NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

MBA PROFESSIONAL PROJECT

HAS DEPARTMENT OF DEFENSE ACQUISITION REFORM POLICY ADDRESSED THE PROBLEMS FACING ACQUISITIONS PROFESSIONALS?

June 2022

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REPORT DOCUMENTATION PAGE			*Form Approved OMB No. 0704-0188*

1. AGENCY USE ONLY *(Leave blank)*	**2. REPORT DATE** June 2022	**3. REPORT TYPE AND DATES COVERED** MBA Professional Project

4. TITLE AND SUBTITLE HAS DEPARTMENT OF DEFENSE ACQUISITION REFORM POLICY ADDRESSED THE PROBLEMS FACING ACQUISITIONS PROFESSIONALS?	**5. FUNDING NUMBERS**
6. AUTHOR(S) Amy R. Hutchings, Christina A. Sullivan, and Maria E. Warner	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000	**8. PERFORMING ORGANIZATION REPORT NUMBER**
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A	**10. SPONSORING / MONITORING AGENCY REPORT NUMBER**

11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release. Distribution is unlimited.	**12b. DISTRIBUTION CODE** A

13. ABSTRACT (maximum 200 words)

This qualitative study analyzes how well recent acquisitions reform policies have addressed the modern difficulties facing acquisition professionals in an attempt to improve acquisition policy. The study reviews literature, case studies, surveys and interviews from previous program managers, and policy and legislation, and then compiles the aggregate results to develop a clearer view of how acquisition reform policy is addressing the problems faced by acquisition professionals. The primary goals of the study are to a) identify the main problems facing DOD acquisition, b) examine recent acquisition reform policies to determine if they address those issues identified, and c) provide recommendations for policy makers to shape acquisitions reforms and legislation in the future. Analysis of our findings suggests that defense acquisition policies and legislation are not addressing the critical issues faced by acquisition professionals and add layers of bureaucracy, further complicating the acquisitions process. Additional research into the factors effecting successful and unsuccessful acquisitions is warranted for a more thorough analysis.

14. SUBJECT TERMS program management, decision bias, operational mindset, Army acquisitions, Navy acquisitions, contracting, best industry practices	**15. NUMBER OF PAGES** 87
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT Unclassified	**18. SECURITY CLASSIFICATION OF THIS PAGE** Unclassified	**19. SECURITY CLASSIFICATION OF ABSTRACT** Unclassified	**20. LIMITATION OF ABSTRACT** UU

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. 239-18

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Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF BUSINESS ADMINISTRATION

from the

NAVAL POSTGRADUATE SCHOOL
June 2022

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ABSTRACT

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LIST OF ACRONYMS AND ABBREVIATIONS

CAS	Cost Accounting Standards
DAU	Defense Acquisition University
DOD	Department of Defense
FAR	Federal Acquisition Regulation
GAO	Government Accountability Office
HASC	House Armed Services Committee
JCIDS	Joint Capabilities Integration and Development System
KO	Contracting Officer
MDAP	Major Defense Acquisition Program
NDAA	National Defense Authorization Act
PM	Program Manager
PPBE	Planning, Programming, Budget, and Execution (PPBE) process
PWS	Performance Work Statement
QA	Quality Assurance
QASP	Quality Assurance Surveillance Plan
SASC	Senate Armed Services Committee
SECDEF	Secretary of Defense
SOO	Statement of Objectives
SRRB	Service Requirements Review Board
USD (AT&L)	Under Secretary of Defense for Acquisition, Technology, and Logistics
WSARA	Weapons System Acquisition Reform Act

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ACKNOWLEDGMENTS

Our team would like to express our gratitude to all the professors in the Acquisitions MBA program for their dedication and support throughout our time at the Naval Postgraduate School. We would like to especially thank our thesis advisors, Professor Raymond Jones and Dr. Robert Mortlock, for their support, mentorship, and guidance throughout our studies and research. Lastly, we are grateful for the NPS Graduate Writing Center and NPS Acquisition Research Program for being wonderful resources throughout this milestone.

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I. INTRODUCTION

A. BACKGROUND

In 2001, the first iPod was introduced by Apple. In the same year, two thousand nine hundred and seventy-seven victims were killed in the September 11th terrorist attack, prompting the United States to take action in Afghanistan and officially beginning the War on Terror. "Gladiator" won the 58th Golden Globes. Dale Earnhardt's life was lost in a crash at the 43rd Daytona 500. The first Xbox was released by Microsoft. Michael Phelps broke the 200m butterfly world record at the age of fifteen. In 2001, the F-35 Lightning II Joint Strike Fighter program began development.

Once called "acquisition malpractice" by Air Force Secretary Frank Kendall, in 2022 the F-35 still has not received a production decision, and it likely will not occur until end of fiscal year 2023 (Reilly, 2022). The F-35 was supposed to be a low-cost plane that would serve the needs of all military branches. Now delayed more than eight years, it is anticipated that it will cost $398 billion to acquire the planned F-35 fleet, $165 billion over the original cost projections, and a life cycle cost of more than $1.7 trillion (Clark, 2012). Still, in 2020, the Project on Government Oversight reported on a leaked document that showed the F-35 was reported to have 448 deficiencies remaining of the initial 883 design flaws (Grazier, 2020).

One might wonder how this could happen. China is completing capabilities every two to four years while the United States has taken twenty-five years to develop one aircraft. (Insinna, 2021). One of the best places to look for answers is within the Department of Defense (DOD) acquisitions process. The acquisitions process is a coordination of enormous procurement programs with a number of processes and people to make a successful acquisition. This process has often failed and is always under scrutiny. The factors used to evaluate the success of an acquisition are cost, performance, and schedule; however, there are a multitude of additional factors that contribute to the success or failure of the acquisition.

The external environment can have a massive impact over the process—fluctuating congressional budgets, shifting initiatives, emerging technology, changes to the political or economic environment, changing priorities, and shifting federal regulations and reforms can all be contributors to a failed acquisition. Acquisition reform has aimed to help, aid, and fix this process.

Defense acquisitions reform is as old as the United States itself. The first acquisitions were to provide supplies and food to the Continental Army and Navy. The deliveries promptly became the subject of complaint, and acquisitions reforms were born (Hunter, 2018). Acquisition reforms up to 1987 typically addressed the symptoms of increased costs rather than the actual cause. Worse, these reforms were only ever partially put into action, leaving government and industry in the same place they were before. The waste, fraud, and mismanagement of the 1980s influenced the sixty-three reforms passed in the 1990s. In 2002, the assistant secretary of the Army for Acquisition, Logistics, and Technology employed Rand Corporation to conduct a study of these 1990s acquisition reform initiatives.

To measure coverage of the acquisition reform initiatives, Rand used the DOD 5000-series acquisition policy documents written by a joint DOD task force between 1999–2001. Here, Rand found that under fifty percent of the sixty-three acquisition reform initiatives from the 1990s were mentioned in the 2001 version of the DOD 5000 series (Fox et al., 2012). This creates little doubt that acquisitions reforms of the past have produced little, if any, long-term success.

