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Finding Opportunities in the Adaptive Acquisition Framework

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Abstract

For over 4 decades, the Department of Defense (DoD) has pursued Major Capability Acquisition (MCA) reforms to counter rising threats, yet programs like the F-35 and Zumwalt-class destroyers suffer persistent cost overruns, delays, and performance shortfalls. This study analyzes DoD policies, Government Accountability Office and RAND Corporation critiques, and external scholarship to reveal why modularity goals, like the Modular Open Systems Approach, falter despite aims for innovative, adaptable systems with strong lifecycle outcomes. Three flaws persist: requirements obscuring utility across cost, schedule, performance, and lifecycle; centralized contractor structures embedding complexity; and contract scales eroding DoD control. With $183 billion in overruns across 36 programs (GAO, 2023), MCA's misalignment—contractors favoring profit incentive over warfighter value—demands change. Historical successes inspire a solution: World War II's (WWII's) 18,000 firms delivered 297,000 aircraft, showcasing modularity and adaptability. To address MCA's centralized failures, a distributed acquisition model is proposed, fractionating systems into small teams of up to 150 members. This approach fosters competition, simplicity, and responsiveness, leveraging organizational theory and analytical tools to meet DoD goals. While implementation awaits further study, this shift promises significant savings and operational agility, urging acquisitions professionals to move beyond reform tweaks and embrace a proven alternative rooted in history.

Introduction

For over 4 decades, the Department of Defense (DoD) has pursued Major Capability Acquisition (MCA) reforms to deliver modular, innovative systems with positive lifecycle outcomes, adaptable to an evolving operational environment filled with rising peer and near-peer threats. Despite these efforts, MCA programs consistently falter, undermining the DoD's vision as articulated in foundational policies like the National Defense Strategy (DoD, 2022b). This study defines persistent flaws thwarting MCA's goals and proposes a distributed acquisition model as a transformative solution. This study asks, what are the DoD's stated intents and challenges in MCA? How do immediate stakeholders, such as the Government Accountability Office (GAO) and RAND Corporation, assess these efforts? What solutions do external experts propose? Through a comprehensive review of DoD policies, stakeholder critiques, and external scholarship, this paper identifies three structural issues: First, requirements miscommunicate military utility across cost, schedule, performance, and lifecycle. Second, centralized contractor organizational structures embed complexity into the solution. Finally, the increasingly large contract scales erode DoD control. This demonstrates the need for a conceptual shift to realign MCA with DoD objectives, while reserving implementation details for a follow-on study.

The DoD's reform journey spans multiple initiatives, from the Goldwater–Nichols Act of 1986, which centralized authority to streamline processes, to the Weapon Systems Acquisition Reform Act (WSARA) of 2009, Better Buying Power (BBP) initiatives, and the Adaptive Acquisition Framework (AAF) of 2019, each targeting cost overruns and delays (DoD, 2023; GAO, 2012b). The Modular Open Systems Approach (MOSA), mandated in 2017, seeks modularity to enhance competition and adaptability (DoD, 2022b). Yet outcomes remain dire. The GAO reports, "In 2023, MCA programs accumulated $183 billion in cost overruns and average delays of two years across 36 programs," with only 14 of 20 programs partially adopting MOSA (GAO, 2023, p. 1). This disconnect between intent and execution signals deeper, structural failures.

Two programs exemplify these challenges. The F-35 Joint Strike Fighter, developed by Lockheed Martin, has faced significant delays and cost growth due to requirements granting priority to stealth and multirole capabilities over affordability and sustainment, straining budgets and operational timelines (GAO, 2015). Similarly, the Future Combat Systems (FCS), canceled in 2009 after investing $18 billion, aimed for a networked system but collapsed under technical complexity and unclear lifecycle goals (Pernin et al., 2012). These cases highlight a pattern: despite reform efforts, MCA struggles to deliver modular, adaptable systems, with costs and delays eroding warfighter readiness.

Theoretical frameworks illuminate these issues. Conway's Law posits that system designs mirror organizational structures, suggesting that centralized contracting organizations produce complex, integrated systems ill-suited for modularity (Conway, 1968; MacCormack et al., 2012). A centralized contractor refers to a single, typically lead system integrator or prime contractor that assumes primary responsibility for designing, developing, integrating, and delivering an entire complex weapon system or major program within the DoD acquisition process. This entity consolidates control over most or all subsystems, often subcontracting components but retaining overarching authority under a monolithic contract structure. Centralized contractors dominate the acquisition process through their extensive resources, proprietary technologies, and entrenched relationships with the DoD, exemplified by firms like Lockheed Martin (e.g., F-35), Boeing, SAIC (e.g., FCS), or Northrop Grumman.

Brooks (1995) reinforces this, noting that large teams exacerbate delays and complexity, a reality MCA reflects. Principal–Agent Theory reveals a further misalignment: contractors prioritize their profit motive over warfighter utility across cost, schedule, and lifecycle phases, as seen in FCS's integrator-driven focus (Pernin et al., 2012). McChrystal (2015) critiques rigid hierarchies as ill-equipped for dynamic threats, underscoring MCA's structural rigidity.

The stakes are high. Emerging threats from adversaries demand systems that innovate and adapt, yet MCA's centralized framework—exacerbated by a shrinking Defense Industrial Base (DIB) and overwhelming contract scales—locks the DoD into a cycle of inefficiency. Historical successes, such as distributed acquisition during WWII, contrast sharply with this reality, suggesting a path forward. External scholarship supports this, with analytical tools like Value-Driven Design (VDD) and Multi-Attribute Utility Theory (MAUT) offering ways to optimize utility and reduce complexity (Abbas, 2018; Collopy, 2007). Organizational insights from small-team successes further bolster the case for change (Brooks, 2010; McChrystal, 2015).

