NPS-AM-26-056

ACQUISITION RESEARCH PROGRAM SPONSORED REPORT SERIES

Department of War Acquisitions & the Integration of Requirement Readiness Levels

March 2026

Capt Benjamin M. Mannino, USMC

MSgt Andrew M. Smith, USMC

Thesis Advisors: Raymond D. Jones, Professor
Dr. Robert F. Mortlock, Professor

Department of Acquisition, Finance and Manpower

Naval Postgraduate School

Prepared for the Naval Postgraduate School, Monterey, CA 93943

The research presented in this report was supported by the Acquisition Research Program of the Department of Acquisition, Finance and Manpower at the Naval Postgraduate School.

To request defense acquisition research, to become a research sponsor, or to print additional copies of reports, please contact the Acquisition Research Program (ARP) via email, arp@nps.edu or at 831-656-3793

ABSTRACT

This research identifies procedural shortcomings in the Department of War (DOW) requirements and acquisition processes that delay the rapid acquisition of evolving technologies. Legacy processes such as the Joint Capabilities Integration and Development System (JCIDS) lack formalized feedback mechanisms to rapidly iterate requirements for new technologies, inhibiting the speed at which the DOW can respond to emerging threats on 21st century battlefields. Through an analysis of defense acquisition reforms, recent conflicts, and a collaborative case study between the Naval Postgraduate School (NPS) and Naval Special Warfare (NSW), this research suggests that current DOW acquisition processes contribute to requirement rigidity and misaligned Key Performance Parameters (KPPs), resulting in increased program risk. This research proposes a framework to formalize operational feedback processes focused on agile requirements-generation that is responsive to an adaptive threat environment. By focusing on the development of requirements identified through capability gaps, this study offers recommendations to improve agility and responsiveness within the Defense Acquisition System (DAS) to better align materiel solutions with warfighter needs.

THIS PAGE INTENTIONALLY LEFT BLANK

ABOUT THE AUTHORS

Capt Benjamin Mannino was born in Staten Island, New York. He graduated from Pennsylvania State University in May 2020 with a Bachelor of Arts in Criminology, and commissioned as a Second Lieutenant.

2ndLt Mannino graduated The Basic School in May 2021 and reported to the Infantry Officer Course. Upon completion, 2ndLt Mannino reported to Kilo Company, 3d Battalion 1st Marines, 1st Marine Division. In March of 2022, 2ndLt Mannino reported for duty as Second Platoon Commander, Kilo Company.

In May 2022, 2ndLt Mannino was promoted to First Lieutenant. 1stLt Mannino conducted pre-deployment workup with Kilo Company 3/1, to include SLTE 3-22 and Steel Knight 2023.

From March 2023 through October 2023, 1stLt Mannino deployed with 3d Battalion 1st Marines in support of Marine Rotational Force-Darwin 23.3 (MRF-D 23.3).

Upon redeployment from MRF-D 23.3, 1stLt Mannino was assigned as Company Executive Officer of Headquarters and Service Company (H&S), 3d Battalion 1st Marines. While serving with H&S Company, 1stLt Mannino supported Weapons and Tactics Instructor Course 2-24 (WTI 2-24) from March 2024 through April 2024.

In June 2024, 1stLt Mannino was assigned to Naval Postgraduate School as a Student in the Defense Systems Analysis program, where he is currently assigned. In October 2024, 1stLt Mannino was promoted to Captain.

Master Sergeant Andrew Smith was born in Decatur, GA. He enlisted in the Marine Corps on July 11, 2005 and graduated from Company K, 3d Recruit Training Battalion, MCRD Parris Island on Octob er 6, 2006. Upon completion of recruit training, he reported to Infantry Training Battalion, School of Infantry East, Marine Corps Base Camp Lejeune where he earned the MOS of 0341, Mortarman. He then reported to Weapons Company, 1st Battalion, 9th Marine Regiment, 2d Marine Division, Marine Corps Base Camp Lejeune. As a Mortarman and Forward Observer he deployed twice, once to Operation Iraqi Freedom, Iraq for combat operations and another with the 24th Marine Expeditionary Unit in support of Operations Unified Response and Enduring Freedom.

In October 2010, Corporal Smith completed his initial enlistment and transferred to the reserve component where he was then promoted to the rank of Sergeant. Sergeant Smith was reassigned to Company L, 3d Battalion, 23d Marine Regiment, 4th Marine Division in Montgomery, Alabama to serve in the billet of 60mm Mortar Section Leader.

In May 2012, Sergeant Smith was reassigned to Company K, 3d Battalion, 25th Marine Regiment, 4th Marine Division in North Versailles, Pennsylvania to serve in the billets of Section Leader and Platoon Sergeant. During this period, he was promoted to the rank of Staff Sergeant and completed his undergraduate degree from the University of Pittsburgh.

In January 2015, Staff Sergeant Smith was reassigned to Wounded Warrior Battalion East, Wounded Warrior Regiment to serve in the billet of Training SNCOIC. During this period, Staff Sergeant Smith was selected to return to the Active Component in his primary MOS of 0369 Infantry Unit Leader.

In December 2015, Staff Sergeant Smith received orders to 3d Battalion, 2d Marine Regiment, 2d Marine Division, Marine Corps Base Camp Lejeune. During this period, Staff Sergeant Smith served as the 81mm Mortar Section Leader and deployed on a Unit Deployment Program to Okinawa, Japan.

In July 2017, Staff Sergeant Smith was selected to serve on the Georgia Liaison Team Rotation 7, 2d Marine Information Group, 2d Marine Expeditionary Force, Marine Corps Base Camp Lejeune. During this period, Staff Sergeant Smith served as Team Chief and deployed to Georgia and Afghanistan as a part of the Georgia Deployment Program Resolute Support Mission. Upon returning from deployment in October 2018, he was promoted to the rank of Gunnery Sergeant.

In August 2019, Gunnery Sergeant Smith was reassigned to Recruiters School, MCRD San Diego. Upon graduation, he received orders to RS Nashville, 4th Marine Corps District, Eastern Recruiting Region where he served as a Canvassing Recruiter and the Program Coordinator.

In November 2022, Gunnery Sergeant Smith received orders to 3d Littoral Combat Team, 3d Littoral Regiment, 3d Marine Division, Marine Corps Base Hawaii where he served at his current rank as the Company Operations Chief for Company C. During this period, Master Sergeant Smith conducted multiple joint and bilateral exercises including the Marine Littoral Regiment Training Exercise, Balikatan 2024, and the Littoral Campaign in Northern Luzan Philippines.

In June 2024, Master Sergeant Smith was reassigned to the Naval Postgraduate School in Monterey, California to study Defense Systems Analysis.

Master Sergeant Smith holds a Baccalaureate of Arts degree from the University of Pittsburgh. His personal decorations include; Navy and Marine Corps Commendation Medal with Combat "C" device and two gold stars and the Navy and Marine Corps Achievement Medal with two gold stars. Master Sergeant Smith is married to Andrea Smith and they have two children, Charlotte and Owen.

THIS PAGE INTENTIONALLY LEFT BLANK

AI DISCLOSURE

We used AI tools in a limited and supervised capacity throughout the generation of our research, as approved by our advisor, Mr. Raymond Jones. NotebookLM was used to streamline the structuring and organization of key themes identified within the literature review chapter. ChatGPT 5.2 was used for basic grammatical review and editing support, to include corrections of tense and clarity. All substantial analysis, interpretation, arguments, and conclusions are the original work of both authors. Additionally, both authors reviewed and ensured the accuracy of all content, academic integrity, and compliance with Naval Postgraduate School AI policies.

THIS PAGE INTENTIONALLY LEFT BLANK

NPS-AM-26-056

ACQUISITION RESEARCH PROGRAM SPONSORED REPORT SERIES

Department of War Acquisitions & the Integration of Requirement Readiness Levels

March 2026

Capt Benjamin M. Mannino, USMC

MSgt Andrew M. Smith, USMC

Thesis Advisors: Raymond D. Jones, Professor
Dr. Robert F. Mortlock, Professor

Department of Acquisition, Finance and Manpower

Naval Postgraduate School

Prepared for the Naval Postgraduate School, Monterey, CA 93943

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

LIST OF FIGURES

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF TABLES

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF ACRONYMS AND ABBREVIATIONS

AAF	Adaptive Acquisition Framework
APB	Acquisition Program Baseline
CBA	Capabilities-Based Assessment
CD&I	Combat Development and Integration
CDD	Capabilities Development Document
CIO	Capabilities Integration Officer
COP	Common Operational Picture
CPD	Capability Production Document
DAS	Defense Acquisition System
DAU	Defense Acquisition University
DEVGRU	Naval Special Warfare Development Group
DFARS	Defense Federal Acquisition Regulation Supplement
DOD	Department of Defense
DOTmLPF	Doctrine, Organization, Training, Materiel, Leadership & Education, Personnel, and Facilities
DOW	Department of War
DRS	Defense Resourcing System
DWG	DOTmLPF Working Group
EA	Evolutionary Acquisition
EVM	Earned Value Management
FAR	Federal Acquisition Regulation
GAO	Government Accountability Office
ICD	Initial Capabilities Document
ID	Incremental Development
ISR	Intelligence, Surveillance, and Reconnaissance
JAGM	Joint Air-to-Ground Missile
JCIDS	Joint Capabilities Integration and Development System
JCM	Joint Common Missile
JROC	Joint Requirements Oversight Council
KOP	Key Operational Problem
KPP	Key Performance Parameter

KSA	Key System Attribute
MARCORSYSCOM	Marine Corps Systems Command
MCA	Major Capability Acquisition
MEIA	Mission Engineering and Integration Activity
NPS	Naval Postgraduate School
NSW	Naval Special Warfare
OSW	Office of the Secretary of War
P&R	Programs and Resources
PM	Program Manager
POR	Program of Record
PPBE	Planning Programming Budgeting and Execution
RDT&E	Research, Development, Testing, and Evaluation
RRAB	Requirements and Resourcing Alignment Board
RRAF	Recurring Requirements Analytical Framework
RRL	Requirements Readiness Level
SON	System Overview Network
SO-P	Special Operations-Peculiar
T&E	Testing and Evaluation
TMRR	Technology Maturation and Risk Reduction
TOW	Tube-Launched, Optically-Tracked, Wire-Guided
TRL	Technology Readiness Level
UAS	Unmanned Aircraft System
USMC	United States Marine Corps
USSOCOM	United States Special Operations Command
WBS	Work Breakdown Structure

I. INTRODUCTION

Note: References to the Department of Defense (DOD) and the Department of War (DOW) are used interchangeably throughout this research for the period following 5 September 2025, in accordance with Executive Order 14347, Restoring the United States Department of War, signed on that date and published in the Federal Register on 10 September 2025. This Executive Order authorizes the use of "Department of War" as an alternate designation for the Department of Defense and permits the Secretary of Defense and subordinate officials to be referred to by corresponding "War" titles in official correspondence, public communications, ceremonial contexts, and non-statutory documents within the executive branch of the United States government.