Modern reforms are generally exercised by congressional legislative powers through Title VIII of the National Defense Authorization Act (NDAA), entitled Acquisition Policy, Acquisition Management, and Related Matters. From 2016–2018, Congress passed almost double the number of provisions in these years' NDAAs than were passed in the previous 10 years combined (Peters et al., 2018). In 2018, one of the three lines of effort in the National Defense Strategy was to reform the Department for Greater Performance and Affordability (McInnis, 2018). While this heightened exposure for reforms is no doubt encouraging, we still see the same familiar issues perpetuating that

have plagued the acquisition process from the beginning: cost overrun, schedule slippage, and underperformance of technical performance.

It is clear that attempts at defense acquisition reforms have fallen short. While ideas for which reforms to include in NDAAs are prevalent, a clear recognition of what is causing the problems seems to be lacking. The United States still cannot compete with China's acquisitions despite the many studies on the effectiveness of acquisition reform, which produce similar findings over and over again: that a fighter jet that took over 20 years to develop still contains structural flaws and enemy vulnerabilities. Major defense programs continue to take more than fifteen years to deliver less capability than planned, and many at double the projected cost.

DOD has been implementing acquisition reforms for decades but finds itself largely facing the same problems year after year. The challenges of readiness and national security are evolving at a rapid pace, while the bulky and difficult acquisitions process is slow to modernize. The United States is on the precipice of losing its global superiority to near-peer competitors who are aggressively pursuing advancements in cyber capabilities, electronic warfare, information systems, communication, Artificial Intelligence, and more. Focused on the war on terror for so long, the U.S. has been inattentive in the areas of innovation and technology, despite the fact that emerging technologies are vital to the future of conflict. The U.S. has not kept up with its adversaries who have proven that they are quicker to develop new advancements and better at acquiring them. The lack of adaptation is now jeopardizing the competitive edge that the U.S. has held for so long.

As emerging innovations and technologies are largely commercial and globalized, the U.S. Government must create a system that works with industry to acquire the latest tech innovations quickly, efficiently, affordably, and without sacrificing quality. Acquisitions reforms continue to address the same problems year after year but never produce the dramatic modernization needed. This leads to the assumption that reforms are not addressing the real issues which impede the current acquisition process.

B. PROBLEM STATEMENT

Preliminary research suggests that specific chronic acquisitions issues exist in the areas of speed, efficiency and effectiveness, budget and funding, knowledge, and culture, which are claimed to impede innovation. As a rule, and with all things being equal, clear pathways for innovation to flourish are preferred in the acquisitions world so that the United States can retain warfighting superiority over near-peer competitors and thereby both deter war and increase the odds of winning an undeterrable war more quickly and with less loss of American lives. Given that a multitude of voices from within the Acquisition Workforce and many reports from the Government Accountability Office (GAO) have repeatedly echoed to Congress these concerns about the impediments to DOD innovation over the past several years, the expectation should be that Congress is addressing these issues in the areas of speed, efficiency and effectiveness, budget and funding, knowledge, and culture through the annual NDAAs.

C. RESEARCH QUESTIONS

1. Are there acquisitions issues of speed, efficiency and effectiveness, budget and funding, knowledge, and culture impeding innovation?
2. If so, have recent acquisitions reforms addressed those issues of speed, efficiency and effectiveness, budget and funding, knowledge, and culture impeding innovation?

D. SCOPE

This MBA project analyzes which areas of acquisitions are identified by experts within the Acquisition Workforce and by the GAO as impediments to innovation, and then determines whether and to what extent those identified areas are addressed via congressional reform in the form of three consecutive NDAAs. By analyzing a literature review of Acquisition Workforce experts and GAO's Weapon Systems Annual Assessments and Report to Congressional Committees from FY18, FY19, and FY20, we intend to determine an answer to our first research question as to whether there are acquisitions issues of speed, efficiency and effectiveness, budget and funding, knowledge,

and culture impeding innovation. Utilizing our literature review and government reports to gather data, we intend to identify aggregate categories that have been frequent factors in hindering the acquisitions process in the pursuit of innovation, this MBA project will compare those identified aggregated categories of acquisitions issues to the FY20, FY21, and FY22 NDAAs to determine an answer to our second research question as to whether and to what extent recent acquisitions reforms addressed those issues of speed, efficiency and effectiveness, budget and funding, knowledge, and culture impeding innovation. While these categories are not all inclusive of all acquisition problems, the collected data indicates how frequently and proportionately congressional acquisition reform policy has addressed the problems facing DOD acquisitions to include those problems which have been identified roadblocks to successful and timely innovation in recent years.

E. METHODOLOGY

This study initially seeks to review past and current acquisition policy as well as existing literature to understand if the policy and legislation is addressing the difficulties, obstructions, and setbacks to innovation commonly found and documented within the DOD acquisitions process over the past several years. The literature review also includes analysis of previous research into what those main problems are, how they can be categorized, and why those main problems have been so impactful within the scope of DOD acquisitions.

This MBA project employs the interpretive approach to analyze acquisitions reform initiatives presented in the National Defense Authorization Acts over the period of several years to determine which topics are continually addressed and, conversely, which topics are overlooked. While the overall objective of this project is to determine what acquisition reforms have been implemented, we also developed our theoretical basis on information from the literature review and from annual GAO reports. The analysis of this theory could reveal the main problems in the Acquisition Process that are not addressed or not adequately addressed.

The acquisitions process is burdensome and complicated. It is difficult to pinpoint the most significant areas that may be causing the biggest challenges to a successful acquisition. Through the literature review, we identified five categories of key areas

repeatedly indicated as obstructions to cost, schedule, and performance of an acquisition capable of providing innovation. These categories were then compared to the reforms presented in subsequent NDAAs.

1. Observations

The intent of this research paper is to is to supplement the full complement of previous thesis research that has been collected by Professor Raymond Jones and Professor Robert Mortlock. Previous research and analysis of the acquisitions process will be gathered and analyzed as a part of a broader research collection on the subject of acquisitions improvements. The data that we have gathered for our MBA research project is from the following primary sources:

1. Literature review of government reports, books, journal, and academic articles.
2. Summary and analysis of interviews with senior representatives from legislative bodies, DOD acquisition leaders, and senior military officers.
3. Analysis of past acquisition reform policies and initiatives to determine if they have adequately addressed the identified or failure of acquisition reform policy.

To evaluate and analyze the data, we categorized the findings from the literature into subcategories and aggregate categories. These were then matched with issues addressed in the NDAA acquisition reform policies from 2019–2021. These categories allowed us to analyze in-depth if acquisition reforms over the last three years did or did not address the categories identified in the literature as being the most important.

2. Findings

The literature review brought to light nineteen subcategories in the current acquisition process that were referenced repeatedly in academic research and data collection: Development, Agility, Performance, Reviews Process, Delivery, Fielding Time, Critical Technologies, Cost Overruns, Inflexibility, Delays, Responsiveness, Training, New Capabilities, Acquisition Workforce, Knowledge-Based Practices, Risk Aversion,

Success Metrics, Organizational Values, and Decision Making. These nineteen subcategories were then sorted into five corresponding aggregate categories that we identified to have the greatest impact on the acquisitions process: (1) Efficiency and Effectiveness, (2) Speed, (3) Budget and Funding, (4) Knowledge, and (5) Culture. This study then compared those categories and sub-categories to the NDAA's for FY19, FY20, and FY21 in order to quantify which categories were addressed, how often they were addressed, and which categories were not. This data was then analyzed and interpreted to determine how completely acquisitions reforms are addressing the identified issues.