This study's proposed distributed acquisition approach, which emphasizes decentralized structures to enhance modularity and adaptability, aligns with emerging legislative efforts to address MCA's systemic issues. Notably, the Fostering Reform and Government Efficiency in Defense Act (FORGE Act), introduced in December 2024, seeks to streamline DoD acquisition by reducing bureaucratic barriers, prioritizing commercial contracting, and fostering competition to diversify the DIB (Wicker, 2024). By advocating for agile, distributed approaches over centralized complexity, this paper's framework complements the FORGE Act's vision, offering a conceptual foundation to support such reforms while addressing the DoD's urgent need for innovative, warfighter-centric systems.

Historical Analysis

Understanding the persistent challenges in MCA—requirements that obscure military utility across cost, schedule, performance, and lifecycle; centralized contractor structures embedding complexity; and contract scales eroding DoD control—necessitate tracing the evolution of U.S. defense acquisition from the early 20th century to the post–Cold War era. This historical analysis explores the oscillation between centralized and distributed approaches, revealing how these three flaws emerged and solidified despite reforms since the Goldwater–Nichols Act of 1986. By contrasting periods of success, such as WWII's distributed model and interwar innovations, with failures like Vietnam-era centralization, this section underscores the potential of a distributed acquisition model to align with the DoD's objectives of modularity, positive lifecycle outcomes, innovation, and adaptability to operational changes (DoD, 2022b). These lessons frame MCA's current critique and proposed solution, with implementation reserved for future work.

Before World War I, centralized arsenals limited scalability, producing minimal output during the Spanish–American War (Krepinevich, 2023). World War I's distributed effort, engaging small firms for aircraft production, showed adaptability, setting the stage for interwar innovation. From 1919 to 1939, decentralized teams drove advancements like radar, thriving on minimal requirements, akin to early missile programs' small-team coordination (Johnson, 2002; Krepinevich, 2023). This agility, absent in modern MCA, prefigures Distributed Acquisition's approach.

WWII showcased a distributed acquisition approach success. The U.S. leveraged 18,000 firms, over 50% small businesses with teams of 150 or fewer, to deliver modular systems like the M4 Sherman rapidly (Herman, 2012). Implicit requirements, guided by engineers' intuitive grasp of military utility and wartime feedback, minimized miscommunication, unlike MCA's rigid specifications. This approach ensured rapid delivery and lifecycle utility, preserving DoD control. Small teams, per Holt et al. (2017) and Dunbar (1992), optimized coordination, aligning with Conway's Law (Conway, 1968) to produce agile systems, supporting distributed acquisition's small-team model.

The post-WWII Cold War era marked a sharp departure from distributed acquisition successes, sowing the seeds for MCA flaws. Early successes persisted briefly, such as Lockheed's Skunk Works's U-2, developed in the 1950s by a small, agile team under Clarence "Kelly" Johnson. Operating with fewer than 150 people—aligning with Dunbar's (1992) organizational coordination limit—Johnson's team delivered the U-2's revolutionary reconnaissance capabilities in under 2 years, embodying innovation and adaptability (Johnson, 1985; Smith, 1995). As Johnson recounted, his lean approach relied on tight-knit groups and clear objectives, producing a modular design that reflected Conway's Law: the team's streamlined structure shaped the U-2's elegant simplicity (Conway, 1968; Johnson, 1985). Maggie Smith's biographical account further highlights how Johnson's decentralized methods maximized creativity within disciplined bounds, setting a benchmark for acquisition agility (Smith, 1995). Further examples in early missile programs leveraging small teams for rapid delivery show the distributed approach's ability to scale with the complexity of the system (Johnson, 2002). However, Ben Rich, Johnson's successor, later cautioned that such decentralized models risked fraud and inefficiency without rigorous oversight, citing cases where lax controls enabled contractor overbilling (Rich & Janos, 1994). These vulnerabilities, coupled with broader systemic pressures, drove a shift toward centralization by the 1960s, epitomized under Secretary Robert McNamara's reforms.

McNamara's push for consolidation, notably through the Tactical Fighter Experimental (TFX) program—precursor to the F-111—responded to perceived inefficiencies in decentralized contracting, including the oversight gaps Rich noted. Requirements ballooned, demanding multirole capabilities across services, which obscured military utility and triggered significant cost overruns and delays into the 1970s (Krepinevich, 2023). Unlike the U-2's clarity, the TFX's centralized, unwieldy organization produced a convoluted system, per Conway's Law, amplifying complexity (Conway, 1968). A key driver of this centralization was the DoD's budgeting system, which penalized programs coming in under budget by reducing future allocations, incentivizing contractors to inflate costs and complexity to secure funding stability (Schwartz, 2014). General Dynamics's centralized structure for the TFX embedded this complexity, while the program's massive contract scale eroded DoD oversight, a pattern McChrystal (2015) attributed to the rigidity of hierarchies in dynamic, complex settings. Vietnam-era acquisition thus prioritized performance over lifecycle adaptability, diverging from WWII's distributed lessons and entrenching oversight-heavy processes that swelled project monitoring and cost control overhead, further distancing MCA from agility and modularity.

The 1980s and 1990s entrenched these flaws further. The Goldwater–Nichols Act of 1986 aimed to streamline authority but left structural issues unaddressed (GAO, 1991). Post–Cold War consolidation, spurred by declining defense budgets and economic pressures, drastically reduced the number of aerospace and defense prime contractors from 51 in the early 1990s to just five by the early 2000s, reshaping the DIB (Chang & Chakrabarti, 2023; DoD, 2022a). This contraction, driven by mergers like Lockheed Martin's formation and Boeing's acquisition of McDonnell Douglas, entrenched centralized acquisition models, amplifying MCA's complexity and oversight challenges.