The Joint Capabilities Integration and Development System (JCIDS) governs how the DOD defines and validates requirements to ultimately drive the acquisition of new technologies to close a capability gap. Within this system, the Capabilities Development Document (CDD) is a formal output that defines validated Key Performance Parameters (KPPs) used to guide the development of acquisition programs. These KPPs eventually drive the Acquisition Program Baseline (APB), a critical document that sets cost, schedule, and performance thresholds for a program (Joint Staff, 2021, p. A4). This research focuses on the refinement of underlying processes that inform and drive the generation of requirements and respective KPPs, particularly the iterative interactions that occur between Milestones A and B within the Adaptive Acquisition Framework (AAF), the DOD's tailorable approach to managing acquisition programs across multiple pathways (AcqNotes, 2017).

A. BACKGROUND

Despite the requirements generation process being central to every defense acquisition program, this process has been repeatedly criticized by past and present administrations for being slow, unresponsive, and ill-suited to meet quickly evolving threats from U.S. adversaries (U.S. Government Accountability Office [GAO], 1988; Commission on Planning, Programming, Budgeting, and Execution Reform [PPBE], 2024).

This concern is relayed within the Marine Corps' modernization efforts through the Force Design 2030 plan. The Force Design 2030 update states, "We are modernizing at a time when the character of war is shifting rapidly ... combat is unforgiving, and victory belongs to the side that adapts faster" (U.S. Marine Corps [USMC], 2025, p.2). This statement reinforces a central theme of this research, that an agile requirements generation process is critical for the United States to gain and maintain an operational advantage on the modern battlefield.

These challenges to the requirements process have been well documented for many years. The President's Blue Ribbon Commission on Defense Management of 1986, informally known as the "Packard Commission," highlighted that unclear requirements, minimal user feedback, and complex processes led to cost delays and ultimately programs that did not suffice warfighter needs (GAO, 1988). Although this commission was formed 40 years ago, the DOD faces similar issues today. On 20 August 2025, the Office of the Secretary of War (OSW) published a memorandum that directed the disestablishment of the JCIDS process, re-aligning the Joint Requirements Oversight Council (JROC) away from Service-level requirements. With this memorandum, the OSW (2025) aims to establish a new framework for requirements generation centered on Key Operational Problems, or KOPs, forming a Requirements and Resourcing Alignment Board (RRAB), and standing up the Mission Engineering and Integration Activity (MEIA), all with the overall intent of accelerating the process in which the DOW fields new capabilities and ensuring requirements are directly tied to decisions that allocate resources such as manpower and funding (OSW, 2025). The disestablishment of the legacy JCIDS is a major shift in how the DOW currently views the acquisition process, confirming that JCIDS is no longer viable. The 2025 OSW memorandum addresses the central problem examined in this research: The current requirements generation process utilized by the DOW is static, non-adaptive to changing or emerging threats, and disconnected from both operational and resourcing capabilities.

PPBE is the DOD's internal process for allocating resources, aligning funding to strategy, and ensuring programs are fiscally executable. PPBE plays a foundational role in determining which programs are prioritized and sustained over time within the broader acquisition system (Defense Acquisition University [DAU], n.d.-c). Since PPBE determines which programs receive funding, its responsiveness, or lack thereof, has a direct impact on whether capabilities related to validated requirements are resourced. Under the current structure, if validated requirements evolve in response to emerging threats, PPBE is not positioned to rapidly adjust funding. This results in programs that are misaligned with operational realities. For this reason, PPBE is not solely an issue of budgeting, but is also directly tied to the requirements process. The Commission on PPBE Reform (2024) acknowledged that the formal requirements process is "the most well understood and organizationally accepted way to make changes...but this process is often not responsive to emerging threats or capabilities" (p. 195). This challenge is most evident during the Technology Maturation and Risk Reduction (TMRR) phase, where informal iterative processes drive requirements generation but are rarely structured and coordinated across stakeholders to allow for agile processes to flourish. These issues often result in outdated requirements reflected by static KPPs, misaligned program funding baselines, and ultimately schedule delays.

Despite reform efforts at the macro-level, such as the PPBE Commission's 2024 final report, the 2025 OSW memorandum, and President Trump's Executive Order No. 14265 (2025), there remains a lack of structural focus on the adaptability of KPPs throughout the acquisition process. Furthermore, there is a gap in integrating innovative organizations such as the Defense Innovation Unit into these formative stages, despite their utilization of rapid contracting techniques such as Other Transaction Authorities. If these agile entities remain detached from programs of record (POR), their insights will continue to be underutilized during critical program decisions.

B. PROBLEM

The problem with the current requirements development process is that requirements are validated in a largely static, non-agile manner and are insufficiently updated over time. Beyond validation, these requirements are not sufficiently informed by structured feedback methods and are not formalized into processes that maintain relevance across the entirety of the program's lifecycle. This leads to outdated and uninformed requirements that are quickly disconnected from the current battlefield environment, resulting in delays, cost overrun, and underperforming programs that do not field capabilities needed by U.S. warfighters. The current Russo-Ukrainian war illustrates how dynamic battlefield conditions require iterative responsiveness within the defense acquisition process due to real-time adversarial adaptation. Both Russian and Ukrainian forces initially employed radio-frequency drones, which were highly effective means of kinetic strike and reconnaissance until both militaries introduced effective electronic warfare countermeasures (Stepanenko, 2025). This shift led to the resurgence of what could be considered "dated" technology in the form of wire-guided drones. According to Stepanenko (2025), "Fiber-optic drones are not a particularly sophisticated technological adaptation (wire-guided munitions are a decades-old phenomenon), but Russian forces were able to impose new battlefield dilemmas on Ukrainian forces starting mid-2024 because these drones were resistant to EW (electronic warfare) interference, enabled precision strikes on armored equipment, and were scalable due to their simplicity" (p. 3). Although this shift seems to be regressive, it has been an operationally sound solution to an electronic warfare-contested battlespace during the proliferation of drone warfare (Epstein & Loh, 2025). This battlefield evolution directly negates the DOD's modernization of the tube-launched, optically tracked, wire-guided (TOW) missile system, which has recently evolved to TOW 2B radio-frequency guided variants (no longer wire-guided) to enhance range and employment techniques (Ruta & Higginbotham, 2009). These cases highlight the need to balance new and existing technology with changing threats. The Russo–Ukrainian conflict example illustrates that technology effectiveness is not binary and requirements must remain adaptable to evolving threats and countermeasures. Present battlefield adaptations must directly influence requirements shifts, and requirements processes that locks in performance parameters (i.e., KPPs) too early in the program lifecycle risk irrelevance by the time the technology is employed by an American warfighter.

The Marine Corps has taken note of the Russo–Ukrainian conflict, and similar principles are echoed within the Force Design 2030 update (USMC, 2025). This update identifies organic precision fires as a critical capability to enhance the infantry's lethality via "advanced, precision-guided, loitering munitions that can engage targets from extended ranges in austere environments" (USMC, 2025, p.5). The Marine Corps intends to field organic precision fires to the Fleet Marine Force in Fiscal Year 2026, indicating a deliberate shift away from bulkier, vehicle-mounted weapon systems such as the TOW missile and toward lighter–weight and more adaptive precision strike munitions. This shift mirrors the battlefield adaptations demonstrated in Ukraine, highlighting the Service's recognition that agile processes resulting in modular weapon systems are necessary for success in modern warfare.

Within the Marine Corps, the relationship between Combat Development and Integration (CD&I) and Marine Corps Systems Command (MARCORSYSCOM) is particularly important. CD&I identifies future capability needs based on operational gaps, while MARCORSYSCOM translates those validated requirements into actionable acquisition or procurement efforts.

Under the direction of the Fiscal Year 2016 National Defense Authorization Act, an advisory panel consisting of 16 acquisition professionals "was charged to deliver recommendations that could transform the defense acquisition system to meet the threats and demands of the 21st century" (Section 809 Panel, 2019, p. 88). The panel's report cites constant changes to "operations, threats, priorities, budgets, technologies, and related systems" between milestones A and B as causes to extended timelines exacerbated by fixed requirements (p. 88). A lack of formal coordination mechanisms to address emerging issues during the TMRR phase may contribute to misaligned outputs and inefficient transitions from the Initial Capabilities Document (ICD) to the CDD. According to a 2015 GAO report on acquisition reform, "completing a CDD takes, on average, 24 months—the longest timeframe of all the program documentation" (GAO, 2015, p. 8). Without formalized iterative feedback mechanisms, requirements will likely fail to adapt at the pace of adversary innovation.

To achieve agility, requirements must be continually reassessed through structured feedback loops before they are locked into the CDD. Without said mechanism, KPPs risk becoming outdated, APBs risk being founded upon flawed assumptions, and acquisition programs risk a continual and costly re-baselining process. The lack of thorough exit criteria for advancing technologies beyond Milestone A to Milestone B further compounds this issue (AcqNotes, 2017). When exit criteria are loosely defined and inconsistently applied, programs will advance with unvalidated assumptions, ultimately inflating risk and resulting in capabilities that are no longer relevant to the respective requirement.

C. RESEARCH QUESTIONS

This study seeks to answer the following research questions:

- What are the current limitations of the AAF in addressing agile requirement changes during the TMRR phase?
- What structural changes to the current AAF would improve agility throughout the TMRR phase without compromising accountability?

D. METHOD & SCOPE

This research proposes that recurring assessments of doctrine, organization, training, materiel, leadership & education, personnel, and facilities (DOTmLPF) should be conducted post-Milestone A to mitigate the risk of a single, frontloaded analysis. These assessments must directly inform the generation of KPPs and subsequent Key System Attributes (KSAs). To remain agile, updated KPPs will drive the APB document that formally establishes a program's cost, schedule, and performance goals (AcqNotes, 2024). Subsequently, outputs from the CDD will inform the specific APB. Without input from continuous DOTmLPF assessments, KPPs risk becoming stagnant and disconnected from evolving threats, user feedback, and the recent technological advancements of United States' adversaries.

The absence of previously stated recurring mechanisms was a central flaw in the legacy JCIDS process, likely impacting the OSW's (2025) decision to disestablish the system. The 2025 OSW memorandum emphasizes the need for experimentation and early industry engagement to accelerate the development of requirements (OSW, 2025). This research complements this reform by focusing on the micro-level processes within a program life cycle between Milestones A and B, to ensure that requirements are continuously refined as necessary rather than only adjusted at major decision points.

The introduction of *scrum*-like reviews between Milestones A and B would act as structured forums, similar to Common Operational Picture (COP) briefs, bringing together stakeholders from MARCORSYSCOM, program management offices, operational users, and testing/evaluation teams. Scrum is a project management methodology derived from agile principles, where cross-functional teams work in short, iterative cycles (called "sprints") to deliver functional outcomes with continuous feedback and improvement (Microsoft, 2022). Applying this model to defense acquisition would ensure faster adaptation to test results, threat shifts, and field data. Given the volume of inputs, the bandwidth required to manage milestone documentation such as the CDD, APB, Test and Evaluation Master Plan, and risk assessments is significant, requiring synchronized updates from multiple teams (AcqNotes, 2024). The current structure lacks a unified mechanism to support this level of coordination during the TMRR phase, which contributes to delays and fragmented requirements.