F. PURPOSE STATEMENT

A greater understanding of how acquisition reform policy addresses the true roadblocks that affect the success of innovation. Research is required to adapt acquisitions policy in a way that will bring about improvements to the speed and efficiency of acquiring programs in the future through legislation. The purpose of this research is to gain a better understanding of the critical issues that acquisition professionals face in enabling innovation and if current reforms address those difficulties. Consequently, this study seeks to examine how future acquisition policy and legislation could be implemented to improve the success of the acquisitions process.

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II. LITERATURE REVIEW

Acquisitions reforms have varied over the last several decades, yet the same themes persist as deterrents to efforts to innovate. The big change that the U.S. would like to see that would modernize the acquisitions process remains elusive. Many studies and analysis of past reforms exist which speak to the success or failure of the intended reform result**.** In the first section of this chapter, we explain the acquisitions process. In the second section, we explain the National Defense Authorization Acts and expound on the Government Accountability Office Annual Assessments. In the third and final section, we discuss the aggregate categories in detail.

A. ACQUISITIONS PROCESS

The DOD's acquisitions process is long and complex. The management of an acquisition entails a multifaceted series of processes, milestones, and reviews from beginning to end to accomplish the multiple phases of the process. A phased approach is used to bring a new capability from conception to delivery to the warfighter. Each phase has its own complicated milestones to determine if a program will proceed into the next phase. This is a method riddled with a myriad of factors, including congressional hurdles, layers of bureaucracy, and budget constraints, which have slowed the process and caused the completion of major acquisitions each year to drop. Although there have been several notable reform efforts that simplify the defense acquisition process, it remains complex, comprised with layers of processes with sub-processes as shown in Figure 1.

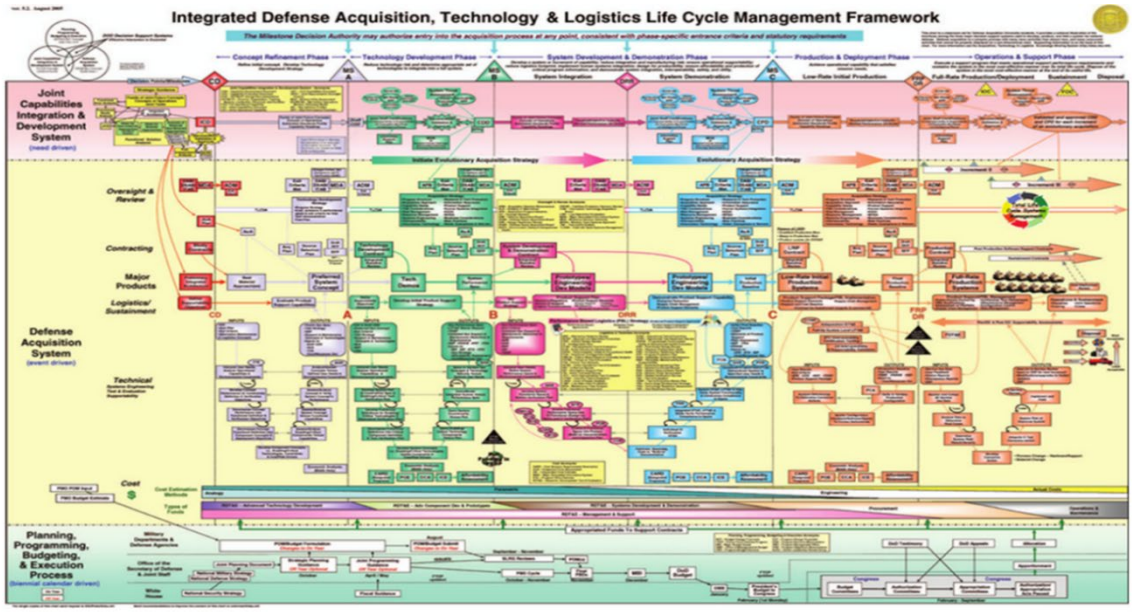


Figure 1. Process Map of Defense Acquisition, Technology, and Logistics Framework. Source: DAU (2018).

In 2020, the DOD revealed their latest rewrite of the acquisitions process called the Adaptive Acquisition Framework (AAF). This modification is once again intended to make the process easier for the Acquisition Workforce to grasp. The idea presents six acquisition strategies, or pathways: (1) major capability acquisition, (2) urgent capabilities, (3) software, (4) business systems, (5) services, and (6) middle-tier of acquisitions as shown in Figure 2.

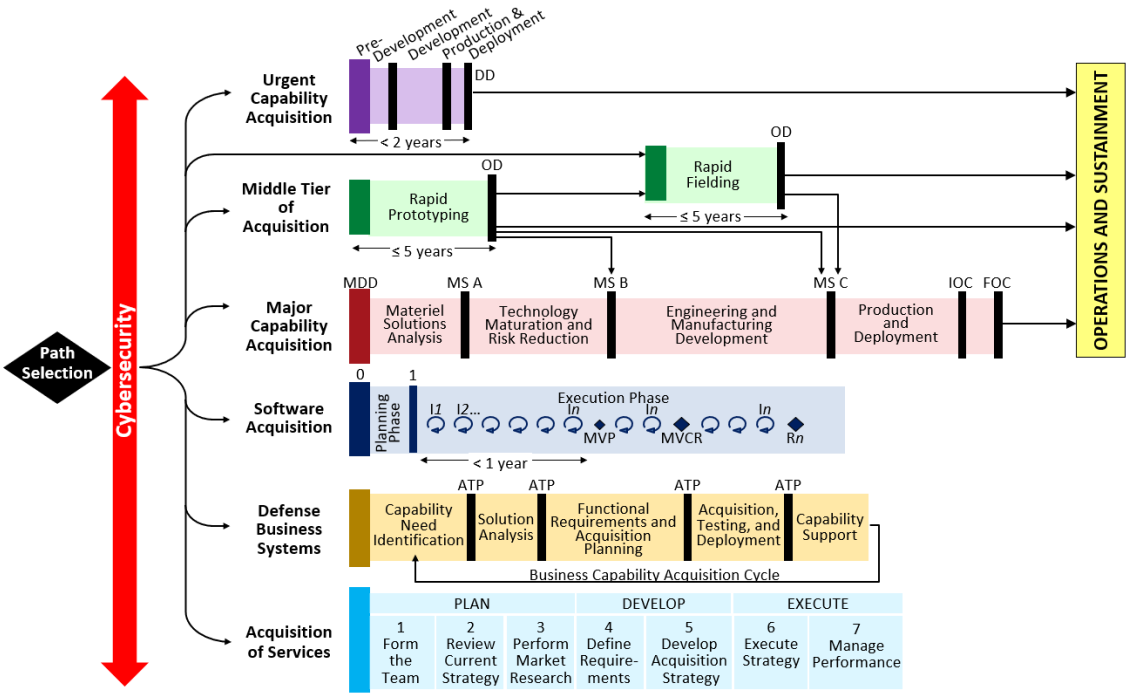
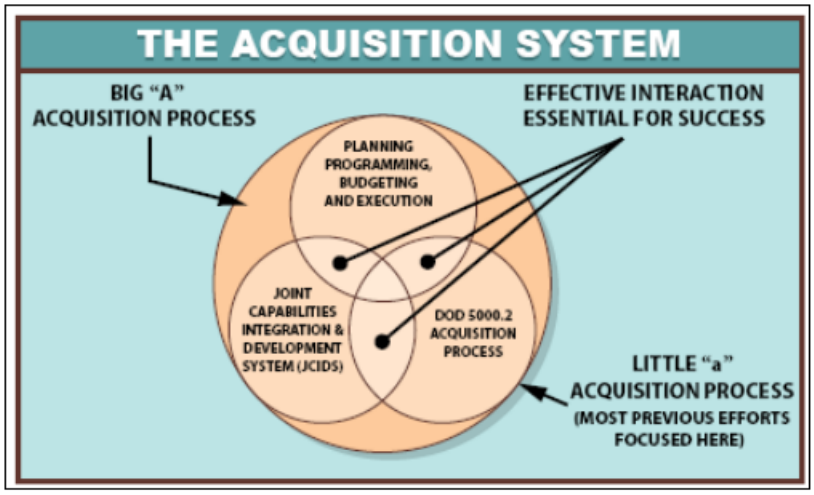


Figure 2. Adaptive Acquisition Framework. Source: DAU (2020).