The cancellation of the A-12 Avenger II in 1991 after substantial investment exemplified MCA's systemic flaws: unfeasible requirements from McDonnell Douglas and General Dynamics demanded stealth and carrier capabilities beyond technical reach, centralized design complexity bogged down integration, and a massive contract scale deterred DoD intervention (GAO, 1991). Weisgerber (2021) connected the A-12's centralized failure to post-9/11 budgets favoring large integrators, which amplified Conway's Law–driven complexity, as monolithic organizations produced convoluted systems (Conway, 1968). Brooks (2010) reinforced this, noting that large organizations lose design coherence, a trend toward centralization that set the stage for modern MCA's struggles with modularity and adaptability.

The historical arc of MCA reveals its flaws as a departure from distributed success. WWII's small-team networks delivered modular, adaptable systems with clear utility (Herman, 2012), while interwar agility drove innovation under resource constraints (Krepinevich, 2023). In contrast, centralized efforts like the TFX and A-12 programs overpromised on ambitious requirements—multirole versatility and stealth, respectively—while neglecting lifecycle costs and DoD oversight, leading to delays, overruns, and cancellations (Krepinevich, 2023). McChrystal (2015) and Brooks (2010) argued that adaptability and coherence thrive in decentralized models, principles aligned with DoD goals for modularity, innovation, and responsiveness (DoD, 2022b). Contrasting WWII and interwar distributed successes with Cold War and post–Cold War centralized failures, the history of MCA compellingly justifies a return to a distributed acquisition solution to restore alignment with modularity, innovation, and operational responsiveness.

Literature Review

Defense acquisition research spanning 4 decades reveals persistent challenges in MCA that undermine the DoD's objectives of delivering modular systems with positive lifecycle outcomes, innovation, and adaptability to an evolving operational environment (DoD, 2022b).

Despite reforms since the Goldwater–Nichols Act of 1986, three flaws remain entrenched: requirements that obscure military utility across cost, schedule, performance, and lifecycle; centralized contractor structures embedding complexity; and contract scales eroding DoD control. This review synthesizes DoD policies, immediate sphere critiques from the GAO and RAND Corporation, and external scholarship to define these issues and evaluate proposed solutions. By integrating historical precedents, theoretical frameworks, and organizational insights, it supports a distributed acquisition model as a transformative approach to align with DoD goals, while reserving implementation specifics for future work.

MCA Reforms and Persistent Challenges

The DoD's reform efforts reflect a cycle aimed at curbing MCA's cost overruns, delays, and performance shortfalls. The Goldwater–Nichols Act of 1986 centralized authority to streamline processes, followed by the WSARA of 2009, which introduced early risk assessments, and BBP initiatives, enforcing affordability caps (DoD, 2015; GAO, 2012b). The AAF of 2019 offered tailored pathways—MCA, Middle Tier Acquisition (MTA), and software acquisition—while the MOSA, mandated in 2017, promotes modularity for competition and adaptability (DoD, 2022b, 2023). Yet, the GAO (2023) found that "only 14 of 20 MCA programs partially adopt MOSA" (p. 23), highlighting a gap between intent and execution. RAND Corporation (2022) noted that MCA lags commercial advances, suggesting reforms address symptoms rather than structural roots, a pattern persisting since the 1980s (Reeves, 1996). This misalignment reflects requirements miscommunication, centralized complexity, and scale-driven control loss, thwarting DoD objectives.

Theoretical Frameworks

Theoretical lenses illuminate MCA's structural flaws and potential remedies. Conway's Law asserts that system designs mirror organizational structures, explaining why centralized integrators produce complex, integrated systems ill-suited for modularity (Conway, 1968; MacCormack et al., 2012). Brooks (1995) amplified this in *The Mythical Man-Month*, arguing that adding personnel to a delayed project exacerbates lateness, a dynamic where large teams deepen MCA's delays and complexity. In *The Design of Design*, Brooks (2010) contrasted this with small teams' ability to maintain conceptual integrity, fostering adaptable systems. Principal–Agent Theory reveals a contractor–DoD misalignment, where profit motives overshadow utility across cost, schedule, and lifecycle, driving requirements that prioritize performance over adaptability (Pernin et al., 2012). These frameworks pinpoint centralization and misaligned incentives as barriers to DoD goals.

To counter these, VDD optimizes component trade-offs, potentially cutting costs by over 10% per component, as validated in aero-engine applications (Cheung et al., 2010; Collopy, 2007). Collopy and Hollingsworth (2011) estimated this could save the DoD $55 billion annually, aligning requirements with lifecycle utility. MAUT refines prioritization across cost, schedule, and performance, proven effective in homeland security contexts (Abbas, 2018), offering a framework to balance warfighter needs. McChrystal's (2015) *Team of Teams* addresses complexity: "Adaptability thrives in decentralized networks with shared consciousness" (p. 128), contrasting MCA's rigid hierarchies.

External frameworks like VDD and MAUT provide practical tools for the distributed acquisition approach. VDD optimizes component trade-offs, with Collopy and Hollingsworth (2011) estimating $55 billion in annual DoD savings by prioritizing lifecycle utility. Applied to complex systems, VDD could streamline MCA's inefficiencies, fostering modularity (Collopy, 2007). MAUT, as Abbas (2018) showed, balances cost, schedule, and performance through utility-based prioritization, offering a method to clarify requirements and counter MCA's miscommunication. McChrystal's (2015) *Team of Teams* emphasized that adaptability in organizations flourishes in decentralized networks with shared consciousness, contrasting MCA's rigid hierarchies. These frameworks, rooted in systems engineering, align contractor incentives with warfighter needs, supporting the distributed acquisition approach's small-team structure. By integrating VDD's optimization and MAUT's decision-making rigor, the approach complements immediate stakeholder critiques, providing a robust foundation to transform MCA's centralized constraints into modular, adaptable systems (DoD, 2022b). Together, these theories support a distributed approach to restore modularity and innovation.