The Marine Corps, via Force Design 2030, has executed a similar shift toward an agile acquisition process centered on continuous warfighter feedback. The Force Design 2030 update (USMC, 2025) outlines the service's adoption of a capability portfolio that is managed by the respective Program Executive Office, stating that "instead of managing programs one-by-one with a focus on cost, this model gives a Program Manager responsibility for a suite of programs under a common capability area... with constant input from the Fleet Marine Force" (USMC, 2025, p. 19). This update emphasizes continuous fleet feedback and cross-functional program integration. This concept closely aligns with this study's proposed scrum-like reviews. Both approaches share the same end state of maintaining a requirement's relevancy through iterative processes and real-time feedback from the user as a replacement for the traditional static milestone-based reviews.

This study builds on the DOD's current reforms by addressing the specific aspect of iterative requirements refinement at the program level between Milestones A and B. Using structured DOTmLPF analyses and integrating scrum-like reviews into the acquisition framework, programs can generate requirements that are actionable, relevant, and resource informed. This research explores whether these mechanisms can effectively reduce misalignment, shorten capability fielding timelines, and enhance the overall operational relevance of the defense acquisition process.

As part of this effort, this study supported the Naval Special Warfare Development Group's (DEVGRU) Combat Development Directorate in conducting a

Group 3 unmanned aircraft system (UAS) requirements analysis. The CDD associated with this Group 3 system served as the primary source of qualitative data utilized throughout the analysis. The CDD was analyzed for requirements, KPPs, and associated KSAs. Industry provided UAS technical performance data served as the primary source of quantitative data used in an analysis of alternatives, enabling comparison with other Group 3 systems in the DOD's arsenal. The system was assessed for its potential to be modified to meet the maritime requirements of DEVGRU's mission and enable operators to acquire an organic intelligence, surveillance, and reconnaissance (ISR) capability. Additionally, collaboration with industry was conducted to validate the system's current and future capabilities. This analysis provided the DEVGRU Combat Development Directorate with a DOTmLPF assessment through the implementation of iterative feedback and requirement review.

This research is organized into five chapters. Following this introduction (Chapter I), Chapter II reviews literature relevant to defense acquisition reform, including foundational context, past and recent reform efforts, and modernization themes illustrated through applied case examples. Chapter III describes the data sources and methods used to analyze a real-world case study conducted in collaboration with DEVGRU. Chapter IV presents the data collected and examines the current acquisition environment to provide discussion and analysis of a proposed framework to improve requirements development and feedback integration. Chapter V concludes the research by summarizing key findings and offering recommendations for future research.

II. BACKGROUND AND LITERATURE REVIEW

The purpose of this literature review is to examine the current DOD acquisition framework and evaluate research aimed at improving its responsiveness and effectiveness. Specifically, this review focuses on the urgent acquisition pathway and its ability to accelerate capability delivery to the warfighter while maintaining accountability and oversight.

A. FOUNDATIONAL CONTEXT

Using Marine Corps processes as the primary case context, this research seeks to analyze how CD&I, MARCORSYSCOM, and Programs and Resources (P&R) interact across the acquisition lifecycle.

1. The Big A and Stakeholders

The term *acquisition* is used frequently throughout this study, and to clarify its meaning, the various uses of the term are defined. The overarching structure of the DOD acquisition system differentiates between Big "A" and little "a" acquisition (DAU, 2024). According to the DAU, the principal organization for training acquisition personnel, the Big A refers to the overall acquisition system, which consists of three inter-connected subcomponents: the Defense Acquisition System (DAS), PPBE, and JCIDS (DAU, 2024). These subcomponents influence and interact with each other through different levers and actions to ensure that all DOD materiel solutions are addressed. Once a materiel solution need is identified to meet a requirement outlined in operational planning, each sub-process plays a critical role in delivering the final product.

During the JCIDS process, the specific requirement is identified. JCIDS ensures effective collaboration across the joint force and alignment of each materiel solution recommendation with the National Defense Strategy, Joint Planning Process, and subordinate service-specific planning directives (DAU, n.d.-b). JCIDS also mandates various requirements throughout the acquisitions lifecycle including documents such as the CDD and various analyses (DAU, n.d.-a). Its goal is to ensure joint interoperability of developed systems.

The PPBE process ensures that new developments are properly resourced. The process provides a pathway to allocate funding for materiel solutions, through federal appropriations or reallocation of existing resources (DAU, n.d.-c.). The OSW Comptroller manages the allocation of financial resources. Each budget year requires adjustments or new budget requests through the National Defense Authorization Act and annual appropriation acts (Candreva, 2024). The goal of the PPBE process is to ensure that all materiel solutions within the DOD acquisition system are resourced and funded.

Finally, the DAS outlines the process through which defense acquisition efforts cycle. DOD Directive 5000.01 establishes the authority and policy while the DOD Instruction (DODI) 5000 series translate the policy into executable pathways and processes depending on their Acquisition Category and technology maturity (Office of the Under Secretary of Defense for Acquisition and Sustainment [OUSD(A&S)], 2020, DOD, 2022). Figure 1 outlines the structure and sequence of each acquisition pathway (OUSD(A&S), 2020, p. 10).

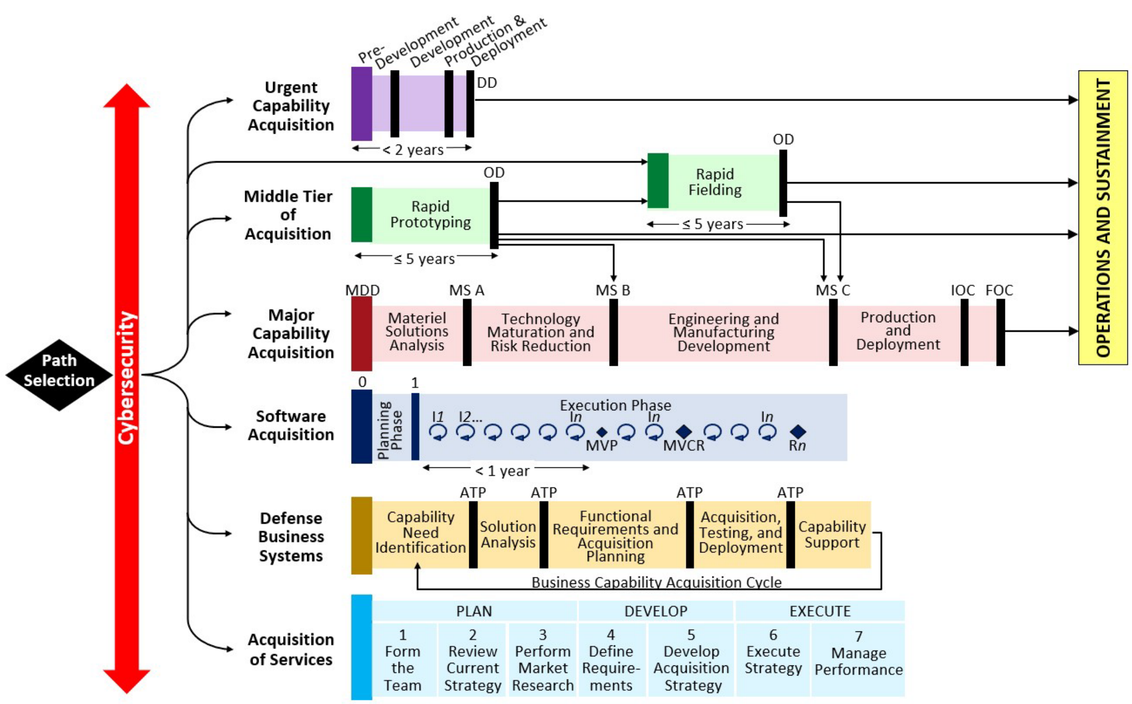

Figure 1. Adaptive Acquisition Pathway. Source: OUSD(A&S), 2020, p. 10.

After the initial planning and guidance is issued by higher-level organizations, Marine Corps entities such as CD&I, MARCORSYSCOM, and P&R collaborate to manage the different facets of the Big A processes of JCIDS, DAS, and PPBE respectively.

2. Combat Development and Integration

The initial phase of operationalizing strategic guidance resides within the Marine Corps' CD&I organization. CD&I's role aligns with the JCIDS process, with the organization's responsibilities including defining capabilities, identifying gaps, recommending solutions, and continuously analyzing the current environment and the service's posture (Capabilities Development Directorate, 2020). The DAS process begins with defining a requirement and identifying the need for a new materiel solution using the Doctrine, Organization, Training, Materiel, Leadership & Education, Personnel, Facilities, and Policy (DOTmLPF-P) framework (Joint Staff, 2021). CD&I ultimately serves as the gatekeeper and initiator for all Marine Corps acquisitions before other stakeholders become involved (Capabilities Development Directorate, 2020).

CD&I's roles and responsibilities align with the DAS life-cycle milestones. CD&I plays a critical role prior to the Materiel Development Decision, during the Materiel Solution Analysis phase, before the acquisition is identified as a program at Milestone A, and during the TMRR phase, before it is designated as a POR at Milestone B (Capabilities Development Directorate, 2020, OUSD[A&S], 2020). Prior to the Materiel Development Decision, CD&I conducts a Capabilities-Based Assessment (CBA) to validate a requirement for proceeding in the lifecycle (Capabilities Development Directorate, 2020). Using the DOTmLPF-P framework, the CBA generates the ICD, officially beginning the acquisition process and entering the Materiel Solution Analysis phase (Joint Staff, 2021). CD&I's role continues in the TMRR phase, where the need identified in the ICD is refined and quantified into performance attributes such as KPPs and KSAs (Capabilities Development Directorate, 2020, p. 7, Joint Staff, 2021, p. 137). Through these refinements, greater clarity on the materiel solution is achieved, and the CDD is drafted and approved at Milestone B, marking the start of the Engineering and Manufacturing Development phase (Chairman of the Joint Chiefs of Staff, 2011, p. 9).

A review of the USMC regulations and policies demonstrates that CD&I places primary emphasis on the requirements-generation process, primarily conducted through various working groups. The organization’s Capabilities Integration Officers (CIOs) are responsible for analyzing strategic and service guidance and conducting CBAs to validate requirements (Capabilities Development Directorate, 2020, pp. 1, 5). Each CIO is directly responsible for “taking appropriate staff action to close identified gaps and meet operational needs through DOTmLPF-P” (Capabilities Development Directorate, 2020, p. 1).

3. Marine Corps Systems Command

The MARCORSYSCOM aligns its roles and responsibilities with the little a, the DAS, as part of the broader Big A. According to MARCORSYSCOM’s (n.d.) website, the organization’s principal responsibility is the development, procurement, and life-cycle management of all Marine Corps programs. Once requirements and capability gaps are identified and approved through CD&I and the JCIDS, MARCORSYSCOM translates those needs into materiel solutions managed by its Program Executive Offices and Program Managers (PMs; MARCORSYSCOM, 2025). This transition from CD&I to MARCORSYCOM typically corresponds to the shift in the life cycle from Milestone A to Milestone B, when the program becomes a POR (USMC, 2021).