As the term "acquisition" is used generously throughout this MBA project, it is vital to understand the difference between what acquisition professionals refer to as Big "A" acquisition and Little "a" acquisition. "From concept to deployment, a weapon system must go through the three-step process of identifying the required weapon system, establishing a budget, and acquiring the system," (Schwartz, 2014). As shown in Figure. 3, this three-step process consists of the Joint Capabilities Integration and Development System (JCIDS), the Planning, Programming, Budgeting, and Execution System (PPBE), and the Defense Acquisition System, which make up the Big "A" acquisition process. Conversely, the Defense Acquisition System alone is designated as the Little "a" acquisition process (see Figure 3).



Source: Defense Acquisition Performance Assessment Report, February 2006, p. 4.

Figure 3. DOD's Three-Step Defense Acquisition Structure. Source: Kadish et al. (2016).

B. NATIONAL DEFENSE AUTHORIZATION ACTS

For sixty-one consecutive years, a National Defense Authorization Act (NDAA) has been passed by Congress and is considered a must-pass law. Generally, the NDAA enjoys bipartisan support as the nature of the legislation is in support of national security and authorizes funding for the U.S. military and critical defense priorities,

The NDAA is an annual authorization for all Department of Defense funding. The bill is written by the House Armed Services Committee (HASC) and the Senate Armed Services Committee (SASC). The working version of the bill is simultaneously sent to House and Senate for their respective amendment proposals. The House and Senate then meet in a conference to discuss and merge their versions and resolve any differences before the final bill is presented to the President to be signed into law.

For DOD to spend money, Congress must both authorize and appropriate the funding. The NDAA is the authorization portion of defense spending. Later in the year, the defense appropriations bill is passed in order to appropriate the funds authorized.

The NDAA has general themes that are addressed each year in provisions for major defense and non-defense spending initiatives. Acquisitions reform and emerging

technologies are consistent topics of the NDAA, as seen in the last several years, and have a major impact on the future of the DOD. Notably, this year's NDAA concentrates on the most crucial priorities affecting national security in the Unites States, involving disruptive technology, artificial intelligence, modernization of military equipment, 5G, and hypersonic weapons focusing on strategic competition with Russia and China.

NDAAs often include controversial or outdated reforms among the thousands of reforms passed each year. Moreover, patterns of adding additional reporting requirements, extending timelines, and creating pilot programs is cyclical, many coming and going every few years.

> At different times in the acquisition reform cycle, a different acquisition priority predominates, giving rise to related policy prescriptions which are often later undone when the priority shifts. For example, the focus of acquisition reform has shifted over time from the following events: (1) development principles that David Packard promulgated in the 1970s; (2) to a focus on buying commercial items in the 1990s; (3) to handing off management responsibility to industry through Total Systems Performance Responsibility ("TSPR") or lead system integrator in the 2000s; and (4) to the cost control focus of the Better Buying Power initiative in 2010. For the defense industry, being in tune with and anticipating these changes in the defense acquisition reform cycle is critical to its business. For many other observers, these policy shifts are exasperating, giving evidence that reform never works and that the government tried every possible policy solution without apparent success. (Hunter, 2018)

While some initiatives seem warranted or as though they are going to result in the acquisitions process making real change, the shifts in priorities back and forth often lead to results that materialize too late when the attention (and funding) have already shifted to a new priority. These cyclical changes end up preventing real, relevant change to the acquisitions process because it is slow to respond; Instead, reforms should focus more on creating a process that is more responsive and can react quickly to shifts in priorities.

Lately, the NDAA has contained acquisition reform requirements with the aim to improve the DOD acquisitions process. This paper will d into the annual reports for FY20, FY21, and FY22.

C. GOVERNMENT ACCOUNTABILITY OFFICE WEAPON SYSTEMS ANNUAL ASSESSMENTS

Since 2003, the Government Accountability Office (GAO) has written a nonpartisan yearly assessment to measure the success and failure of the acquisition process, focusing on the costliest weapons programs or major defense acquisition programs (MDAPs). It also evaluates acquisitions reform implementation progress, cost overruns, and schedule delays.

Past GAO reports warned about acquisition costs that were climbing sharply, which predicted the eventual $300 billion cost overrun in 2008. It also reported on the DOD's failure to attain their own criteria for technological and design maturity which later led to the passing of the Weapon Systems Acquisition Reform Act (WSARA) (Levine, 2019). The assessment is now widely agreed to be the preeminent benchmark for Congress to set future reform initiatives.

1. GAO Assessment (FY 2018): "Knowledge Gaps Pose Risks to Sustaining Recent Positive Trends"

GAO's 16th annual Weapon Systems Annual Assessment and Report to Congressional Committees was published in April of 2018. This year's report examines how eighty-six different programs worth $1.66 trillion have performed on the basis of their cost and schedule (Government Accountability Office [GAO], 2018). The report also compares the performance from before 2010 as opposed to its performance after significant acquisitions reforms were enacted after 2010. The GAO report also reviews how past acquisition reforms have been applied, focusing on knowledge-based practices, by examining fifty-seven individual programs.

GAO found three key areas of observation:

1. DOD's 2017 Portfolio grew in scope and extent, including an increase in cost. The twenty-five programs that DOD started after 2010 represent twenty-nine percent of the eighty-six programs in the current portfolio, however, those twenty-five programs only comprise fifteen percent of the total cost of acquisitions during that time (GAO, 2018). These programs

are showing improvements to cost performance when compared to that of older programs. Nonetheless, while they do show better cost performance, GAO found that there was still a $7 billion cost increase (after adjusting for quantity increase). This, the report estimates, was most likely due to the increased "time and effort to complete development and procurement," (GAO, 2018). (See Figure 4). Further, from 2016 to 2017, other costs increased as well. Development and procurement expenses grew to $8.8 billion and $45.4 billion respectively. Meanwhile, the amount of time that it took to deliver each capability increased from 2016 to 2017 by more than a month. GAO determined that the most cost-growth occurred after production started.