Historical Precedents and External Critiques

Historical precedents underscore distributed models' efficacy. During WWII, a network of small firms delivered modular, adaptable systems rapidly, avoiding billion-dollar contracts and centralized complexity (Herman, 2012). Krepinevich's (2023) *The Origins of Victory* extended this, detailing interwar innovations like carrier aviation, where agile teams met operational needs, and Vietnam-era failures like the TFX, where centralized requirements for multirole capabilities drove massive overruns and delays. These successes contrast with MCA's reliance on large-scale contracts that cede control, a trend that Holt et al. (2017) attributed to exceeding the 150-member coordination limit proposed by Dunbar (1992).

Defense analysts and systems engineers like Maddox, Easterling, Clowney, Felder, Collopy, Griffin, Brooks, McChrystal, and Krepinevich quantify MCA's toll and propose solutions. Maddox et al. (2013) estimated daily losses at $208 million, signaling systemic inefficiency, while Easterling (2020) documented 58 Nunn–McCurdy breaches from 1997 to 2016, reflecting billions at risk. Clowney et al. (2016) attributed $62 billion in terminated efforts to cost growth, cuts, and delays. Felder and Collopy (2012) critiqued systems engineering's complexity, and Griffin (2010) called for elegant designs over process-heavy approaches. Collopy (2004) argued that diminishing DoD demand for new technologies hampers innovation, leaving MCA reliant on a stagnant supplier base. Brooks (2010) and McChrystal (2015) advocated small, adaptable teams, aligning with historical agility, while Krepinevich (2023) emphasized responsiveness over centralization's rigidity.

Reform Gaps and Proposed Solution

Despite reforms like early testing (Gilmore, 2011) and digital engineering (DoD, 2023), MCA's structural flaws persist. Post-9/11 consolidation has amplified these flaws through entrenched integrator dominance (Augustine, 1983; Chang & Chakrabarti, 2023; Weisgerber, 2021). Reeves (1996) traced this rigidity over decades, noting the failure of attempted reforms to shift away from industry centralization. Historical successes (Herman, 2012; Krepinevich, 2023) and theoretical support from Conway's Law (Conway, 1968), VDD (Collopy, 2007), MAUT (Abbas, 2018), and organizational insights (Brooks, 2010; McChrystal, 2015) reveal the potential for a decentralized approach to overcome MCA's inefficiencies. The literature converges on a distributed acquisition model—fractionating systems into small teams—as the solution. A distributed acquisition model, as Holt et al. (2017) advocated, would be composed of teams of 150 or fewer to clarify requirements, reduce complexity, and restore DoD control. This approach would organically align with MOSA (DoD, 2022b), as its modular structure embraces open interfaces central to MOSA's principles, positioning distributed acquisition to transform MCA into an agile, innovative framework.

Methodology

This study employs a systematic literature review to define the persistent challenges in the DoD's MCA pathway and propose a distributed acquisition model as a solution aligned with the DoD's objectives of delivering modular systems with positive lifecycle outcomes, innovation, and adaptability (DoD, 2022b). The distributed acquisition model identifies three fundamental flaws—requirements obscuring military utility across cost, schedule, performance, and lifecycle;

centralized contractor structures embedding complexity; and contract scales eroding DoD control—all of which have resisted reform since the Goldwater–Nichols Act of 1986. By synthesizing sources from 2000 to 2025 across DoD policies, immediate sphere critiques, and external scholarship, this paper ensures a comprehensive analysis grounded in historical precedent and theoretical rigor, while reserving implementation details for a follow-on study.

Data collection targeted three stakeholder perspectives to address the research questions: What are the DoD's stated intents and challenges in MCA? How do immediate stakeholders interpret these efforts? What solutions do external experts propose? The DoD sources examined encompass foundational policies, such as the National Defense Strategy (DoD, 2022b), DoD Instruction 5000.97 (DoD, 2023), and AAF guides, all of which articulate goals of modularity and adaptability. DoD policy documentation was supplemented by reform documents like BBP 3.0 (DoD, 2015) and modernization priorities from the DoD and military services, offering a longitudinal view of intent and obstacles.

Building on DoD and component guidance, immediate sphere critiques were also drawn from the GAO, RAND Corporation, and think tanks such as the Atlantic Council and Brookings Institution. GAO reports from 1991 to 2023 (e.g., GAO, 2023) quantified overruns and delays, while RAND Corporation's analyses (e.g., Pernin et al., 2012) assessed integrator impacts. Think tank writings (e.g., Kunz et al., 2022; Lofgren et al., 2023) provided stakeholder interpretations of reform efficacy, enriching the critique of MCA's persistent issues.

External scholarship extended beyond immediate stakeholder analysis, drawing on theoretical and historical insights to inform the distributed acquisition model. A Google Scholar search using keywords *Nunn–McCurdy Breaches*, *DoD Acquisitions*, *Conway's Law*, and *Distributed Acquisition* yielded works like Maddox et al. (2013) on cost inefficiencies and Easterling (2020) on breaches. These searches were supplemented by queries via the large language model Grok, which aided in identifying relevant terms and validating source relevance. Reference tracing from GAO and RAND Corporation reports uncovered seminal texts, including *Augustine's Laws* (Augustine, 1983), *Systems Architecting* (Rechtin, 1991), and *Freedom's Forge* (Herman, 2012) on the success of distributed acquisition in WWII. Additional sources—*Team of Teams* (McChrystal, 2015), *The Mythical Man-Month* (Brooks, 1995), *The Design of Design* (Brooks, 2010), and *The Origins of Victory* (Krepinevich, 2023)—addressed complexity, small-team benefits, and historical precedents, strengthening the foundation of the proposed distributed acquisition approach.