As the program becomes a POR, contracting offices become more involved in developing materiel solutions. In coordination with Marine Corps’ P&R, funding from the PPBE cycle is allocated to the programs within MARCORSYSCOM’s portfolios (USMC, 2021, pp. 98–101). Once designated as a POR, the program falls directly under MARCORSYSCOM’s responsibility. The organization matures the program using tools such as the APB and earned value management (EVM) to translate the identified capability gap into a materiel solution (USMC, 2021). The purpose of the APB is to ensure that the program remains within the cost, schedule, and performance parameters established by appropriations and to prevent breaches or “deviations” (USMC, 2021, pp. 54–57). To maximize efficiency and reduce risk, MARCORSYSCOM uses EVM to “ensure sound planning and resourcing of all tasks required for contract performance” (USMC, 2021, p. 47). EVM provides a cumulative metric for measuring program efficiency in terms of cost, schedule, and performance as the program matures (USMC, 2021, p. 47). These parameters are driven by the technical subcomponents needed to build the project, the work breakdown structure (WBS), as well as the timeline of events, the integrated master schedule (USMC, 2021, pp. 48, 51). Each process conducted by MARCORSYSCOM is aimed at the efficient development of materiel solutions for the warfighter.

The key process in requirements generation and validation is the transition of requirements from CD&I to the acquisition process at MARCORSYSCOM, formally known as the requirements transition process (USMC, 2021, p. 35). This transition represents a critical point in translating requirements into acquisition pathways to address capability gaps. While CD&I conducts annual DOTmLPF-P analyses of capability gaps through its CIOs, the requirements transition process marks the formal shift in responsibility from CD&I to MARCORSYSCOM.

4. Programs and Resources

The Marine Corps P&R organization is principally responsible for linking a program to the allocation and appropriation of resources necessary to support it (USMC, 2021, p. 24). P&R advances Marine Corps programs through the PPBE process by "balancing resources, priorities, and associated trade-offs among cost, schedule, technical feasibility, and performance on major defense acquisition programs" (USMC, 2021, p. 24). According to the organization's website, P&R's mission is to serve as the principal financial advisor to the commandant of the Marine Corps (U.S. Marine Corps, Deputy Commandant for Programs & Resources, n.d.). Within the broader Marine Corps enterprise, P&R serves as the link between strategic priorities, identified through organizations like CD&I, and the financial resources required to execute those priorities.

As programs mature into PORs, P&R supports all life cycle management decision points for current and future programs through continuous cost estimation and affordability analysis (USMC, 2021, p. 24). These decision points are collected and acted upon through various working groups and ultimately guide funding decisions for all programs. Furthermore, P&R provides resource and budgetary oversight in support of PMs, helping ensure programs are resourced in a manner consistent with the financial requirements outlined in the Federal Acquisition Regulation (FAR; 2025) and the Defense Federal Acquisition Regulation Supplement (DFARS; 2020).

Given the rigid financial regulations and processes within the government, establishing a more adaptable and responsive P&R organization presents significant challenges. The flexibility of P&R is largely constrained by the actions of adjacent organizations, such as CD&I and MARCORSYSCOM.

B. DEFENSE ACQUISITION REFORM

The modern DAS system has undergone numerous reforms and adjustments, many of which were in response to evolving threat environments and structural shifts within the DOD. A consistent theme throughout the history of DOD management is the need for greater interconnection among the military branches. The emphasis on "jointness" arose from the recognition that modern conflicts require unified, cross-domain responses.

Before 1985, the defense acquisition environment was widely criticized as overly bureaucratic and inefficient, plagued by fragmented authority, poor accountability, and limited transparency (President's Blue Ribbon Commission on Defense Management, 1986). In response, President Ronald Reagan established the President's Blue Ribbon Commission on Defense Management, commonly known as the Packard Commission, to address these inefficiencies. The commission's report became a seminal blueprint for reform, leading to new acquisition and procurement policies, structural command realignments, and formalized training programs (President's Blue Ribbon Commission on Defense Management, 1986).

Among its major findings, the Packard Commission identified weaknesses in the budgeting process and the misalignment between strategic planning and resource allocation. It recommended greater integration between budgeting and planning through a 5-year planning cycle and biennial budgeting (President's Blue Ribbon Commission on Defense Management, 1986). It also advocated for a stronger "joint" organizational structure, both in acquisition management and in what would evolve into today's combatant commands. Section 3 of the Goldwater–Nichols Reorganization Act of 1986 codifies these reforms as congressional policy, stating that the intent of the legislation is, "(6) to provide for more efficient use of defense resources; (7) to improve joint officer management policies; and (8) otherwise to enhance the effectiveness of military operations and improve the management and administration of the Department of Defense" (1986, § 3).

The Commission also called for a more professional and accountable acquisition workforce, emphasizing the need to strengthen management authority and improve industry relationships to reduce cost overruns and schedule delays (President's Blue Ribbon Commission on Defense Management, 1986). Many of these recommendations became foundational to the modern acquisition processes codified in the DOD 5000 series and subsequent adaptive frameworks.

A follow-up evaluation by the U.S. Government Accountability Office (GAO) confirmed substantial progress in implementing the commission's proposals. As noted in its report, *Status of Recommendations by Blue Ribbon Commission on Defense Management,* the GAO (1988) found that most recommendations had been adopted or were in progress, especially those related to acquisition leadership and workforce development (pp. 1–4). The GAO emphasized that meaningful change occurred rapidly when directed by senior leadership but also noted that structural integration, particularly aligning acquisition with budgeting and programming, remained incomplete. Persistent fragmentation among Services appears to continue to challenge coordination and accountability.

J. Ronald Fox's *Defense Acquisition Reform, 1960-2009: An Elusive Goal* (2011) provided a comprehensive historical analysis of defense acquisition reforms. Fox (2011) highlighted the Packard Commission's attempt to address "persistent problems of cost growth, schedule slippage, and technical performance shortfalls" within the acquisition culture (p. 189). He also recognized the complexity of the acquisition system due to its span across multiple agencies and functions (p. 130). Ultimately, the Packard Commission's findings and recommendations were leveraged through legislative change to remedy inefficiencies at the highest levels, a potential shortfall in implementing across the span of the acquisitions workforce (p. 131).

The Packard Commission was instrumental in improving the DOD's acquisition processes, but much remains to be done. Fox (2011) observes that although many of the commission's recommendations targeted senior leadership and authoritative agencies, they did not sufficiently address the procedural and structural changes required at lower organizational levels for effective implementation (pp. 131–132). The implementation of these reforms quickly drew criticism from subordinate organizations, as the commission's efforts often treated the symptoms of inefficiency rather than their root causes. This dynamic highlighted the persistent tension between flexibility and oversight, a theme that continues to shape acquisition reform today. Reports such as Fox's (2011) underscore the ongoing need for the acquisition community to adopt more adaptive and responsive approaches. This tension between top-down reform and bottom-up implementation is reflected again in more recent structural changes initiated under the Trump administration in 2025, which are discussed in a later section.

Building on these earlier reform efforts, the broader Big A acquisition system continues to evolve in response to a shifting global environment. A 2022 RAND report synthesizing over 3 decades of acquisition research emphasizes that the changing geopolitical landscape underscores the need not only for enhanced joint interoperability but also for ongoing reform of the acquisition enterprise (Wong et al., 2022). Since the Packard Commission and the subsequent Goldwater–Nichols Act, the DOD has experienced multiple waves of reform, most notably the *Weapon Systems Acquisition Reform Act* in 2009, the *Better Buying Power* initiatives of the 2010s, and the *Adaptive Acquisition Framework* in 2020, each seeking to improve lifecycle efficiency and institutional agility (Wong et al., 2022, pp. 1, 26–27). Despite these repeated efforts, Wong et al. (2022) finds that reforms often address surface-level inefficiencies rather than the deeper misalignments in governance, incentives, and organizational structure that constrain systemic adaptability (p. 27). The researchers identify eight enduring institutional and operational challenges, spanning cost growth, workforce capability, interoperability, and cybersecurity, with an overarching need for agility and responsiveness to evolving threats (Wong et al., 2022, pp. 13–17). Ultimately, RAND concludes that the acquisition enterprise remains hindered by misaligned processes and limited adaptability; sustained improvement will require continued reform of requirements generation and the ability to remain flexible throughout the acquisition lifecycle.

C. MODERNIZATION THEMES AND EMERGING CONCEPTS

This section examines the evolution of defense acquisition modernization efforts in response to increasingly dynamic environments. These modernization efforts are outlined within a broader historical context, showcasing how legacy processes struggle to keep pace with the rapid technological evolutions of the modern battlefield. By identifying the limitations of traditional requirement processes to include policy and resource allocation reform, this section provides the foundational context to understand why agile, feedback-driven approaches are now central to defense modernization efforts.

1. Limitations of Traditional, Constrained Requirements Processes in a Dynamic Environment

Traditional defense acquisitions, while continually modified and reformed, present constrained requirements in the interaction between the DAS and the JCIDS processes. This rigidity negatively impacts acquisition flexibility, particularly in the early stages of requirements development and materiel solution integration. Before the development of the DODI 5000 series, acquisition processes were often characterized as due to the system's requirement for detailed identification of all performance requirements at the earliest stage of a program's lifecycle (Lorell, Lowell, & Younossi, 2006, p. 7). This created a dilemma for the Warfighter, limiting adaptability. Once "requirements [were] formally approved, [they] would often become cast in stone as an unchangeable template against which all aspects of the program were judged, regardless of changing or newly emerging operational needs" (Lorell, Lowell, & Younossi, 2006, p. 7). While Lorell, Lowell, & Younossi's research is dated, similar inefficiencies relating to the requirements process persist today.

Maintaining a constrained requirements identification process often risks misaligning the final materiel solution with evolving operational needs, particularly given the fluid and unpredictable nature of modern threats. According to a 2020 RAND report on agility in acquisitions, "flexibility in requirements allows the product to meet the latest needs as the battlespace evolves" (Anton et al., 2020, p.17). Additionally, GAO noted in a 2024 report that "recent reforms were intended to lead to faster results, but slow, linear development approaches persist," illustrating how traditional acquisition practices remain regardless of reform efforts (GAO, 2024, p. 3). These historically standardized, linear models have contributed to capabilities that can be outdated by the time they are delivered, extended development schedules, and inefficiencies across stakeholders.

2. The Policy Shift towards Capabilities-Based and Evolutionary/ Incremental Acquisition

Throughout the history of DOD acquisitions, numerous policy shifts have aimed to streamline the process. While acquisition processes appeared to include all necessary steps, a significant gap often remained between identifying a requirement and delivering a final solution to the warfighter. Policies continued to be refined to align current practices with evolutionary concepts aimed at adapting to changing environments. In response to the emerging need to pace with technological advances, the DOD revised the DODI 5000 series documents in May 2003, to allow for a "flexible and innovative, yet disciplined" acquisition process (DAU, 2005, p. 27). These refinements targeted the JCIDS process to better control requirements and meet user needs. While the document requirements remained unchanged, emphasis was placed on "close integration with the JCIDS and increased 'front-end' planning and analysis" (DAU, 2005, p. 29). In addition, evolutionary acquisition (EA) remained the central approach and, importantly, was labeled as the "preferred approach for rapid acquisition of mature technology and meeting operational needs" (DAU, 2005, p. 29). The purpose of refining the EA approach, as opposed to the single-step approach, is to ensure that the final materiel solution meets the user's requirements. Within the AAF, numerous pathways vary in lifecycle length depending on the Acquisition Category level and scope, with Major Capability Acquisition (MCA) pathway program on average taking 8 to 11 years to deliver initial capability (GAO, 2024, p. 3). Given lengthy timelines and the ever-changing threat environment and requirements, EA addresses the need for constant feedback between industry and user.

