, as it prioritizes speed over process maturity. While it may use existing commercial solutions, these systems may not be manufactured at scale or with repeatable, Army-specific standards, leaving gaps in production capacity, quality control, and supply chain stability.

f. Technical Risk Justification

For technical risk, COA 3: MCA was ranked the most favorable (1) because it provides the most rigorous framework for managing and mitigating risk. MCA incorporates extensive system engineering, developmental and operational testing, and technology integration reviews. These measures reduce the likelihood of unforeseen technical failures and ensure that systems meet performance thresholds before full-rate production. COA 2: MTA and COA 4: Hybrid were tied for the second-best ranking (2.5) in technical risk. MTA reduces risk through competitive prototyping and early vendor engagement but may not allow time for comprehensive integration and testing prior to fielding. Similarly, the Hybrid model begins with higher-risk UCA fielding but transitions into more structured acquisition pathways like MTA or MCA, which provide opportunities to reduce technical uncertainty over time. This phased approach helps mitigate risk but may still carry challenges during the transition period. COA 1: UCA was rated least favorable (4) due to its minimal time for integration, testing, and risk analysis.

Ultimately, the Army selects the appropriate course of action based on its prioritization of the evaluation criteria. Table 13 summarizes the main points of justification for each COAs ranking amongst each evaluation criteria. If the Army prioritizes cost, it should select COA 3: MCA. If schedule takes precedence, it should choose either COA 1: UCA or COA 4: Hybrid. If performance is the most critical factor, it should opt for COA 3: MCA or COA 4: Hybrid. If flexibility is the highest priority, the Army should pursue COA 4: Hybrid. If MRL maturity is most important, the Army should pursue COA 3: MCA and if technical risk is the critical criteria, then the Army should utilize COA 3: MCA as well.

Table 13. Summary of Justifications.

Criterion	COA 1: UCA	COA 2: MTA	COA 3: MCA	COA 4: Hybrid
Cost	- Higher total ownership costs due to limited competition and sustainment planning. - Risk of vendor lock and expensive support.	- Better cost-value trade-offs via competition. - Limited life cycle planning increases cost risk.	- Comprehensive life cycle cost planning, competition, and support for MOSA/ upgrades.	- Combines rapid fielding costs from UCA with inefficiencies from pathway transitions.
Schedule	- Most favorable because fields capability within 2 years.	- Moderate schedule due to fielding in 5 years. - Allows prototyping.	- Rigorous and testing and validation process prioritizes completeness.	- Combines UCA speed for initial fielding with long-term transitions to MTA.
Performance	- COTS solutions may not meet all requirements or battlefield resilience.	- Encourages prototyping, but limited testing reduces assurance of meeting full performance thresholds.	- Full requirements validation, test & evaluation, and incremental upgrades yield high operational effectiveness.	- Uses phased approach to meet immediate needs and allows robust performance through structured testing in follow-on phases.
Flexibility	- Not tailorable after fielding. - Rigid scope with limited upgradability.	- Allows some pivoting during development. - limited life cycle adaptability.	- Structured for long-term upgrades via MOSA and blocks.	- Blend of pathways allows tailored, phased strategy to adapt to changing requirements and tech.
MRLs	- Systems may lack scalable, Army-standard manufacturing processes.	- Competitive prototyping helps mature production, but compressed timeline may constrain MRL development.	- Ensures mature manufacturing before full-rate production through early pilot builds and quality checks.	- Transitioning introduces inefficiencies. - Initial UCA systems may not be optimized for long-term manufacturing.
Technical Risk	- Minimal integration/testing time elevates risk of failures or delays.	- Competitive prototyping. - limited time for full integration/testing.	- Extensive systems engineering and validation lowers technical risk.	- Begins with high-risk UCA. - Transitions help mitigate technical uncertainty over time.

2. Cost/Schedule Heavy Sensitivity Analysis

The decision matrix shown in Table 14 reflects the perspective of Congress by prioritizing cost (weight = 3) and schedule (weight = 2) as the most critical evaluation criteria. Under this sensitivity analysis, COA 3: MCA emerges as the best value option for the program office to pursue for the FTUAS.

Table 14. Decision Matrix w/ Cost/Schedule Heavily Weighted Sensitivity Analysis.