Table 1: DOD Estimates that its 2017 Portfolio Will Cost More and Take Longer to Deliver as Compared to the 2016 Portfolio

Fiscal year 2018 dollars in billions

	2016 portfolio estimates[a]	2017 portfolio estimates	Net change between 2016 and 2017	Percentage change between 2016 and 2017
Total estimated research and development cost	305.2	313.9	8.8	2.9
Total estimated procurement cost	1,284.6	1,330.0	45.4	3.5
Total estimated acquisition cost[b]	1,603.1	1,657.8	54.7	3.4
Average cycle time (in months) to deliver initial capabilities	121.7	123.0	1.3	1.1

Source: GAO analysis of Department of Defense (DOD) data. | GAO-18-360SP

[a]For the 2016 portfolio, we included $132.3 billion in first full estimates for the 11 programs that entered the 2017 portfolio and subtracted $23.2 billion for the three programs that exited the portfolio between 2016 and 2017. These adjustments made the portfolios comparable for measurement of cost and schedule differences.

[b]In addition to research and development and procurement costs, total acquisition cost includes acquisition-related operation and maintenance and system-specific military construction costs.

Figure 4. DOD 2017 Portfolio Estimates. Source: GAO (2019b).

2. The GAO observed the implementation of three different acquisitions reforms. 1) The reform documented that "knowledge-based acquisition practices can lead to better cost and schedule outcomes" (GAO, 2018). However, programs still were not fully using the knowledge-based best practices to complete their programs acquisitions (see Figure 5). Specifically noted in the report were that all of the knowledge points were not met prior the start of system development or critical design reviews in

most cases. Further, no program bothered to confirm that their manufacturing process was adequate before they went to production. 2) Promoting competition was more universally implemented with that fifty-five of fifty-seven weapon programs promoted competition during the acquisition process. 3) Programs limited by budget restrictions and "should cost" analyses reported the constraints were not fully tested and still in progress (GAO, 2018).

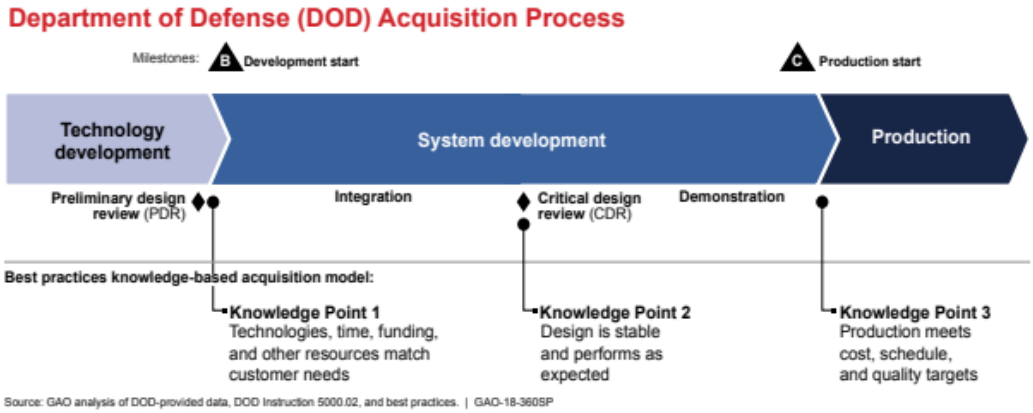


Figure 5. Key Knowledge Points Timeline. Source: GAO (2019b).

3. Finally, the GAO discussed eight observations gathered at key knowledge points for the same fifty-seven programs. Notably, they found that most programs were not completing the process based on best practices and failing to completely demonstrate key capability indicators or meet required objectives before beginning the next stage of the acquisition (see Figure 6). In addition to those mentioned in the previous section, GAO also noted that programs are typically entering into production (where cost growth is most prevalent) without complete knowledge, and this also contributes to cost and schedule growth.

DOD Programs Continue to Not Fully Implement Key Knowledge-Based Acquisition Practices

Practices Associated with the Three Key Knowledge Points (KP)	Thirty-seven programs GAO previously assessed that had completed the KP	Eight programs GAO assessed in 2018 that recently completed the KP
Demonstrate all critical technologies are very close to final form, fit, and function within a relevant environment	◐	●
Demonstrate all critical technologies are in form, fit, and, function within a realistic environment	○	●
Completed preliminary design review before system development start	◐	○
Release at least 90 percent of design drawings to manufacturing	○	●
Test a system-level integrated prototype	○	○
Demonstrate critical manufacturing processes are in statistical control	○	○
Demonstrate critical processes on a pilot production line	◐	●
Test a production-representative prototype in its intended environment	○	◐

Programs completing each best practice ● 75 - 100 percent ◐ 50 - 74 percent ○ 0 - 49 percent

Figure 6. Implementation Shortfalls during Key Knowledge Points. Source: GAO (2019b).

2. GAO Assessment (FY 2019): "Limited Use of Knowledge-Based Practices Continues to Undercut DOD's Investments"

GAO's 17th annual Weapon Systems Annual Assessment and Report to Congressional Committees was published in May of 2019. This report observed programs use of knowledge-based practices, analyzed the effects on programs that did not implement these practices, and surveyed future programs on their intention of implementing specific key practices. As with GAOs previous work, this report emphasizes the importance of "applying knowledge-based acquisition practices as a way to improve DoDs program outcomes" (GAO, 2019).

Below are two key observations made by GAO:

1. **Knowledge-based acquisition practices are not being fully implemented—**In this year's assessment of the 45 current programs, GAO observed that "most of them proceeded into system development, through critical design reviews, and into production without completing

the key knowledge-based practices associated with each of these three points" (GAO, 2019). Programs that do not implement these key knowledge-based practices are made more susceptible to schedule delays and cost overruns throughout the program's life cycle (see Figure 7).

DOD Major Defense Acquisition Programs Continue Not to Fully Implement Key Knowledge-Based Acquisition Practices

Practices associated with the three key knowledge points (KP)	Programs that completed the KP before this assessment period	Programs that completed the KP during this assessment period
KP 1 practices	**38 programs**	**Four programs**
Demonstrate all critical technologies are very close to final form, fit, and function within a relevant environment	◐	◐
Demonstrate all critical technologies are in form, fit, and, function within a realistic environment	○	○
Completed preliminary design review before system development start	◐	○
KP 2 practices	**33 programs**	**Two programs**
Release at least 90 percent of design drawings to manufacturing	○	●
Test a system-level integrated prototype	○	○
KP 3 practices	**15 programs**	**Three programs**
Demonstrate critical manufacturing processes are in statistical control	○	○
Demonstrate critical processes on a pilot production line	◐	●
Test a production-representative prototype in its intended environment	○	●

Programs completing each best practice: ● 75 - 100 percent; ◐ 50 - 74 percent; ○ 0 - 49 percent

Source: GAO analysis of Department of Defense data. | GAO-19-336SP

Figure 7. Key Knowledge-Based Acquisition Practices. Source: GAO (2019).

Future programs offer mixed signals—GAO surveyed six future programs to gauge whether they will implement specific knowledge-based acquisition practices at development start. The survey results in Figure 8 show that only some of the programs stated that they plan to implement the selected practices. GAO's previous work has shown that the programs that fail to implement these key practices "run a greater risk of cost growth and schedule delays than programs that satisfy the knowledge practices," (GAO, 2019).

Table 14: Planned Implementation of Selected Knowledge-Based Acquisition Practices at Development Start among Six Future Major Defense Acquisition Programs

	Plan to demonstrate all critical technologies in a realistic environment	Plan to complete all system engineering reviews	Plan for a development phase of less than six years
Yes	0	2	2
No	0	0	0
To be determined	3	1	1
Information not available	3	0	0
Not applicable	0	2	2
Not applicable—ship	0	1	1

Source: GAO analysis of Department of Defense data. | GAO-19-336SP

Figure 8. Future Programs Implementation Plans. Source: GAO (2019).