To further ensure the DAS lifecycle satisfies the end-user requirements, JCIDS was created in 2003 to "identify the capabilities and associated operational performance criteria required by the joint warfighter" (Fast, 2010, p. 644). Accordingly, the JROC's responsibilities are supported through JCIDS, which validates requirements across the joint force (Fast, 2010, p. 644). JCIDS is based on the CBA in the early stages, during the transition from identifying a requirement to assessing the need for a materiel solution (Fast, 2010, p. 645). The purpose of the CBA is to validate capabilities and identify gaps that are not currently addressed in the DOTmLPF-P of the joint force (Fast, 2010, p. 645; Chairman of the Joint Chiefs of Staff, 2011, p. GL-3). The output of the CBA process is the ICD, leading to the subsequent development of the CDD and Capability Production Documents (CPD) that direct the phases in the acquisition pathways (Fast, 2010, p. 645). These guiding documents are required by JCIDS across all acquisition pathways and align with the various milestones between acquisition phases, serving as gateways for all programs (Chairman of the Joint Chiefs of Staff, 2011).

3. Implementing Agile Resource Allocation for Shifting Requirements: 2024 PPBE Reform Commission

The PPBE process, as briefly described in the Introduction chapter, has long served as the linkage between U.S. defense strategy and resource allocation. This process provides a structured means for defense and government officials to align strategic goals with budgetary priorities. However, the PPBE Reform Commission of 2024 found that this dated process has become inefficient as the operational tempo and technological pace on the modern battlefield continues to accelerate. The 2024 PPBE Reform Commission final report states, “the current PPBE process is not capable of responding as quickly and effectively as needed to support today’s warfighter. The DOD needs a new process, one that enables strategy to drive resource allocation in a more rigorous, joint, and analytically informed way” (Commission on PPBE Reform, 2024, p. 1). This finding demonstrates the current PPBE shortfalls not only through an administrative lens, but also in terms of the National Defense Strategy; ultimately, the current PPBE process delays the delivery of new capabilities across acquisition programs.

The commission identified several issues, including the slow budget approval process, limited analytic capability due to dated systems, and the misalignment of strategy and resources. The report states, “current strategic and resource allocation guidance documents are frequently consensus-driven, often late to need, and sometimes fail to provide actionable direction to the DOD Components” (Commission on PPBE

Reform, 2024, p. 2). Further, “one of the most consistent concerns the Commission heard over the past two years is that the current PPBE process lacks agility, limiting the Department’s ability to respond quickly and effectively to evolving threats, unanticipated events, and emerging technological opportunities” (Commission on PPBE, 2024, p. 3). The outlined deficiencies directly contribute to the stagnation of the DOD’s acquisition process, resulting in defense program offices and industry partners operating with outdated funding constructs that cannot adapt in real-time to emerging battlefield requirements.

To correct these deficient processes, the commission proposed the implementation of the Defense Resourcing System (DRS), intended to strengthen the relationship between strategy and resource allocation with increased agility. The DRS would replace the legacy PPBE phases with three main functions: strategy, resource allocation, and execution. The report states that the DRS would, “fundamentally strengthen the connection between strategy and resource allocation while creating a more flexible and agile execution process and preserving congressional oversight” (Commission on PPBE Reform, 2024, p. 4). It is important to note that this process would utilize feedback loops to “evaluate overall fiscal, program, and operational performance, as well as alignment with strategic and planning goals” (Commission on PPBE Reform, 2024, p. 5). The proposed restructuring of the PPBE construct directly aligns with the central hypothesis in this study that iterative user feedback and continuous requirement review are necessary for relevant acquisition decisions that are directly impacted by resource alignment.

Although the recommendations put forth by the 2024 Commission on PPBE Reform are a critical step in the right direction, the group’s report leaves specific implementation gaps unaddressed. As it currently stands, implementation of the DRS is still a theoretical solution. This report does not specify how iterative feedback from the end-user will further inform the reallocation of resources during budgetary execution. The commission acknowledges that these recommendations “will require substantial effort on the part of Congress and the DOD, especially its resource management community” (Commission on PPBE Reform, 2024, p. 9). Without a formal mechanism in place to analyze and implement the addressed feedback loops, the envisioned impact of the DRS will remain widely conceptual rather than operational.

D. CASE EVIDENCE AND APPLIED EXAMPLES

The following section synthesizes case-based applied examples that illustrate the challenges and opportunities associated with requirement management in defense acquisition. The following cases draw from program level studies, oversight findings, and recent policy reform examples. Collectively, the following section highlights a recurring theme of disconnect between requirements, testing, operational needs, and continuous user feedback to influence iterative refinement.

1. Challenges in Implementing Flexible Requirements Management within Incremental Acquisition

Mortlock (2020) argues that "Program Managers and acquisition professionals struggle to formulate the preferred approach at program approval milestones, and many programs are approved as single-step development efforts whereas an incremental approach may be more appropriate and effective in delivering capability" (p. 283). His analysis, centered on the Joint Common Missile (JCM) and Joint Air-to-Ground Missile (JAGM) programs, demonstrates how rigid CDDs and directed KPPs limit program flexibility in the former while time-phased requirements enabled adaptability and success in the latter. The JCM program was ultimately cancelled due to its inflexible single-step strategy, while the JAGM program succeeded by employing incremental development (ID) that allowed requirements to be modified in a timely manner. This distinction demonstrates how iterative approaches can deliver capability faster with reduced requirements risk when compared to single-step acquisition models. This theme directly reinforces our argument that the CDD and its associated KPPs must remain iterative and adaptive.

Mortlock (2020) further supports his claim with evidence drawn from case studies and a survey of over 30 acquisition professionals. He finds that acquisition professionals generally view ID as a more effective method of delivering capability, particularly when contrasted with the drawbacks of single-step development, such as protracted timelines and elevated program risk. Mortlock (2020) highlights that "the widely employed single-step acquisition model can be more effective in achieving materiel solutions that meet requirements through the Integrated Development (ID) approach" because it emphasizes iterative refinement (p. 285). These findings provide a qualitative validation regarding the benefits of incremental acquisition processes that closely align with the scrum-like iterations that this research proposes as a mechanism for real-time refinement of KPPs.

Mortlock (2020) acknowledges several limitations in his work; the survey was limited to 31 participants, and his analysis of "warfighter capability" was confined to the JCM and JAGM case studies (p. 295). He notes that this research "could not fully answer the secondary research question, 'How can the decision input factors be changed to enable a PM or acquisition professional to recommend an ID strategy that more closely resembles the actual strategy later adopted by the Services?'" (Mortlock, 2020, p. 298). These limitations acknowledge a key gap in current literature, generalizing Mortlock's findings beyond a small sample size and Service-specific programs, as well as how acquisition decision inputs can be formally captured and restructured to better facilitate an ID approach. Mortlock identifies the alignment of ID with decision inputs such as Technology Readiness Levels (TRLs), this research extends this concept by demonstrating how rapid battlefield adaptations, such as the proliferation of new drone technology in the Russo–Ukrainian war, justifies the necessity for continuous DOTmLPF updates to better inform acquisition milestone decisions.

2. Office of Inspector General (2020) *Audit of U.S. Special Operations Command Testing and Evaluation*

A 2020 audit report from the DOD Office of Inspector General revealed that U.S. Special Operations Command (USSOCOM) did not verify that newly acquired equipment was compliant with associated performance requirements prior to being fielded. The objective of this audit was to determine whether Special Operations-Peculiar (SO-P) equipment had met its associated KPPs, defined in the audit as "those system attributes considered most critical or essential for an effective military capability" (Office of Inspector General, 2020, p. i). The authors concluded that for six out of 10 programs, USSOCOM did not verify that their equipment passed the required testing and evaluation (T&E) criteria. These six programs contained a total of 29 KPPs, and only six of those were tested before the equipment had been fielded to the warfighter. The lack of KPP validation was attributed to procedural shortcomings and a failure to adhere to

USSOCOM-established directives. The respective PMs did not consistently utilize a requirements correlation matrix to tie program KPPs with their respective T&E criteria necessary to validate them. As a result, USSOCOM purchased and employed equipment "without verifying that the equipment meets user needs" (Office of Inspector General, 2020, p. ii). This led to user feedback that indicated the equipment fielded was not "operationally effective" and had significant functional issues (Office of Inspector General, 2020, p. ii).

Through the application of agile and collaborative methods, such as recurring DOTmLPF working groups (DWG), issues identified in this audit may have been mitigated. An incremental approach to KPP validation would have produced an integrated verification process throughout the equipment's lifecycle instead of concentrating these efforts towards the end. Additionally, iterative testing would have driven PMs to maintain a requirements correlation matrix as a continuous document, quickly identifying issues with performance metrics and preventing a scenario in which 23 of the 29 KPPs failed verification before fielding. The implementation of a continuous working group consisting of key stakeholders has the potential to create an iterative feedback mechanism between users and developers, ultimately preventing the fielding of operationally ineffective equipment and more efficiently allocating limited resources such as manpower and funding. The establishment of a formal collaboration between stakeholders would have identified disconnects between requirements and user needs earlier in the acquisition process, avoiding situations where loosely defined evidence such as email traffic from a contractor stating that the equipment "worked great" was the sole documentation of KPP verification (Office of Inspector General, 2020, p. 11). Although the audit group's final recommendation is to enforce documentation standards prior to the issuance of a fielding and deployment release, a formalized continuous user feedback model would serve as a proactive measure ensuring that there is shared confidence among all stakeholders that a system meets verified warfighter needs.

3. OSW (2025) Memorandum: *Reforming the Joint Requirements Process to Accelerate Fielding of Warfighting Capabilities*

The 20 August 2025 OSW memorandum disestablished JCIDS, signaling a major shift in how the DOW manages requirements, stating “Effective immediately, commence the disestablishment of JCIDS and direct JROC to cease validating Component-level requirement documents to the maximum extent permitted by law” (p. 1). The decision to cease JCIDS was made due to the process’ inability to keep pace with current operational demands. This memorandum explicitly emphasizes that rebuilding U.S. military capability requires faster methods for delivering technology. The former JCIDS process locked programs into an overly rigid documentation process that slowed the DOD’s ability to react to the evolving nature of the 21st century battlefield.

In lieu of JCIDS, this memorandum includes the formalization of new processes aimed at accelerating the fielding of technologies, such as JROC and RRAB to identify requirements and align the appropriate resources. It also dictates the establishment of the MEIA, directed to “rapidly engage with industry, conduct mission engineering analysis to refine capability requirements, and conduct rapid integration of capabilities and structured and iterative experimentation campaigns” (OSW, 2025, p. 2). The MEIA’s emphasis of iterative experimentation and early user input directly mirrors a scrum-type feedback framework that should occur between Milestones A and B of a program’s lifecycle. Additionally, RRAB’s bridging of requirements and resources closely aligns with continuous DOTmLPF informed inputs, ensuring that capabilities remain connected with the evolving operational environment. The release of this memorandum at the OSW-level reinforces the DOW’s need for an iterative and agile approach to capability development.