The analysis effort integrated the aforementioned perspectives to illuminate MCA's flaws. DoD policies established intent—modular, adaptable systems—and challenges like intellectual property barriers (DoD, 2022a). Conway's Law mapped centralized structures to complex designs (Conway, 1968; MacCormack et al., 2012), with Brooks (1995) noting the inherent inefficiency of large teams. Immediate sphere critiques quantified impacts—for example, $183 billion overruns (GAO, 2023)—and tested contractor–DoD misalignment via Principal–Agent Theory (Pernin et al., 2012). External perspectives offered solutions: VDD optimized trade-offs (Collopy, 2007), MAUT balanced utility (Abbas, 2018), and historical models validated small-team efficacy, with Holt et al. (2017) setting 150 as the coordination limit (Dunbar, 1992). McChrystal (2015) emphasized adaptability: "In complex environments, shared consciousness trumps hierarchy" (p. 128), aligning with DoD goals.

Sources were categorized into DoD intentions, immediate sphere critiques, and external solutions, revealing MCA's resistance to transformation since the 1980s (Reeves, 1996). Iterative cross-referencing—for example, GAO delay data (Gilmore, 2011) with Maddox et al.'s (2013) cost estimates—ensured robustness. This methodology provides an evidentiary foundation for identifying inefficiencies in MCA's current execution and proposing a distributed acquisition model to refine its application, correcting flaws in requirements, complexity, and control while advancing modularity and adaptability.

Results

This section synthesizes findings from DoD policies, immediate sphere critiques, and external scholarship to define the persistent flaws in the contemporary application of MCA, which undermines the DoD objectives of modularity, positive lifecycle outcomes, innovation, and adaptability (DoD, 2022b). Across three perspectives—DoD, immediate sphere (e.g., GAO, RAND Corporation), and external analysts—three flaws emerge: requirements obscuring military utility across cost, schedule, performance, and lifecycle; centralized contractor structures embedding complexity; and contract scales eroding DoD control. These insights, grounded in data and examples, highlight MCA's misalignment with DoD goals, supporting a distributed acquisition model conceptually.

DoD Perspective

The DoD envisions MCA as a cornerstone for delivering modular, innovative systems with positive lifecycle outcomes and adaptability to an evolving operational environment, countering rising threats from adversaries like China and Russia (DoD, 2022b). Foundational policies articulate this intent: the National Defense Strategy seeks "resilient, sustainable systems with enduring advantages" (DoD, 2022b, p. 17), while DoD Instruction 5000.97 (DoD, 2023) and the MOSA mandate modularity and agility (DoD, 2022a). BBP 3.0 enforces affordability and technical excellence (DoD, 2015), targeting platforms like aircraft and missile defenses. Yet, MCA's persistent struggles reveal a stark disconnect between this vision and execution, as three fundamental flaws—requirements obscuring military utility across cost, schedule, performance, and lifecycle; centralized contractor structures embedding complexity; and contract scales eroding DoD control—undermine these goals, highlighting the need for a structural shift.

Requirements miscommunication consistently prioritizes initial performance over comprehensive utility, misaligning with adaptability and lifecycle aims. The F-35 Joint Strike Fighter, developed by Lockheed Martin, exemplifies this: its focus on stealth and multirole capabilities led to significant cost overruns and delays, with sustainment challenges straining operational readiness (GAO, 2015). Similarly, the Zumwalt-class destroyer's advanced gun system, intended as a cutting-edge feature, became inoperable due to prohibitively expensive ammunition, neglecting lifecycle planning and rendering the platform less effective (GAO, 2018). The DoD acknowledges that complex requirements often exacerbate delays across MCA programs, a flaw persisting despite decades of reform efforts (DoD, 2022b; Reeves, 1996). This misalignment reflects a failure to balance cost, schedule, and long-term utility, thwarting the DoD's modularity objectives.

Centralized contractor structures embed complexity, further diverging from the DoD's vision. Conway's Law posits that system designs mirror organizational hierarchies, a dynamic evident in MCA (Conway, 1968; MacCormack et al., 2012). *The State of Competition within the Defense Industrial Base* report highlights a consolidated industry, noting that "five major primes now dominate" a once-diverse field (DoD, 2022a, p. 1). Intellectual property barriers—described as "Swiss cheese" data rights—lock the DoD into proprietary, tightly integrated designs, resisting MOSA's push for open systems (DoD, 2022a, p. 8). The F-35's variants (A, B, C) faced integration delays due to Lockheed's centralized approach, while the Zumwalt's radar and gun systems reflect similar rigidity, limiting adaptability (GAO, 2015, 2018). Brooks (1995) warned that large teams compound complexity, a pattern MCA mirrors as centralized structures hinder modularity and innovation.

Contract scale erodes DoD control, amplifying a principal–agent misalignment where contractors prioritize profit over warfighter utility (Pernin et al., 2012). The F-35's multibillion-dollar agreement with Lockheed Martin deterred timely intervention due to legal and economic risks, locking the DoD into a costly trajectory (Weisgerber, 2021). The Zumwalt's similarly massive contract left little room for adjustments when flaws emerged, tying the DoD's hands (GAO, 2018). Gilmore (2011) reported that manufacturing and integration failures delay 84% of major programs, driven by centralized bottlenecks and oversized contracts, a challenge the DoD struggles to mitigate (Gilmore, 2011, p. 389). This scale clashes with the agility needed for rapid threat response, undermining the innovation goals outlined in *USD(R&E) Technology Vision for an Era of Competition* (DoD, 2022c).

The DoD's solution approaches—digital engineering to integrate models (DoD, 2023), MOSA to promote open designs (DoD, 2022a), and BBP 3.0's cost targets (DoD, 2015)—attempt to address these issues but fall short of structural change. MTA accelerates prototyping, yet oversight remains weak, and MCA's pace lags operational needs (DoD, 2022c ; GAO, 2023). These efforts tweak processes rather than dismantle the centralized framework that embeds MCA's flaws, a limitation echoing past incremental reforms (Reeves, 1996). The desired end state—modular, sustainable systems—remains elusive as complexity and scale persist, misaligning with the DoD's vision for enduring deterrence and adaptability.