3. GAO Assessment (FY 2020): "Drive to Deliver Capabilities Faster Increases Importance of Program Knowledge and Consistent Data for Oversight"

In June of 2020, the GAO published their 18th annual assessment of DOD's weapon programs. The report analyzes ninety-three MDAP programs just as years past had, but also "expands to include selected major IT systems and rapid prototyping and rapid fielding programs, in response to a provision in the National Defense Authorization Act for Fiscal Year 2019," which adds an additional $34.6B worth of program reviews to the existing $1823.8B in MDAPs reviewed, (GAO, 2020). As shown in Figure 9, that's also an additional 28 programs examined outside of the usual MDAPs.

Department of Defense Planned Investments in Selected Acquisition Programs GAO Reviewed (Fiscal Year 2020 Dollars in Billions)

Type of program	Number of programs reviewed	Total investment
Major defense acquisition programs (current and future)	93	$1823.8
Major information technology programs	15	$15.1
Middle-tier acquisition programs	13	$19.5
Total	**121**	**$1858.4**

Source: GAO analysis of Department of Defense data. | GAO-20-439

Figure 9. MDAPs, IT Programs, and MTAs Reviewed. Source: GAO (2020).

In keeping with the report's title and expansion of program review, observations on the 2020 report found:

1. **Milestone prerequisite knowledge unmet** - In most programs, "non-quantity-related cost growth and schedule growth" has leveled, but many programs "continue to proceed with limited knowledge and inconsistent software development approaches and cybersecurity practices," (GAO, 2020). Performance differences between the two types of programs are shown in Figure 10.

Statistically Significant Knowledge-Based Acquisition Practices and Their Corresponding Unit Cost and Schedule Outcomes

Knowledge practice	Programs that implemented the practice	Programs that did not implement the practice	Net performance difference
Complete a system-level preliminary design review prior to system development	• -13.1% unit cost growth • 11.6% schedule growth	• 33.6% unit cost growth • 46.3% schedule growth	• 46.7% less unit cost growth • 34.7% less schedule growth
Release at least 90 percent of design drawings by critical design review	• -5.5% unit cost growth • 10.3% schedule growth	• 45.1% unit cost growth • 50.3% schedule growth	• 50.6% less unit cost growth • 40.0% less schedule growth
Test a system-level integrated prototype by critical design review	• 13.3% schedule growth	• 43.2% schedule growth	• 29.9% less schedule growth

Source: GAO analysis of Department of Defense data. | GAO-20-439

Figure 10. Knowledge-Based Acquisition Practices. Source: GAO (2020).

2. **MTA programs lack standardized reporting and metrics** - For the relatively new MTA programs, the average fielding time of 3.8 years does fall within the intended 2–5 year timeline, and definitively exceeds the average of over 10 years for scheduled capability delivery of MDAPs, but the new modality is also subject to "inconsistent cost reporting and wide variation in schedule metrics across MTA programs, which pose oversight challenges for Office of the Secretary of Defense and military department leaders trying to assess performance of these programs," (GAO, 2020). The business case inconsistencies are shown in Figure 11.

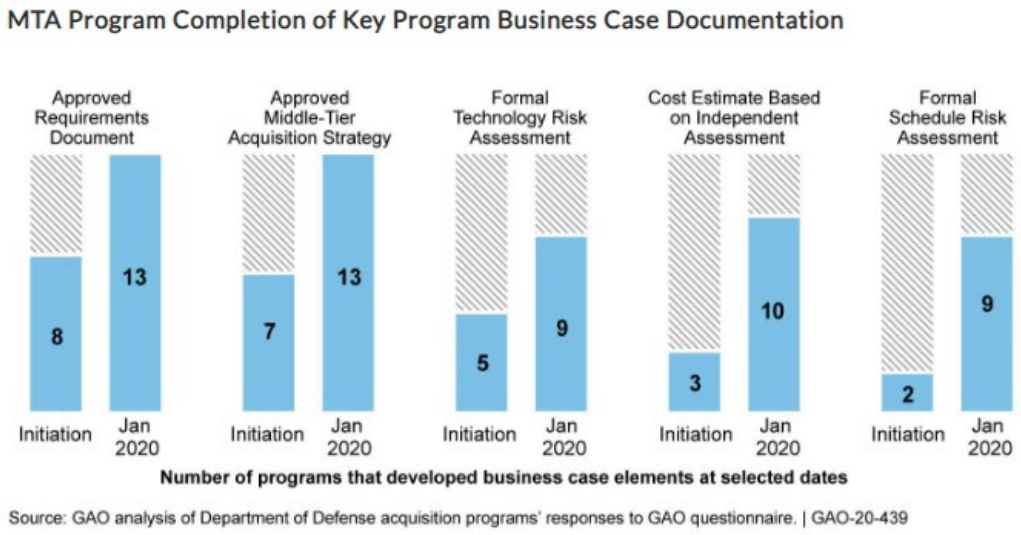


Figure 11. MTA Business Case Documentation Completion. Source: GAO (2020).

3. **Schedule creep continues** - Program cycle times remain without improvement from the past year, as seen in Figure 12, having grown "by an average of 29 percent from first full estimates to current estimates, resulting in an average capability delivery delay of more than 2 years," (GAO, 2020). Certainly, this is a substantial increase even from the FY18 GAO report, with timelines increasing by an average of over 5 months per program.

Table 12: Schedule Changes since First Full Estimate for 80 Selected Major Defense Acquisition Programs in the Department of Defense's 2019 Portfolio in Months

	Identified in programs' first full estimates	Reported by programs in 2019	Cycle time change since first full estimate	Cycle time percentage change since first full estimate
Estimated average cycle time to deliver initial capabilities	93.0	120.2	27.2	29.2

Source: GAO analysis of Department of Defense (DOD) data. | GAO-20-439

Figure 12. Schedule Changes in MDAPs. Source: GAO (2020).

Although the key problems identified by GAO did not appreciably change from previous years, the report acknowledges congressional actions to include the National Defense Authorization Act for Fiscal Year 2020 requiring additional reporting on cyber defense actions, MTAs above certain thresholds, and test and evaluation strategies (GAO, 2020). But MTAs are specifically designed to streamline fielding programs, so the additional administrative requirements ladled onto them makes them less effective, even as their increased and standardized reporting and metrics make oversight less complex and more certain. So too, further administrative requirements have historically increased MDAP schedule creep, but may serve to mitigate the GAO acknowledged problem of programs proceeding into the next milestone or concurrent milestones with limited knowledge and inconsistencies in software development and cybersecurity.

Herein lies the largest conundrum in contracting, the balance between accountability and agility. As the report claims, "[i]n the NDAAs for recent fiscal years, Congress included numerous reforms related to MDAPs that could help to streamline acquisition oversight and field capabilities faster," (GAO, 2020). Yet, the average fielding time for MDAPs and their related capabilities is rising and not falling, calling into question whether identified acquisitions problems are being addressed.