Decision Matrix (Qualitative Ranking of Options)								Option Scores (lower is better)	
		Cost	Schedule	Performance	Flexibility	MRLs	Technical Risk	Unweighted	Weighted
	Criteria Weighting	3	2	1	1	1	1		
COA 1 UCA		3	1.5	4	4	4	4	20.5	
		9	3	4	4	4	4		28
COA 2 MTA		2	3	3	3	3	2.5	16.5	
		6	6	3	3	3	2.5		23.5
COA 3 MCA		1	4	1.5	2	1	1	10.5	
		3	8	1.5	2	1	1		16.5
COA 4 Hybrid		4	1.5	1.5	1	2	2.5	12.5	
		12	3	1.5	1	2	2.5		22

3. Flexibility/Performance/MRLs Heavy Sensitivity Analysis

Table 15, from the perspective of PEO Aviation, puts emphasis on performance (weight = 4), flexibility (weight = 3), and MRLs (weight = 3) as the most significant criteria. This weighting emphasizes the program office's desire to provide capability that meets all requirements while utilizing a pathway that allows for the adaptability to evolving with requirements and maturing manufacturability. This sensitivity analysis highlights COA 3: MCA as the best pathway to acquire and procure the FTUAS.

Table 15. Decision Matrix w/ Flexibility/Performance/MRLs Heavily Weighted Sensitivity Analysis.

Decision Matrix (Qualitative Ranking of Options)								Option Scores (lower is better)	
		Cost	Schedule	Performance	Flexibility	MRLs	Technical Risk	Unweighted	Weighted
	Criteria Weighting	1	1	4	3	3	2		
COA 1 UCA		3	1.5	4	4	4	4	20.5	
		3	1.5	16	12	12	8		52.5
COA 2 MTA		2	3	3	3	3	2.5	16.5	
		2	3	12	9	9	5		40
COA 3 MCA		1	4	1.5	2	1	1	10.5	
		1	4	6	6	3	2		22
COA 4 Hybrid		4	1.5	1.5	1	2	2.5	12.5	
		4	1.5	6	3	6	5		25.5

4. Schedule/Performance/Technical Risk Heavy Sensitivity Analysis

This sensitivity analysis is from the perspective of AFC which provided the requirement for a next-generation ISR asset. This perspective puts emphasis on schedule (weight = 4), performance (weight = 3), and technical risk (weight = 2). This weighting allows for consideration of an acquisition path that rapidly delivers a capability to fill the operational need statements that meet all performance requirements while acknowledging that technical risk can have drastic impact on rapid delivery. Table 16 sensitivity analysis results in COA 4: Hybrid as the most advantageous acquisition option.

Table 16. Decision Matrix w/ Schedule/Performance/ Technical Risk Heavily Weighted Sensitivity Analysis.

Decision Matrix (Qualitative Ranking of Options)								Option Scores (lower is better)	
		Cost	Schedule	Performance	Flexibility	MRLs	Technical Risk	Unweighted	Weighted
	Criteria Weighting	1	4	3	1	1	2		
COA 1 UCA		3	1.5	4	4	4	4	20.5	
		3	6	12	4	4	8		37
COA 2 MTA		2	3	3	3	3	2.5	16.5	
		2	12	9	3	3	5		34
COA 3 MCA		1	4	1.5	2	1	1	10.5	
		1	16	4.5	2	1	2		26.5
COA 4 Hybrid		4	1.5	1.5	1	2	2.5	12.5	
		4	6	4.5	1	2	5		22.5

5. Cost/Schedule/MRLs Heavy Sensitivity Analysis

The next sensitivity analysis is from the perspective of vendors. From an industry standpoint, emphasis is placed on schedule (weight = 4), cost (weight = 3), and MRLs (weight = 2). This weighting breakdown represents the emphasis vendors place on schedule and cost to maintain profitability and mature production lines and supply chains to minimize risk, reduce rework, and maintain delivery credibility. According to Table 17, with this weighting, COA 3: MCA is the most favorable option.

Table 17. Decision Matrix w/ Cost/Schedule/MRLs Heavily Weighted Sensitivity Analysis.

Decision Matrix (Qualitative Ranking of Options)								Option Scores (lower is better)	
		Cost	Schedule	Performance	Flexibility	MRLs	Technical Risk	Unweighted	Weighted
	Criteria Weighting	3	4	1	1	2	1		
COA 1 UCA		3	1.5	4	4	4	4	20.5	
		9	6	4	4	8	4		35
COA 2 MTA		2	3	3	3	3	2.5	16.5	
		6	12	3	3	6	2.5		32.5

Decision Matrix (Qualitative Ranking of Options)								Option Scores (lower is better)	
COA 3 MCA		1	4	1.5	2	1	1	10.5	
		3	16	1.5	2	2	1		25.5
COA 4 Hybrid		4	1.5	1.5	1	2	2.5	12.5	
		12	6	1.5	1	4	2.5		27

6. Schedule/Performance Heavy Sensitivity Analysis

The final sensitivity analysis (Table 18) is from the perspective of the BCTs or end users. The warfighter puts emphasis on performance (weight = 4) and schedule (weight = 3). Ultimately, the warfighter is concerned with obtaining a capability that is effective in meeting all the requirements and is delivered in a rapid manner to impact the modern battlefield. This weighting results in COA 4: Hybrid being the best option for the acquisition strategy of the FTUAS.