MCA Immediate Stakeholder Perspective

Stakeholders within the DoD's immediate sphere—including the GAO, RAND Corporation, Naval Postgraduate School (NPS), Atlantic Council, Acquisition Research Program, Industrial College of the Armed Forces, and analysts like Norman Augustine (1984) and Marcus Weisgerber (2021)—assess MCA's intent to deliver modular systems with positive lifecycle outcomes, innovation, and adaptability, as outlined in the National Defense Strategy (DoD, 2022b). Yet, their critiques reveal three persistent flaws unchanged since the Goldwater–Nichols Act of 1986: requirements obscuring military utility across cost, schedule, performance, and lifecycle; centralized contractor structures embedding complexity; and contract scales eroding DoD control. GAO (2023) quantified this misalignment: "MCA programs face $183 billion in overruns and two-year delays across 36 efforts" (p. 1), underscoring a systemic failure that thwarts DoD goals.

The immediate sphere's intent aligns with the DoD's: MCA should deliver affordable, timely systems meeting warfighter needs. GAO targets "reliable, capable outcomes" (Gilmore, 2011, p. 390), RAND Corporation seeks cost-effective adaptability (Pernin et al., 2012), and NPS prioritizes relevance (Kunz et al., 2022). Yet, execution falters due to requirements miscommunication. The FCS, canceled in 2009 after Boeing consumed $18 billion, prioritized technical ambition over lifecycle utility, collapsing under a networked vision that neglected modularity (Pernin et al., 2012). The A-12 Avenger II, abandoned in 1991 after significant investment, suffered from unfeasible specifications set by McDonnell Douglas and General Dynamics, driving costs beyond control (GAO, 1991). Kunz et al. (2022) highlighted an "operational knowledge gap" (p. xxi), while Etemadi (2020) noted 8-year cycle times misaligned with threats, reflecting requirements that fail to balance utility across key dimensions.

Centralized contractor structures embed complexity, amplifying MCA's challenges. Conway's Law suggests hierarchical organizations produce integrated systems (Conway, 1968; MacCormack et al., 2012), a pattern evident in FCS's integration-heavy collapse and Boeing's rigid approach (Pernin et al., 2012). Post-9/11 consolidation entrenched the "Big Five" contractors, dominating budgets and resisting adaptability, as Weisgerber (2021) observed: "The defense industry's consolidation post-9/11 shifted power to a handful of giants." Brooks (1995) warned that large teams exacerbate delays, a flaw Lofgren et al. (2023) traced to prolonged timelines, clashing with the DoD's modularity goal (DoD, 2022b). Reeves (1996) extended this critique across centuries, noting centralized rigidity's deep roots.

Contract scale erodes DoD control, locking the system into inflexible frameworks. The A-12's massive contract deterred intervention until costs spiraled, reflecting a principal–agent tension where profit trumps utility (GAO, 1991; Pernin et al., 2012). FCS's vast scope similarly ceded authority to Boeing, with legal and economic pressures from large integrators—such as potential litigation over contract disputes—further constraining oversight (Weisgerber, 2021). Chang and Chakrabarti's (2023) interview with Augustine pointed at the 1990s consolidation push, entrenching a scale that Gilmore (2011) linked to manufacturing delays in 84% of programs. This misalignment undermines innovation and responsiveness, key DoD priorities (DoD, 2022b).

Proposed solutions from this sphere focus on process adjustments rather than structural change. GAO advocated early testing to curb delays (Gilmore, 2011), RAND Corporation suggested risk tools and engineering rigor (Pernin et al., 2012; RAND Corporation, 2022), and NPS recommended warfighter integration (Kunz et al., 2022). Lofgren et al. (2023) proposed portfolio models, and Etemadi (2020) offered decision frameworks, but these approaches do not address centralization. Reeves (1996) hinted at decentralization, but Augustine stated that the consolidation legacy persists (Chang & Chakrabarti, 2023). The desired end state—timely, adaptable systems—remains elusive, with centralized complexity and scale thwarting breach-free, relevant outcomes (Kunz et al., 2022; Pernin et al., 2012).

External Perspective

External scholars and analysts beyond the DoD'S immediate sphere—drawing from systems engineering, organizational theory, and historical analysis—offer a critical lens on MCA, defining its persistent failures in meeting the DoD's objectives of modularity, positive lifecycle outcomes, innovation, and adaptability (DoD, 2022b). Three flaws, unchanged since the Goldwater–Nichols Act of 1986, emerge: requirements obscuring military utility across cost, schedule, performance, and lifecycle; centralized contractor structures embedding complexity; and contract scales eroding DoD control. Maddox et al. (2013) estimated MCA's toll at "$208 million in daily losses" (p. 89), while Easterling (2020) tracked 58 Nunn–McCurdy breaches, signaling systemic misalignment with DoD goals.

External scholars offer solutions to MCA's flaws, reinforcing the distributed acquisition approach's potential. Griffin (2010) advocated elegant designs, emphasizing simplicity that aligns with the approach's modular, small-team structure to reduce complexity. Felder and Collopy (2012) and Holt et al. (2017) critiqued systems engineering's overcomplexity, noting large teams inflate risks; the approach's 150-person cap, informed by Dunbar (1992), fosters agile coordination. These systems engineering insights propose actionable reforms, complementing GAO and RAND Corporation critiques and positioning the distributed acquisition approach to deliver adaptable systems. By prioritizing design coherence and manageable team sizes, external scholarship provides a blueprint to overcome MCA's rigidity, ensuring innovation and responsiveness (DoD, 2022b).