Although the OSW (2025) memorandum outlines significant reformations, there are still critical gaps left unaddressed. With emphasis on iterative experimentation and early engagement with industry, there is no direct specification of how continuous user feedback will be formalized across the defense acquisition process. Without structured mechanisms such as recurring DWGs in place, the new processes outputted by this directive risk relying on periodic stakeholder inputs instead of continuous adaptation. Additionally, this memorandum highlights resourcing and integration but does not provide any detailed guidance regarding the analysis of adversarial advancements in technology that may render U.S. capabilities inadequate. These gaps emphasize the importance of this research, which aims to advance this directive's goal through the recommendation of a formalized process for iterative user feedback that continually refines requirements.

E. IMPLICATIONS OF LITERATURE

This literature examined the current Big "A" processes within the Marine Corps and numerous reform efforts across the DOW's defense acquisition enterprise. While each reform initiative addressed specific aspects of the little "a," research consistently finds that the system struggles to keep pace with evolving requirements needed to address capability gaps. As a result, the system's evolution—from the Packard Commission (1986) to the most recent OSW memorandum (2025)—has been gradual and uneven, remaining largely unchanged despite decades of reform.

THIS PAGE INTENTIONALLY LEFT BLANK

III. DATA

Note: Due to the classification (SECRET) of the data, the scope of this chapter is restricted for public release. The point of contact for this matter is DEVGRU, Combat Development Directorate, and can be reached at (757)862-0504.

A. INTRODUCTION

The quantitative data presented in this chapter regarding the selected UAS platform was used to conduct a DOTmLPF-P analysis. This data primarily represents the platform's technical specifications to include performance characteristics, capabilities and limitations of those specifications, and modularity of the platform's design to execute specific Naval Special Warfare (NSW) mission profiles. Ultimately, this analysis focused on fulfillment of the user requirement, this platform's ability to execute key tasks in accordance with DEVGRU's mission statement, methods of tactical delivery, and the impacts that the acquisition of this platform would have on DEVGRU's task organization.

B. ANALYTICAL FRAMEWORK

Using DEVGRU's CDD, areas of concern were linked to critical operational issues (COIs) that define the requirements for the UAS. Data specific to the selected UAS platform was analyzed to determine its suitability in addressing these COIs. Table 1 identifies the areas of concern and the associated COIs that were used to evaluate the platform's effectiveness.

Table 1. COIs

Area of Concern	COI
Alignment with User Requirements	Does this system meet operational needs and KPPs outlined in the CDD?
Mission Integration and Employment	Can this platform be integrated into current DEVGRU mission profiles in a maritime environment?
Modularity and Adaptability	Can this system be configured for DEVGRU mission profiles across varying operational environments?
Delivery Methods	Is this system able to be launched and recovered from current DEVGRU assets?
Sustainment Considerations	What additional logistical burdens will this system present to operators?
Organizational Impact	How will the procurement of this system affect DEVGRU's current table of organization and training demands?

C. DATA

Technical data specifications provided by the manufacturer were evaluated to ensure the UAS platform meets DEVGRU's requirements. Each technical specification parameter identified in Table 2 was used to analyze the platform's suitability in addressing the areas of concern. Additional evaluation incorporated the technical specifications within the DOTmLPF-P framework to support seamless integration of the platform into the organization.

Table 2. UAS Platform Technical Specifications

Parameter	Value	Unit
Max Gross Takeoff Weight	All Values Omitted	lb
Payload Capacity	[redacted]	lb
Length/Wingspan	[redacted]	ft
Operating Altitude	[redacted]	ft DA
Endurance	[redacted]	h
Fuselage Payload Size	[redacted]	in
Payload Cassette Volume	[redacted]	in^3
Payload Power	[redacted]	W
Cruise Airspeed	[redacted]	kt
Max Airspeed	[redacted]	kt
Silent Flight Period	[redacted]	min
L&R Wind Limitation	[redacted]	kt
Temperature Range	[redacted]	°F
Precipitation Limit	[redacted]	in/hr
L&R Boundary	[redacted]	ft
L&R Conversion Altitude	[redacted]	ft

D. LIMITATIONS OF DATA ANALYSIS

Several limitations are inherent in the analysis of this data. As the system is undergoing T&E, certain performance metrics, such as aircraft endurance with specific payloads, may undergo modifications. Standalone quantitative data cannot fully capture the system's operational effectiveness under combat conditions, including the introduction of non-state actors and peer adversary EW countermeasures, as well as variations in weather and environmental factors (e.g., maritime corrosion, wind fluctuations). It is necessary to acknowledge that the system's specifications reflect the current performance at a specific point in time and technology readiness level. Future T&E results, coupled with the continuous proliferation of adversarial capabilities, will further influence DEVGRU's decision to procure this system. Consequently, this research proposes an iterative acquisition strategy with a continuous DOTmLPF-P update at critical milestones. This approach enables DEVGRU's Capabilities Development Directorate to continuously update its acquisition strategy in real time, aligning it with adversarial advancements and evolving battlefield conditions. This strategy effectively mitigates both cost overruns and schedule delays.

THIS PAGE INTENTIONALLY LEFT BLANK

IV. DISCUSSION AND ANALYSIS

Through a Group 3 UAS study examining the adaptation of a land-based system for maritime application, several inefficiencies were identified in organizational adaptability and acquisition agility. The organizations involved relied heavily on legacy JCIDS processes and documentation, resulting in significant delays in capability implementation and acquisition timelines. These delays exacerbated existing gaps in ISR coverage that could have been mitigated through more agile and collaborative acquisition practices. Analysis suggests that the primary causes of these delays were limited joint communication and interface mechanisms, coupled with rigid adherence to current JCIDS procedures such as CDD preparation, CBAs, and DOTmLPF integration analysis.

A. INTRODUCTION OF RECURRING REQUIREMENTS ANALYTICAL FRAMEWORK

These findings highlight a systemic disconnect between requirements-generation and program execution. The lack of iterative communication and adaptability across organizational boundaries contributed to inefficient timelines and underdeveloped capability delivery mechanisms. In response, a conceptual Recurring Requirements Analytical Framework (RRAF) was developed. The RRAF is a continual and adaptive model designed to address these inefficiencies and improve the integration between requirement definition and acquisition execution. The intent of the RRAF is to establish an iterative process capable of revealing misalignments between user requirements and AAF pathways early in the acquisition lifecycle. The framework enables a continuous feedback loop that maintains alignment between user requirements and evolving operational environments, ensuring capability development remains responsive to changing threats.

The RRAF is designed for universal application across acquisition pathways, whether adapting existing systems to meet emerging requirements, as in our UAS case, or developing entirely new technologies. The intent of the structured and recurring analytical process was to institutionalize adaptability, enhance communication between user and program management functions, and provide early indicators of requirement-to-capability alignment risks.

Building on the RRAF, a Requirements Readiness Level (RRL) is assigned to each program as a complementary analytical tool. The RRL serves as a dynamic metric for assessing a program's alignment with user requirements, integrating both qualitative and quantitative inputs derived from recurring analyses. Its intent is to provide a unified, recurring measure that helps programs maintain consistent focus on addressing user needs throughout development and execution. The RRL functions as the primary output of iterative analysis conducted through the RRAF and is continually evaluated across a program's lifecycle, particularly during the periods between traditional JCIDS milestones, thereby maintaining visibility on requirement maturity and alignment during critical transition phases.

B. RECURRING REQUIREMENTS ANALYTICAL FRAMEWORK

The RRAF uses a feedback driven, iterative requirements development process. The legacy JCIDS process validates requirements in a linear progression through documentation and milestones. As seen in Figure 2, the proposed RRAF serves as an adaptive process, continually reassessing the operational environment and technological maturation as they pertain to the original requirement.

The requirement itself, not the materiel solution, serves as the focus of this framework. The RRAF begins with the identification of a capability gap driving the need for an operational requirement. This is the sole purpose of the requirements generation process and should not change. The identified requirement then progresses through recursive phases of planning, validation, and integration. Each of these phases is supported by a continual DWG, driving the analytical inputs of the process. The DWG examines how all of the DOTmLPF elements interact to either support or constrain the requirement. Throughout each phase, the DWG identifies the associated risk factors, evaluate how the requirement interacts with each DOTmLPF element, and ultimately provide targeted feedback to inform a decision regarding advancement, refinement, or regression of that requirement. The RRAF's iterative nature would introduce agility into the requirements generation process, ensuring that a requirement evolves in real-time predicated upon emerging threats, technological advancements, and the availability of resources. This framework ultimately prevents the traditional stovepipes that were identified throughout the JCIDS process, particularly when a static requirement surpasses its operational relevance.

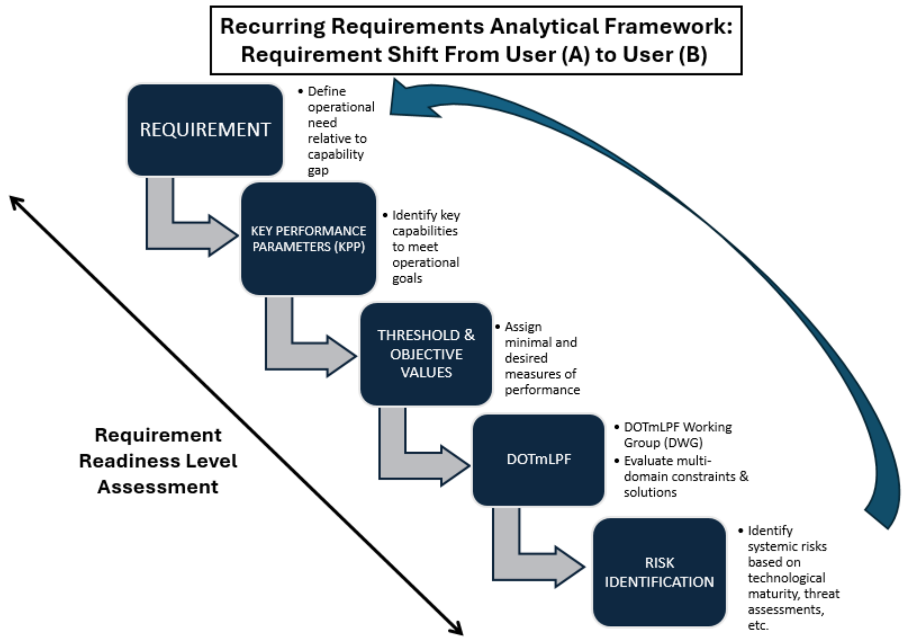

Figure 2. Recurring Requirements Analytical Framework.

C. REQUIREMENTS READINESS LEVELS

The RRL functions as a quantitative maturity model for evaluating a requirement's ability to advance through the acquisition milestones, as seen in Table 3. Where the TRL framework focuses on the materiel solution itself, the RRL applies a similar logic to the requirement, measuring the validity, feasibility, and operational relevance of a requirement across each phase of its development.

The RRL scale ranges from RRL 1 (Capability Gap Defined) to RRL 9 (Operationally Proven Requirement). Each level represents an increase in maturity based on analysis, user feedback, and DWG integration. RRLs 1-3 (Planning Phase) pertain to the conceptual identification of a requirement that has not been validated or aligned with user feedback. RRLs 4-6 (Validation Phase) correspond to iterative validation reviews, where KPPs and associated threshold/objective metrics are tested, risks are identified and mitigated, and the requirement is refined through DWG assessments. RRLs 7–9 (Integration Phase) correspond to a requirement that has been validated across all elements of the DOTmLPF process. To achieve RRLs 7–9, the previously identified risks associated with that requirement must be resolved, and the associated materiel solution must be tested and successful in a realistic operating environment.