Table 18. Decision Matrix w/ Schedule/Performance Heavily Weighted Sensitivity Analysis.

Decision Matrix (Qualitative Ranking of Options)								Option Scores (lower is better)	
		Cost	Schedule	Performance	Flexibility	MRLs	Technical Risk	Unweighted	Weighted
	Criteria Weighting	1	3	4	1	1	1		
COA 1 UCA		3	1.5	4	4	4	4	20.5	
		3	4.5	16	4	4	4		35.5
COA 2 MTA		2	3	3	3	3	2.5	16.5	
		2	9	12	3	3	2.5		31.5
COA 3 MCA		1	4	1.5	2	1	1	10.5	
		1	12	6	2	1	1		23
COA 4 Hybrid		4	1.5	1.5	1	2	2.5	12.5	
		4	4.5	6	1	2	2.5		20

H. FINAL RECOMMENDATION

As depicted in each of the tables above, the best COA depends on how the Army, and more specifically the stakeholders, weigh the evaluation criteria.

While the Army faces urgent operational demands due to the retirement of the RQ-7 Shadow and evolving threat environments, the long-term success and sustainability of the FTUAS hinges on delivering a system that is technically sound, operationally effective, affordable over its life cycle, and adaptable to future needs. The MCA pathway provides the most deliberate and structured approach, emphasizing rigorous requirements validation, developmental and operational testing, risk-reduction, and life cycle support planning. These characteristics make the MCA pathway particularly well-suited to field a VTOL ISR platform that aligns with MDO and avoids many of the pitfalls and DOTmLPF-P concerns that plagued the RQ-7 Shadow.

MCA consistently ranked as the best or second-best option in nearly every evaluation category and sensitivity analysis. In the initial unweighted decision matrix, MCA achieved the lowest score, indicating it performed best when all evaluation criteria were considered equal. It was the top-performing pathway in cost, performance, MRLs, and technical risk and performed solidly in flexibility. Across three of five sensitivity analyses from the perspectives of Congress, PEO Aviation, and vendors, the MCA pathway was rated the best acquisition strategy. Only when the evaluation was narrowly focused on schedule and rapid delivery (as seen in the AFC and BCT sensitivity analyses) did COA 4: Hybrid edge ahead due to its near-term delivery via UCA.

However, while schedule urgency is critical, it must be balanced against the real risk of fielding an immature or underperforming system. GAO findings already highlight gaps in technical risk analysis, cost credibility, and schedule risk management in the current FTUAS program. The MCA pathway directly addresses these issues by incorporating the depth of analysis and oversight needed to avoid costly rework, vendor lock-in, or performance shortfalls. It also supports MOSA integration and incremental modernization, which will be essential for evolving requirements and emerging technologies.

VI. CONCLUSION

A. EPILOGUE

The FTUAS program is a significant case study in Army acquisition because it showcases how tailoring acquisition strategies to meet urgent operational needs while fostering long-term modernization is critical but also mandates thorough assessment. This research project finds that although the Army opted for a different acquisition pathway, the program office effectively applied the AAF by blending UCA and MTA pathways. The Army's approach allowed for rapid fielding of interim capability through Increment 1 while simultaneously pursuing a more deliberate and innovative solution through Increment 2. This dual-path strategy enabled the program office to balance cost, schedule, and performance in a way that directly supported operational requirements and modern battlefield demands.

The "Buy, Try, Inform" methodology, ensured that Soldier feedback informed key acquisition decisions and requirements development, and that only mature, field-ready systems advanced to the next phase. The project also reveals that the Army's broader institutional modernization efforts, including the creation of Army Futures Command and emphasis on the adoption of MOSA, supported this acquisition approach by aligning requirements generation, technology development, and acquisition execution under a more agile and responsive framework.

The research suggests that the program office selected the Hybrid approach based on their assessed importance of schedule urgency, rapid meeting of performance requirements, and acquisition strategy flexibility. The Hybrid approach allows them to get the interim solution into the hands of the warfighter which is crucial with the retirement of the Shadow and allows the program office flexibility to adapt to changing requirements through real-world operational use and conflict around the globe. Simultaneously, it preserved the ability to refine requirements based on feedback loops and incrementally adopt a more deliberate acquisition pathway for the program of record.