External analysts aim for cost-effective, adaptable systems prioritizing warfighter utility (Herman, 2012; Maddox et al., 2013). Yet, requirements miscommunication drives inefficiencies. Collopy (2007) quantified 7% to 10% component cost growth from rigid specifications, a flaw evident in the FCS, where Boeing's $18 billion networked vision collapsed under technical overreach, neglecting lifecycle utility (Pernin et al., 2012). Clowney et al. (2016) attributed $62 billion in terminated efforts to cost growth, cuts, and delays, while Felder and Collopy (2012) critiqued systems engineering's complexity. Krepinevich (2023) critiqued Vietnam's TFX program, noting that its overambitious requirements led to massive cost overruns, a historical precedent for MCA's struggle to balance utility and adaptability (DoD, 2022b). Brooks (1995) warned in *The Mythical Man-Month* that scaling teams on a delayed project exacerbates lateness, a reality in the Littoral Combat Ship, where Lockheed Martin and Austal's integrated designs delayed modules for years (GAO, 2020). Collopy (2013) identified thousands of unaddressed risks in centralized MCA efforts, resisting the MOSA (DoD, 2022b). McChrystal (2015) critiqued hierarchical rigidity as unfit for dynamic threats, a flaw persisting since the 1980s (Reeves, 1996).

Contract scale erodes DoD control, exacerbating principal–agent misalignment (Pernin et al., 2012). FCS's vast scope ceded authority to Boeing, with legal entanglements deterring oversight (Pernin et al., 2012; Weisgerber, 2021). Holt et al. (2017) and Dunbar (1992) set 150 as the coordination limit, beyond which MCA's massive contracts falter, as seen in prolonged FCS timelines. Collopy (2004) warned of declining military technology pull, leaving MCA reliant on stagnant suppliers—a trend Krepinevich (2023) traced to post-WWII consolidation. This scale stifles innovation, clashing with DoD adaptability goals.

Historical contrasts highlight these flaws' severity. WWII's distributed network of 18,000 firms, over 50% small businesses, delivered modular, adaptable systems without billion-dollar contracts (Herman, 2012). Chrysler's small suppliers and Kaiser's subcontractors met wartime needs rapidly, aligning with Holt et al.'s (2017) limit. Interwar innovations—carrier aviation, radar—thrived on agile teams, while centralized efforts like TFX faltered (Krepinevich, 2023). Brooks (2010) noted that small teams ensure design coherence, a principle MCA abandons. The desired end state—efficient, adaptable systems—remains elusive, with centralized complexity and scale thwarting modularity and responsiveness (DoD, 2022b).

Discussion

This study set out to define the persistent challenges in MCA that undermine the DoD's objectives of delivering modular systems with positive lifecycle outcomes, innovation, and adaptability to an evolving operational environment (DoD, 2022b). Synthesizing findings from DoD policies, immediate sphere critiques (e.g., GAO, RAND Corporation), and external scholarship, three flaws emerge—unchanged since the Goldwater–Nichols Act of 1986: requirements obscuring military utility across cost, schedule, performance, and lifecycle; centralized contractor structures embedding complexity; and contract scales eroding DoD control. These flaws, evident across programs like the F-35, Zumwalt-class destroyers, FCS, and A-12 Avenger II, reflect a centralized framework that thwarts MCA's goals, as GAO (2023) quantified with $183 billion in overruns and 2-year delays across 36 efforts. Integrating historical precedents and theoretical frameworks, this discussion supports a distributed acquisition model as a transformative solution, conceptually aligning with DoD aspirations while reserving implementation for a follow-on study.

The DoD's vision—articulated as "resilient, sustainable systems with enduring advantages" (DoD, 2022b, p. 17)—clashes with MCA's reality. Requirements miscommunication prioritizes initial performance over utility, as seen in the F-35's stealth focus straining sustainment and FCS's technical ambition collapsing without lifecycle coherence (GAO, 2015; Pernin et al., 2012). Immediate sphere critiques highlight similar issues in the A-12's unfeasible specs, while external scholars like Collopy (2007) noted 7% to 10% component cost growth from rigid requirements (GAO, 1991). Centralized structures, embedding complexity per Conway's Law (Conway, 1968; MacCormack et al., 2012), resist modularity, with the Littoral Combat Ship and Zumwalt reflecting integrator-driven rigidity (GAO, 2020, 2018). Contract scales—multibillion-dollar agreements—cede control, locking the DoD into frameworks where profit trumps warfighter needs, a principal–agent tension Weisgerber (2021) and Augustine

(1983; Chang & Chakrabarti, 2023) attributed to post-9/11 consolidation, noting that major contractors' dominance has diminished DoD oversight.

Across perspectives, MCA's centralized framework emerges as the core issue. The DoD identified consolidation and intellectual property barriers (DoD, 2022a), yet reforms like digital engineering (DoD, 2023) tweak processes, not structure. Immediate sphere stakeholders quantify overruns and critique reform inefficacy (GAO, 2023; Lofgren et al., 2023), proposing adjustments like early testing (Gilmore, 2011) that leave centralization intact. External scholars cut deeper, linking flaws to theory—Brooks (1995) warns, "Adding manpower to a late project makes it later" (p. 25)—and history, with Vietnam's TFX echoing MCA's overreach (Krepinevich, 2023). All agree: MCA's misalignment persists, embedding complexity and resisting adaptability since the 1980s (Reeves, 1996).

Historical precedents offer a stark contrast. WWII's distributed network of 18,000 firms—over 50% small businesses—delivered modular, adaptable systems rapidly, as Herman (2012) noted: "Small suppliers turned out tanks in months" (p. 142). Interwar innovations like carrier aviation thrived on agile teams, avoiding centralized pitfalls (Krepinevich, 2023). Centralized failures—TFX, A-12—overpromised and underdelivered, neglecting lifecycle utility (GAO, 1991; Krepinevich, 2023). This agility aligns with MCA's needed shift, supported by theoretical frameworks. Conway's Law suggests decentralized structures yield modular designs (Conway, 1968), while VDD optimizes trade-offs, potentially saving $55 billion annually (Collopy, 2007; Collopy & Hollingsworth, 2011). MAUT refines utility across dimensions (Abbas, 2018), and McChrystal (2015) advocated adaptability: "Shared consciousness trumps hierarchy" (p. 128). Holt et al.'s (2017) 150-member limit ensures control (Dunbar, 1992), promising innovation over MCA's rigidity.