D. AGGREGATE CATEGORIES

In the framework of our research, the five aggregate categories are those which summarize the themes noted in the literature review process to have the greatest impact on the acquisition process. Our research identified five key categories: (1) Efficiency and Effectiveness, (2) Speed, (3) Budget and Funding, (4) Knowledge, and (5) Culture. These key categories should be addressed in current and future acquisition reforms to improve the acquisition process.

To best analyze data in support of our research questions, we first used the literature available—with particular consideration for the annual GAO weapons assessment reports—to determine which major problems had been identified by the acquisition's workforce itself and watchdog organizations over the past several years. Then, we utilized that same classification process within NDAA actions to determine whether and which

identified problems were in fact addressed by congressional reforms and with what frequency.

1. Efficiency and Effectiveness

a. Scheduling

In defense acquisition, scheduling is simply defined as the act of developing a schedule comprised of a series of tasks that need to be accomplished in a specific order within a certain period of time. These tasks serve to achieve a common goal within a program or project. Additionally, scheduling is one of the three primary tasks of program management, with the other two being cost and performance.

The DOD recognizes the importance of managing schedules and reducing schedule slippage but has not been consistently successful in this area. One of the biggest issues identified is that the DOD has routinely set unrealistic program schedules, which cause a variety of problems that can create a snowball effect (Light et al., 2018). First, extending development or production activities over longer periods than planned creates significant growth within the program. Second, when schedule slippage occurs, program funds often will need to be restructured, which contributes to budget turmoil and uncertainty. Lastly, schedule delays within the acquisition process result in late delivery of critical capabilities to the warfighter. This requires deployed forces to use outdated, less capable, and often more costly-to-maintain assets longer than initially planned, which reduces our military's overall capability and effectiveness (Light et al., 2018).

As previously discussed, the DOD's F-35 program is a prime example of a program that has experienced significant cost overruns and schedule slippages. Not only were the schedule slippages a major issue within the program itself, but also caused significant problems for the DOD's aircraft forces in both the U.S. and overseas. Capability gaps, more time for competitors to develop surpassing aircraft technology, and costs associated with extending the life of legacy aircraft are all major impacts associated with the programs schedule slippages (Franck et al., 2018, p.483).

If we continue to fail to understand the "how" and "why" cost overruns and schedule slippages occur in major defense acquisition programs, we will continue to fall

behind our adversaries, who are rapidly and more effectively developing and acquiring technological advancements.

b. Risk aversion

"Risk aversion" can be best defined as choosing the path of least uncertainty over the path with the best value. Despite decades of training and study, the Acquisition Workforce as a whole remains largely risk averse and unlikely to see risk or uncertainty as potentially beneficial in the way that industry must. As a result, the DOD as a whole routinely stagnates and loses opportunities for technological innovation and process improvement.

In his 2010 article, *Embracing uncertainty in DOD acquisition*, Senior Advisor to the Defense Intelligence Agency (DIA) Acquisition Executive David Frick, USA (Ret) acknowledges the DOD's history of risk aversion. He states that "decision makers will routinely forego potential rewards to reduce even the perception of failure... I believe, [as] a consequence of a zero defects culture that is incapable of embracing 'honest failure' as a medium for creating knowledge." (Frick, 2010.) So long as the DOD maintains the mindset of eschewing failure rather than accepting risk for the potential of greater success, any forward momentum in efficiency and effectiveness will remain difficult to impossible to achieve.

Importantly, a contradictory minority opinion exists that openly claims that the DOD assumes too much risk in modern contracting techniques, especially Other Transaction Authority and general contracting methods that function outside the confines of the FAR and many restricting acts such as CICA or the Bayh-Dole Act. In his 2017 article, *'Other transactions' are government contracts, and why it matters*, George Washington University Law Professor and Arnold & Palmer Government Contracts & National Security practice group associate Nathaniel Castellano argues that without not only the "CAS and the FAR, but essentially all of the standard clauses that agencies rely on to allocate risk and resolve disputes," the DOD takes on a potentially much higher and less mitigatable level of risk (Castellano, 2017). So even as contracting reforms are

attempted to reward stepping beyond the traditional DOD risk aversion, success can be mixed when at odds with current processes or standard accountability.

2. Speed

When discussing "speed" in terms of acquisitions, usually the most important benchmark is the time taken between requirements definition and the actual fielding of a product or service to be used by the warfighter. The speed with which the defense industrial base can supply the warfighter with the new weapon and information systems necessary to be an effective lethal force is imperative to meeting military goals. As shown earlier, however, GAO demonstrated that MDAP fielding has reached a high of over ten years on average for scheduled delivery to the warfighter, so speed is certainly an area in which the Acquisition Workforce can show improvement (GAO, 2020).

While seemingly an independent attribute, speed is actually closely interrelated with many other Acquisition Workforce capabilities. In their paper, *Accelerating defense acquisition: Faster acquisitions produce a stronger force*, presented to the 2019 Naval Postgraduate School Sixteenth Annual Acquisition Research Symposium, Massachusetts Institute of Technology Research Corporation (MITRE) Senior Defense Capability Accelerator Peter Modigliani and Principal Systems Engineer Peter Ward both agree that "[a]ccelerating deliveries starts with leadership creating a culture of speed, agility, and innovation to deliver capabilities to users for mission success," (Modigliani & Ward, 2019, p. 557). Although they also recognized the impact of scope and requirements, system design, documentation and reviews, and contracting generally, a foundational culture valuing the importance of speed and taking conscious action to enable speed in programs was listed first among those factors that allowed for successful acceleration of defense programs.

Since speed is fairly universally lauded as immensely important to a military trying to retain its cutting edge in the modern world, the common stumbling blocks preventing speed in most DOD acquisitions programs are worth examining. In his 2019 thesis, *Integrating immature systems and program schedule growth*, John Kamp concludes that "[p]rogram managers can make early programmatic decisions and work with the external

requirements and resource processes to increase their likelihood of delivering product on schedule" dependent on timely and effective feedback for that decision making (Kamp, 2019.) However, the fielding time for MDAPs remain high, and technologically advanced MDAPs are now the norm, but MTAs average fielding in 3.8 years. Part of that difference in speed is doubtlessly driven by which programs are chosen to be MTAs, but it is worth noting that—despite reforms to increase speed for traditional acquisitions—MDAP average time to fielding continues in a rising trend.

3. Budget / Funding

There is finally a common goal in the acquisitions process that everyone can agree on: reduce cost. Unfortunately, it's not that easy. Defense spending is in decline and the pace of advancement is rendering old technology useless at a pace that has never been encountered in history. Procurement spending was at a high point in 2008 at $165.7 billion. Since then, it has fallen nearly 58%, with research and development taking a large hit (Weisgerber, 2014). Still, the DOD has continued to ask Congress to approve more funding every year to acquire weapons and technology. In short, competition for funding within DOD is high, and so is the need to make acquisitions faster and cheaper.

The budget process has remained largely unchanged since 2003, the same year Android and Tesla were founded. But, unlike those innovative tech companies, the process has not been evolving and adapting over the past two decades. The current DOD process for allocating resources—Planning, Programming, Budget, and Execution (PPBE)—presents challenges when acquiring modern weapons and systems for the modern-day warfighter.