B. SUMMARY

In response to the primary and secondary research questions:

1. How did the Army project office tailor the AAF and contracting processes to procure the FTUAS?

The Army tailored the Adaptive Acquisition Framework to meet the unique needs of the FTUAS program by dividing it into two increments. Increment 1 followed the Urgent Capability Acquisition pathway to rapidly field a non-developmental system as an interim solution, while Increment 2 employed the Middle Tier of Acquisition pathway to support rapid prototyping and development of a long-term program of record. The Army further tailored the process by using other transaction authority agreements in early phases and planning a transition to a hybrid FAR-based contract structure combining Firm Fixed Price and Cost-Plus-Fixed-Fee elements. The use of milestone-based down-selects and Modular Open Systems Architecture enabled the program to remain flexible, responsive to operational feedback, and adaptable to future requirements.

However, this strategy implemented by the program office is not without risk. The research suggests while the hybrid strategy offers short-term responsiveness, it introduces long-term risks that resemble the pitfalls of the RQ-7 Shadow acquisition. Specifically, the danger of fielding a capability before requirements, sustainment planning, and interoperability considerations are fully mature. In the Shadow program, the Army prioritized the rapid fielding of a commercial off-the-shelf system to meet urgent needs, but this led to persistent challenges, including performance limitations, sustainment inefficiencies, and vendor lock-in. The FTUAS Increment 1 risks becoming another interim solution that burdens the force if not carefully transitioned and integrated with Increment 2. Several risks are worth highlighting including requirements drift, in which early fielding sets premature parameters that do not align with future needs; fragmented sustainment if the Army fails to secure technical data packages or enforce modular-open-system compliance; and reduced competition due to early vendor down-selection, which can result in sole-source sustainment contracts. There is also the risk of institutional complacency, where the urgency of delivery overshadows long-term performance and life cycle cost accountability. If executed with discipline, the hybrid approach could effectively bridge immediate needs with a sustainable long-term solution. However, if

Increment 1 becomes entrenched as a long-term capability without rigorous oversight, the Army may once again find itself sustaining a system that was never intended to endure as long as it did.

2. How were OTAs leveraged to encourage a robust response from vendors in the FTUAS program?

OTAs played a critical role in fostering competition and innovation in the FTUAS program. By avoiding traditional FAR constraints, the Army created a streamlined contracting process that appealed to non-traditional vendors. The "Buy-Try-Inform" approach awarded OTA-based prototype contracts to four vendors, allowing them to demonstrate capabilities in real-world operational environments. This structure reduced entry barriers and incentivized participation through the promise of potential follow-on production contracts. Milestone-based evaluations provided transparency and allowed the Army to progressively down-select vendors, encouraging sustained performance and responsiveness throughout the acquisition process.

3. What institutional changes did the Army implement to modernize its acquisition process for FTUAS?

Since the acquisition of the RQ-7 Shadow and broader modernization goals, the Army has implemented several institutional reforms. Most notably, the Army adopted the Adaptive Acquisition Framework to allow for more flexible and tailored acquisition strategies and increasingly relied on OTAs to speed up contracting and engage non-traditional vendors. The Army has also established Army Futures Command to consolidate modernization efforts under a single authority and accelerate capability development. AFC leverages cross-functional teams to drive innovation and streamline coordination across requirements, acquisition, and technology development. These institutional changes enhanced acquisition agility, reduced bureaucratic delays and allowed the Army to better align capability development with operational needs.

4. What insights can be drawn from the FTUAS program that could be applied to other DoD program offices to improve acquisition outcomes?

The FTUAS program offers several insights applicable across the Department of Defense. First, tailoring acquisition pathways to a program's urgency and risk profiles can improve responsiveness and reduce delays. Second, integrating early and iterative prototyping helps reduce technical and operational risk while allowing end-user feedback to inform design decisions. Third, embedding MOSA principles supports future upgradability and competition, which can drive down long-term costs. Finally, the institutional shift toward flexible frameworks, streamlined contracting, and centralized modernization structures highlights the value of aligning organizational processes with the pace of technological change and operational demand.

C. RECOMMENDATIONS FOR FUTURE RESEARCH

Based on these findings, several recommendations for future research emerge. First, a follow-up analysis should assess how Increment 2 performs over time, particularly in terms of cost control, vendor competition, and life cycle sustainment. Second, additional comparative research could explore how other uncrewed or autonomous systems programs have implemented similar acquisition reforms and whether institutional challenges remain. Lastly, future studies should assess the accuracy of cost estimates and how well life cycle sustainment strategies hold as the program matures.

In summary, the FTUAS program demonstrates how a well-tailored, flexible acquisition strategy grounded in adaptive policy, innovative contracting, and responsive leadership can accelerate delivery of critical capabilities while managing long-term risk. It serves as a model for future unmanned and defense acquisition programs seeking to operate at the speed of relevance and maintain the U.S. Army’s competitive edge in an increasingly dynamic and contested global environment.

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