A distributed model—fractionating systems into small teams—directly targets these flaws. By clarifying requirements, it reduces lifecycle neglect, unlike the F-35's sustainment burden (GAO, 2015). Decentralized structures foster modularity, supporting MOSA (DoD, 2022b), in contrast to FCS's complexity (Pernin et al., 2012). Smaller contracts restore control, diluting integrator dominance (Weisgerber, 2021) and expanding the DIB beyond five primes (DoD, 2022a). This enhances competition and responsiveness, as WWII proved (Herman, 2012), aligning with DoD goals where incremental reforms falter (DoD, 2023; Gilmore, 2011). Brooks (2010) and Krepinevich (2023) reinforced this with coherence and historical agility, breaking MCA's entrenched cycle.

MCA's centralized framework is the elephant in the room, thwarting modularity and adaptability (DoD, 2022b). A distributed model, rooted in WWII's success and theoretical rigor, reclaims utility, simplicity, and control. Future work will detail implementation—team structures, funding—but this shift urges acquisitions professionals to reimagine MCA's foundation, moving beyond reform tweaks to a proven alternative.

Conclusion

MCA stands at a critical juncture, its persistent failures etched in decades of cost overruns, schedule delays, and performance shortfalls that undermine the DoD's vision of modular systems with positive lifecycle outcomes, innovation, and adaptability to an evolving operational environment (DoD, 2022b). This study has defined three root causes—unchanged since the Goldwater–Nichols Act of 1986: requirements obscuring military utility across cost, schedule, performance, and lifecycle impacts; centralized contractor structures embedding complexity; and contract scales eroding DoD control. Through a systematic review of DoD policies (e.g., DoD, 2022b), immediate stakeholder critiques (e.g., GAO, 2023; Pernin et al., 2012), and external scholarship (e.g., Collopy, 2007; Herman, 2012), MCA's centralized framework emerges as misaligned with its goals, costing billions and delaying readiness. A distributed acquisition model—fractionating systems into small and medium-sized teams—offers a transformative solution, conceptually validated by history and theory, with implementation reserved for a follow-on study.

Programs like the F-35, Zumwalt-class destroyers, and FCS exemplify these flaws, their struggles with requirements, complexity, and scale echoing across stakeholder perspectives (GAO, 2015, 2018; Pernin et al., 2012). Yet, the DoD's intent for resilient, adaptable systems (DoD, 2022b) remains attainable. Historical precedents light the path: WWII's 18,000 firms, largely small businesses, delivered modular, adaptable systems rapidly, avoiding the centralized traps MCA repeats (Herman, 2012). While WWII's distributed successes are compelling, their industrial focus requires adaptation to modern cyber and space systems, where small teams and VDD optimize modular components for adaptability and cost (Collopy, 2007; DoD, 2022b). Interwar innovations like carrier aviation thrived on agility, while Vietnam's TFX faltered under bloated requirements (Krepinevich, 2023). These lessons, paired with Conway's Law (Conway, 1968), VDD (Collopy, 2007), and organizational agility (McChrystal, 2015), ground a distributed model that reclaims utility and control.

This shift is no mere tweak but a foundational reimagining. Requirements clarified by small teams address lifecycle neglect, as VDD's 10%+ cost savings per component suggest (Collopy, 2007). Decentralized structures align with MOSA's modularity (DoD, 2022b), shedding complexity that bogged down FCS (Pernin et al., 2012). Smaller contracts restore oversight, expanding the DIB beyond five primes (DoD, 2022a), fostering competition and innovation that the U.S. experience in WWII proved possible (Herman, 2012). McChrystal (2015) captured the stakes, emphasizing that adaptability outperforms rigid hierarchies in complex environments, a principle MCA's rigidity defies. With billions at risk—$208 million daily losses (Maddox et al., 2013)—and threats accelerating, the DoD cannot afford incrementalism.

The FORGE Act's reforms signal a path forward, but their success hinges on a robust methodology to translate policy into practice. By prioritizing streamlined processes, competition, and a diversified DIB, FORGE addresses the same inefficiencies distributed acquisition targets—unclear requirements, centralized complexity, and eroded control. Distributed acquisition's small-team framework, validated by WWII's agility and theoretical clarity (Conway, 1968; Holt et al., 2017), offers a viable approach to implement FORGE's vision, fostering modularity and innovation through MOSA-aligned structures (DoD, 2022b). Exploring distributed acquisition as a pilot for FORGE's reforms could break MCA's centralized cycle, delivering systems that meet warfighter needs.

The urgency is clear. Decades of reforms—Goldwater–Nichols to AAF (DoD, 2023; GAO, 1991)—have patched processes without dismantling centralization, a failure GAO (2023) and external critiques (Maddox et al., 2013) quantify. A distributed model, rooted in WWII's proven agility and interwar responsiveness (Herman, 2012; Krepinevich, 2023), offers a break from this cycle. It leverages MAUT for balanced utility (Abbas, 2018) and Holt et al.'s (2017) 150-member limit for coordination (Dunbar, 1992), promising operational readiness over entrenched inefficiency. Future work will detail execution—team structures, funding models, perhaps piloting with complex systems—but this study establishes the imperative: MCA's centralized ghosts must give way to a system that delivers.

Acquisitions professionals face a choice. Clinging to a framework that locks the DoD into complexity and cost risks strategic lag against agile adversaries. Embracing a distributed model harnesses America's historical strength—decentralized innovation—as WWII's small firms did against existential threats (Herman, 2012). This is not speculation but a return to what works (Johnson, 2002), bolstered by theory and data (Brooks, 2010; Collopy, 2007). The DoD's mission demands systems that adapt, not falter. This study urges a bold step: reimagine MCA, break the cycle, and build a future where modularity, innovation, and adaptability prevail.

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