Although these levels are laid out in a linear design, this process is not static. As external factors such as threats or technology continue to evolve, RRLs progress or regress respectively. The fluidity provided through the RRLs is central to the RRAF's purpose of ensuring that a requirement reflects its current maturity and not its desired end state.

The RRL serves as both a feedback and control mechanism within the RRAF. It provides a quantifiable metric to decision-makers regarding a requirement's maturity. This helps to inform decisions such as whether a requirement should advance, undergo additional refinement, or regress for additional analysis. Each iteration of the RRAF should result in an updated RRL that is informed by the cumulative outcome of the DWG's analysis, risk mitigation, and performance against threshold metrics.

Table 3. Requirement Readiness Level Overview

Phase	RRL	Key Event	Description
PLANNING	RRL 1	Capability Gap Defined	Initial capability gap identified, no formal validation, limited user input or data.
PLANNING	RRL 2	Draft Requirement Defined	Basic KPPs drafted, initial DOTmLPF analysis conducted, early feasibility discussions.
PLANNING	RRL 3	Preliminary Technical Analysis Conducted	Threshold and objective metrics proposed, early risk identification initiated.
VALIDATION	RRL 4	DOTmLPF Working Group Initiated	DWG convened, non-materiel and materiel solutions evaluated, multi-domain dependencies documented.
VALIDATION	RRL 5	Risks Quantified and Mitigation Planned	Operational risks defined and mitigation strategies identified through current environment threat assessment, ORM visualization introduced.
VALIDATION	RRL 6	Validated Requirement	Requirement's KPPs validated through developmental testing, metrics refined, DOTmLPF adjustments documented.
INTEGRATION	RRL 7	Integration Assessment	Requirement validated across multiple environments through operational testing, interoperability risks assessed.
INTEGRATION	RRL 8	Pre-Milestone Validation	All major risks mitigated or accepted, requirement ready for inclusion in acquisition documentation (CDD validation).
INTEGRATION	RRL 9	Operationally Proven Requirement	Requirement solution demonstrated in current operational environment, metrics verified, requirement confirmed effective.

DWG: DOTmLPF Working Group
ORM: Operational Risk Management
CDD: Capabilities Development Document

D. EXAMPLE CASE: USER A (LAND-BASED) AND USER B (MARITIME-BASED)

The adaptability of the RRAF can best be illustrated through a comparative example involving User A and User B. Both organizations have overlapping capability gaps but operate in different environments.

User A, a land-based organization, identifies a requirement for a UAS platform capable of conducting ISR in a relatively permissive environment. Through an iterative analysis conducted under the RRAF, User A identifies a materiel solution, validates the associated KPPs, and mitigates the associated risks such as maintenance requirements, operator training and proficiency, etc. These steps have allowed User A's requirement to mature into a high RRL, indicating readiness for the requirement's capability to be integrated into the CDD.

User B, a maritime-based organization, identifies a similar ISR requirement and seeks to adopt the same UAS platform as in User A's requirement. However, due to User B's maritime operating environment, the DWG has identified relevant risks, such as how the UAS will require modifications to conduct launch and recovery from amphibious platforms and be resistant to saltwater corrosion. Although the materiel solution itself is technically viable, the maritime specific considerations will reduce User B's RRL, reflecting that additional requirement refinement is required prior to operational integration.

E. CASE SUMMARY

These short examples demonstrate the contextual dependence of a requirement. A system that is validated for one specific environment does not maintain the same RRL across multiple domains. The RRL captures not only the technical feasibility of a solution but also its operational adaptability within each unique constraint of a mission profile.

The example cases provided in this chapter demonstrate how a reliance on legacy requirement processes may constrain an organization's adaptability resulting in capability gaps, particularly in an evolving environment. The analysis conducted identifies a disconnect between requirement generation and program execution due to limited joint communication and insufficient feedback mechanisms. To address these issues, this chapter introduced the RRAF, which is an adaptive feedback-driven model intended to align requirements with operational realities. Complementary to the RRAF are RRLs, intended to provide a quantitative maturity metric that assesses a requirement's validity and operational relevance, enabling early identification of risk and a more responsive capability development.

V. RECOMMENDATIONS, CONCLUSION, AND FUTURE RESEARCH

The analysis conducted throughout this research demonstrates the variety of persistent issues observed within the TMRR phase that arise from the structural limitations of the AAF's management of requirement evolution. The current requirement generation process lacks an iterative mechanism that links requirement maturation to real-time battlefield adaptations, emerging threats, shifts in technological readiness, and resource constraints. This current process follows a linear structure in which technological maturation and DOTmLPF-P analyses occur in a disconnected manner.

As this chapter turns toward the implementation of the RRAF and RRLs, this study argues that these tools alone are insufficient without an accompanying feedback mechanism to provide PMs a COP. To illustrate how a COP could be achieved, this chapter introduces the application of a System Overview Network (SON), informed by principles from Graph Theory. By visualizing interdependencies, feedback loops, and evolving requirement relationships, a SON-based approach would enable decision-makers to better assess, in real time, how effectively a program is adapting to changing operational requirements.

A. APPLICATION OF GRAPH THEORY

The problem of optimizing concepts and processes has a long history across scientific disciplines. To streamline analytical thinking, graph theory emerged as a visual modeling tool that depicts relationships and their interactions (Mondal & De, 2017, p. 751). Since its origins with Leonhard Euler, graph theory has evolved from a purely mathematical construct into a widely applied framework for understanding complex relationships across numerous fields (Carlson, n.d.). As networking and interfacing among system elements become increasingly complex, so, too, do the relationships that bind them. This evolution highlights the need for tools, such as graph theory, that can visualize acquisition ecosystems, uncover hidden dependencies of derived requirements (the equivalent of implied tasks in military planning), and support adaptive, network-aware decision-making.

As seen in Figure 3, graph theory centers on visually representing systems as sets of vertices, or “nodes,” connected by lines called “edges,” which together illustrate relationships (Carlson, n.d.; Mondal & De, 2017, p. 752). Graphs may be undirected, representing bidirectional relationships, or directed, where edges convey directionality and indicate the flow of influence, data, or decision authority (Carlson, n.d.; Mondal & De, 2017, p. 753). Each node has a measurable “degree,” determined by the number of edges connected to it, which reflects its level of interaction or influence within the network (Mondal & De, 2017, p. 753). Over time, graph theory has expanded to include additional visual and analytical techniques, such as color-coding, node sizing, and other attribute-based distinctions, to better represent complex systems depending on the discipline and analytical goals.

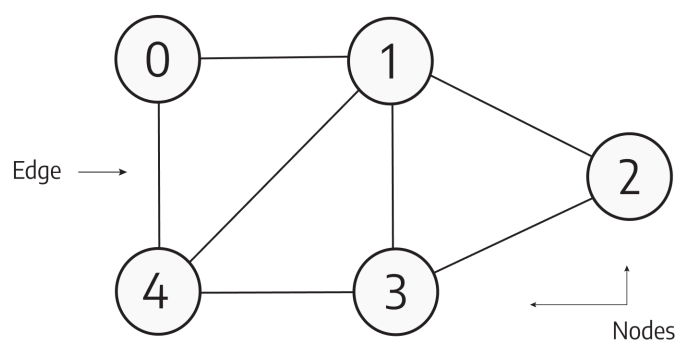

Figure 3. Components of Graphs. Source: Ghazaryan (2023).

Graph theory offers valuable mechanisms for mapping acquisition decision pathways, requirements-refinement loops, and interdependent programmatic elements. When tailored to defense acquisitions, these tools can illuminate relationships and influences that are not immediately obvious through traditional linear analysis. As a result, graph-based modeling can enhance understanding of the acquisition ecosystem, support clearer communication among stakeholders, and strengthen decision-making across system lifecycles.

B. INTRODUCTION TO SYSTEM OVERVIEW NETWORK

The proposed SON concept is grounded in the principles of graph theory. It ultimately aims to provide a requirement-centric visualization tool that highlights the interdependent relationships between all aspects of the acquisition process throughout a specific program's maturation. Unlike the standard linear documentation process that results in static working groups, the SON will accurately portray all of a requirement's components as "nodes" within a dynamic network. These nodes will have respective weighted "edges" that capture the status of all functional area dependencies. The SON is intended to be reflective of the program's WBS, accurately depicting how acquisition programs are actively built and managed with DOTmLPF-P considerations layered into the network.

Within the context of the RRAF, the SON will provide a conceptual outlook for increased agility within the requirements process. While the stakeholders continuously iterate through the DOTmLPF-P and RRL processes, the SON will provide a visualization of how changes to one functional area influence the broader acquisition environment. This network-based approach can support a more responsive decision cycle for PMs, detecting emerging risks early in the process and offering a clear picture of how a requirement's maturity evolves within a multi-disciplinary set of inter-connected functions. This ultimately provides the decision-maker with a relevant COP that would have the capability to continuously update in real time.

C. RECOMMENDATIONS AND CONCLUSION

As a result of this fragmentation, interdependencies among organizations and stakeholders are obscured, delaying the early identification of compounding risk and ultimately allowing a requirement to advance through the acquisition process without technological or organizational conditions keeping pace. For these reasons, programs frequently identify risks late in the development cycle, causing schedule delays and cost inefficiencies due to unsound requirement drivers. These identified shortfalls frame the central end state of this research: identifying the AAF's limitations in supporting agile requirement changes during the TMRR phase and determining what structural changes could introduce agility into this process without compromising the required accountability and oversight.

As a result of this analysis, program offices should consider building and integrating a SON as a structural improvement to address the systemic deficiencies. A complete SON will offer a requirement-centric, network-based model that actively tracks the full range of interdependent requirement viability attributes. By maintaining the requirement as the central node and linking subordinate nodes derived from a program's WBS, the SON captures how subsystem development, integration relationships, T&E outputs, logistical considerations, manpower and training organization, and infrastructure constraints all influence each other throughout development. Each node is assigned a readiness metric such as TRLs, program cost, or schedule significance, while the links between them visualize how a change to one affects all. As a program office receives new information from DWGs, the entirety of the network shifts accordingly. The product is a continuously updated view of requirement readiness, allowing decision-makers to perceive how technical, programmatic, and operational factors interact as a program progresses through its designated acquisition pathway.

Framed against the research questions, the SON mitigates identified limitations of the current AAF by providing a uniform representation of requirement health instead of isolated snapshots only identified during major program milestones. This binary milestone logic would effectively be replaced with a continuously evolving maturity assessment, affording PMs an early detection metric of misalignment and options for agile course correction. The SON would synchronize requirement advancement with technological maturation through the integration of RRLs. As a result, the SON offers a formalized method to advance requirements when underlying program conditions support such a decision based on data, improving agility while preserving the existing accountability processes. These decisions would be traceable through time-stamped updates, defined node relationships and responsibilities, and a logged justification for any updates, ensuring that agility does not come at the expense of oversight.

The envisioned end state of this recommendation is a fully interactive decision support system that provides a shared operational picture for requirements and acquisition professionals. In a mature form, the SON provides updated insight into a requirement's maturity, identify emerging risk, and allow PMs to simulate the impacts of a potential programmatic change prior to dedicating personnel and resources. Once developed, this system has the potential to better align user needs with technical feasibility through a scalable interface that ensures requirements evolve as a reflection of the current operational environment, ultimately keeping programs on or ahead of schedule. The SON would be analytically grounded through user and stakeholder data inputs, ensuring that warfighter requirements maintain pace with the rapidly evolving character of modern warfare.

D. AREAS FOR FUTURE RESEARCH

With the recent and significant changes to the DOD acquisition process, the need for continued refinement to develop a more efficient and adaptive system is increasingly apparent. This research highlights the importance of ongoing improvement within the requirements-generation process, regardless of a program's stage in the acquisition lifecycle. Given the complexity of the current operating environment, combined with persistent resource and policy constraints in the acquisition sector, additional research is required to determine the most effective methods for implementing the proposed metrics, frameworks, and systematic analyses.

Recommended areas for future research include the following:

1. Assessing how artificial intelligence can be leveraged to create a dynamic system-overview network capable of providing program offices with a COP and enhanced situational awareness.
2. Evaluating the impact of a system-overview network on the PPBE and contracting processes, with specific focus on how improved visibility and data integration could influence budgeting, prioritization, and acquisition timelines.
3. Expanding research collaboration between the NPS and NSW through a multidisciplinary team representing all major components of the organization. This team should include special operators, intelligence professionals, aviation personnel, logisticians, and contracting specialists. Such diversity would enable a more holistic exploration of capability gaps and strengthen the applicability of future findings.

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF REFERENCES

AcqNotes. (2017). *Milestone requirements matrix*. https://acqnotes.com/milestone-requirements-matrix

AcqNotes. (2024). *Technology readiness level (TRL) – Overview*. https://acqnotes.com/acqnote/tasks/technology-readiness-level

Anton, P. S., Tannehill, B., McKeon, J., Goirigolzarri, B., Holliday, M. A., Lorell, M. A., & Younossi, O. (2020). *Strategies for acquisition agility: Approaches for speeding delivery of defense capabilities* (Research Report No. RR-4193-AF). RAND Corporation. https://doi.org/10.7249/RR4193

Candreva, P. J. (2024). *National defense budgeting and financial management: policy & practice* (2nd ed.). Information Age Publishing.

Capabilities Development Directorate. (2020). *Command element information division handbook*. U.S. Marine Corps, Combat Development and Integration.

Carlson, S. C. (n.d.). Graph theory. In *Encyclopedia Britannica*. Retrieved November 19, 2025, from https://www.britannica.com/topic/graph-theory

Chairman of the Joint Chiefs of Staff. (2011, March). *Joint capabilities integration and development system (JCIDS)* (CJCS Instruction 3170.01G). U.S. Department of Defense. https://www.jcs.mil/

Commission on Planning, Programming, Budgeting, and Execution Reform. (2024, March 6). *Defense resourcing for the future: Final report*. https://ppbereform.senate.gov/finalreport/

Defense Acquisition University. (2005). *Manager's guide to technology transition in an evolutionary acquisition environment*. https://www.dau.edu/artifact/dau-managers-guide-technology-transition-evolutionary-acquisition-environment-historical

Defense Acquisition University. (2024, September 17). *Guide to DoD program management business processes*. Defense Acquisition University, Defense Systems Management College. https://aaf.dau.edu/storage/2024/09/Guide-to-Program-Management-Business-Processes.pdf

Defense Acquisition University. (n.d.-a). *Adaptive Acquisition Framework*. Retrieved January 30, 2026, from https://aaf.dau.edu/

Defense Acquisition University. (n.d.-b). *JCIDS documentation (DCR, ICD, CDD, JEON, JUON, and their variants)*. Retrieved January 30, 2026 from https://www.dau.edu/acquipedia-article/jcids-documentation-dcr-icd-cdd-jeon-juon-and-their-variants

Defense Acquisition University. (n.d.-c). *Planning, programming, budgeting & execution process (PPBE)*. Retrieved January 30, 2026 from https://www.dau.edu/acquipedia-article/planning-programming-budgeting-execution-process-ppbe

Defense Federal Acquisition Regulation Supplement (DFARS), 48 C.F.R. ch. 2 (2020). https://www.acquisition.gov/sites/default/files/current/dfars/pdf/DFARS.pdf

Department of Defense. (2022). *Department of Defense directive 5000.01: The defense acquisition system (Change 1)*. U.S. Department of Defense. https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodd/500001p.pdf

Epstein, J., & Loh, M. (2025, February 7). *Ukraine is turning to an "unjammable" drone that uses a fiber-optic link to keep pace with Russia's electronic warfare. Business Insider.* Business Insider. https://www.businessinsider.com/ukraine-unjammable-fiber-optic-drone-keep-pace-russia-2025-1

Executive Order No. 14265 90 C.F.R. 15621 (2025). https://www.whitehouse.gov/presidential-actions/2025/04/modernizing-defense-acquisitions-and-spurring-innovation-in-the-defense-industrial-base/

Executive Order No. 14347 90 C.F.R. 43893 (2025). https://www.whitehouse.gov/presidential-actions/2025/09/restoring-the-united-states-department-of-war/

FAR, 48 C.F.R. ch. 1 (2025). https://www.acquisition.gov/browse/index/far

Fast, W. R. (2010, May 12–13). *Improving defense acquisition decision-making* [Conference presentation]. Seventh Annual Acquisition Research Symposium: Creating Synergy for Informed Change, Monterey, CA, United States. https://calhoun.nps.edu/server/api/core/bitstreams/d003aaac-19ed-4748-a54a-57374c7be0bf/content

Fox, J. R. (2011). *Defense acquisition reform, 1960–2009: An elusive goal.* U.S. Army Center of Military History.

Ghazaryan, A. (2023, July 14). *What is a graph database?* Memgraph. https://memgraph.com/blog/what-is-a-graph-database

Goldwater-Nichols Department of Defense Reorganization Act of 1986, Pub. L. No. 99-433, 100 Stat. 992 (1986). Retrieved January 30, 2026, from https://history.defense.gov/portals/70/documents/dod_reforms/goldwater-nicholsdodreordact1986.pdf

Government Accountability Office. (1988, November 4). *Defense management: Status of recommendations by Blue Ribbon Commission on Defense Management* (GAO/ NSIAD-89-19FS). https://www.gao.gov/assets/nsiad-89-19fs.pdf

Government Accountability Office. (2015, February) *Acquisition Reform: DOD Should Streamline Its Decision-Making Process for Weapon Systems to Reduce Inefficiencies* (GAO-15-192). https://www.gao.gov/assets/gao-15-192.pdf

Government Accountability Office. (2024, June). *Weapon systems annual assessment: DOD is not yet well-positioned to field systems with speed* (GAO-24-106831). https://www.gao.gov/assets/gao-24-106831.pdf

Joint Staff. (2021, October 30). *Manual for the operation of the Joint Capabilities Integration and Development System.* U.S. Department of Defense. https://www.dau.edu/sites/default/files/2024-01/Manual%20-%20JCIDS%20Oct%202021.pdf

Lorell, M., Lowell, J., & Younossi, O. (2006). *Evolutionary acquisition: Implementation challenges for defense space programs.* RAND.

Marine Corps Systems Command. (2025). *MARCORSYSCOM strategic plan 2025–2032.* https://www.marcorsyscom.marines.mil/Portals/105/Documents/ MARCORSYSCOM_Strategic_Plan_2025-2032.pdf

Marine Corps Systems Command. (n.d.). *About us.* U.S. Marine Corps. https://www.marcorsyscom.marines.mil/About-Us/

Microsoft. (2022, November 28). *What is scrum?* https://learn.microsoft.com/en-us/devops/plan/what-is-scrum

Mondal, B., & De, K. (2017). Overview applications of graph theory in real field. *International Journal of Scientific Research in Computer Science, Engineering and Information Technology*, *2*(5), 751–759.

Mortlock, R. F. (2020, July). Studying acquisition strategy: Formulation of incremental development approaches. *Defense Acquisition Research Journal, 27*(3), 264–311. https://nps.idm.oclc.org/login?url=https://www.proquest.com/scholarly-journals/ studying-acquisition-strategy-formulation/docview/2427313704/se-2

Office of Inspector General. (2020, August 12). *Audit of U.S. Special Operations Command testing and evaluation* (DODIG-2020-111). U.S. Department of Defense. https://www.dodig.mil/reports.html/Article/2313070/audit-of-us-special-operations-command-testing-and-evaluation-dodig-2020-111/

Office of the Secretary of War. (2025, August 20). *Reforming the joint requirements process to accelerate fielding of warfighting capabilities* [Memorandum]. Department of War. https://www.dmi-ida.org/knowledge-base-detail/Reforming-the-Joint-Requirements-Process-to-Accelerate-Fielding-of-Warfighting-Capabilities

Office of the Under Secretary of Defense for Acquisition and Sustainment. (2020, January 23). *Operation of the adaptive acquisition framework* (DoD Instruction 5000.02). U.S. Department of Defense. https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/500002p.pdf

President's Blue Ribbon Commission on Defense Management. (1986, June 30). *A quest for excellence: Final report to the President* (SEC809-RL-86-0106). https://dair.nps.edu/bitstream/123456789/3705/1/SEC809-RL-86-0106.pdf

Ruta, B., & Higginbotham, C. L. (2009, July–September). The TOW missile—Precise and powerful. *Army AL&T Magazine, 2009*(3), 29–33. https://asc.army.mil/docs/pubs/alt/2009/3_JulAugSep/articles/31_The_TOW_Missile--Precise_and_Powerful_200907.pdf

Section 809 Panel. (2019, January 15). *Report of the Advisory Panel on Streamlining and Codifying Acquisition Regulations: Volume 3 of 3 (Part 1)*. U.S. Department of Defense. https://discover.dtic.mil/wp-content/uploads/809-Panel-2019/Volume3/Sec809Panel_Vol3-Report_Jan2019_part-1_0509.pdf

Stepanenko, K. (2025*). The Battlefield AI Revolution Is Not Here Yet: The Status of Current Russian and Ukrainian AI Drone Efforts*. Institute for the Study of War. https://understandingwar.org/backgrounder/battlefield-ai-revolution-not-here-yet-status-current-russian-and-ukrainian-ai-drone

United States Marine Corps, Deputy Commandant for Programs and Resources. (n.d.). *About.* United States Marine Corps. Retrieved January 30, 2026 from https://www.pandr.marines.mil/About/

United States Marine Corps. (2021). *Marine acquisition guidebook* (FY21-03; Version 4.0).

United States Marine Corps. (2025). *Force design update: October 2025*. Department of Navy. https://www.marines.mil/force-design/

Wong, J. P., Younossi, O., LaCoste, C. K., Anton, P. S., Vick, A. J. … Whitmore, T. C. (2022, June 16). *Improving defense acquisition: Insights from three decades of RAND research* (RRA1670-1). RAND. https://www.rand.org/pubs/research_reports/RRA1670-1.html

Acquisition Research Program
Department of Acquisition, Finance and Manpower
Naval Postgraduate School
555 Dyer Road, Ingersoll Hall
Monterey, CA 93943

www.acquisitionresearch.net