The PPBE process is calendar driven and designed to allocate DOD resources. The first step is Planning, which begins after the National Security Strategy (NSS) is issued. The National strategies presented drive the approach for the Under Secretary of Defense for Policy (USD-P) with input from the Chairman of the Joint Chiefs of Staff (CJCS) to produce the final document, the Defense Planning Guidance (DPG). The second step, Programming, is owned by the Office of the Secretary of Defense Cost Assessment and Program Evaluation (OSD-CAPE) and allocated resources to the Military Departments and

Defense Agencies. Each DOD component develops a Program Objective Memorandum (POM), which gives a complete proposal for programs and allocation of resources outlined out for the next five years.

The third step, Budgeting is owned by the Under Secretary of Defense Comptroller (USD-C), see Figure 13. During this phase, the components prepare their Budget Estimation Submissions (BES), which are evaluated for (1) use of the correct funding for appropriation category, (2) appropriate pricing for the requirement, (3) phasing of the work, and (4) efficiency (Defense Acquisition University [DAU], n.d.). The SECDEF approves the Program Budget Decisions (PBDs) before it is added to the President's Budget. The final phase is the Execution Review, which reviews how much of the budget has been obligated and paid, and how well it matches up with the planned spending.

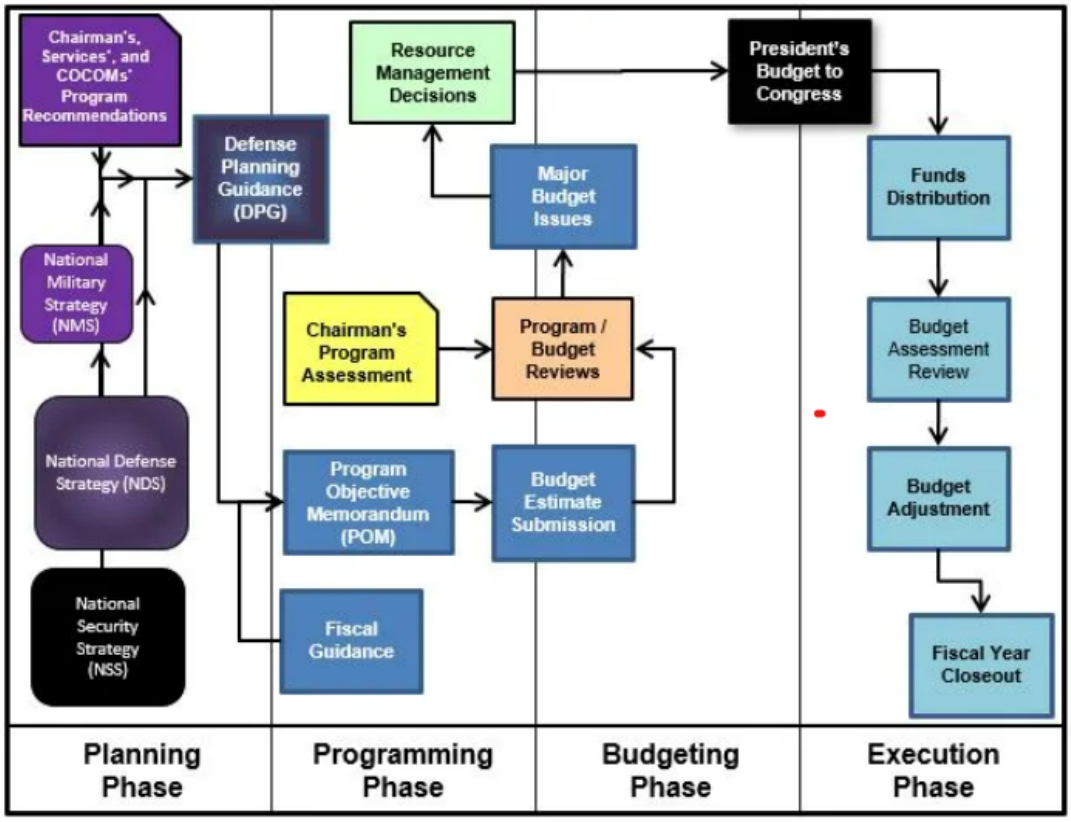


Figure 13. PPBE Process Overview. Source: AcqNotes (2022).

Furthermore, Capitol Hill's late budgeting plays a role. Year after year, congressional budgets are not passed on time, causing the organization to go into each new Fiscal Year under a Continuing Resolution. This period allows for the government to continue running but delays the consideration of any new programs ad prohibits increased production rates and multi-year procurements. This stopgap greatly effects the acquisition of new technology as it inhibits efficiency, creates delays and missed opportunities, and brings programmatic risks.

The PPBE process claims to have flexibility for change, however, budgets are developed for the following five years. Funding for specific programs gets locked in for long periods of time and creates incredible hurdles to reallocating those funds when priorities change. While the commercial sector and China are setting the pace, the Congressional budgeting process lacks organizational responsiveness. The goal is to allocate funding based on strategic objectives and national strategy, yet the rigid bureaucratic process fails because it is so inflexible and difficult to quickly shift funding to emerging requirements. Defense Planners have to make programmatic decisions more than two years in advance, and there is no easy way to terminate and re-allocate funding that has been assigned to a specific effort towards an emerging requirement or innovative solution.

The lack of flexibility and discretionary spending make the PPBE process ill-equipped to support the warfighter. The military is a dynamic and mobile environment that is difficult to pair with a standardized and strict budgeting process. Still, operational requirements are easier to justify than training and education. Educational requirements are difficult to quantify and may cause budget officials to be hesitant to approve these initiatives without a definable return on investment. (Kenning, 2021).

Notable recommendations have been made to reform the budgeting and reallocation processes, even in terms of improving the speed and augmenting the value of decision making. For example, in his 2020 article, *Risk-based ROI, capital budgeting, and portfolio optimization in the DOD*, Naval Postgraduate School Research Professor, Jonathan Mun, puts forth a "reusable, extensible, adaptable, and comprehensive advanced analytical modeling process to help the U.S. Department of Defense (DOD) with risk based capital

budgeting and optimizing of acquisition and program portfolios with multiple stakeholders while subject to budgetary, risk, schedule, and strategic constraints," (Mun, 2020). Although admittedly in need of further development and more test cases, modern methodologies like Mun's have the potential to alleviate many of the administrative budgetary challenges facing the DOD.

4. Knowledge

The term "knowledge" refers holistically to the training and capabilities of the Acquisition Workforce and to the ability and consistency of that workforce in applying knowledge-based practices. A natural opposite, "knowledge gap" refers to the Acquisition Workforce itself lacking specific and sufficient subject matter experts to effectively perform their duties in acquisitions and contracting to the best possible standard. That is not to disparage the professionalism or experience of members of the workforce itself, but rather to acknowledge the need to more consciously shape the workforce to meet the challenges that the acquisition world faces today and in the future.

In their paper *Understanding Defense Acquisition Workforce Challenges* presented to the 2017 Naval Postgraduate School Fourteenth Annual Acquisition Research Symposium, Massachusetts Institute of Technology Research Corporation (MITRE) Contract Analysts Colleen Murphy and Adam Bouffard analyze workforce challenges to include knowledge gaps that prevent the agility and innovation desired of the Acquisition Workforce. They conclude that, "[t]o achieve the success metrics established by DOD leadership, the DOD must make fundamental changes at the workforce level. The workforce needs modern tools to maneuver through the acquisition system and fill the gaps left by the retiring experienced personnel," (Bouffard, 2017).

With a chart created by USD[AT&L] office itself, it was demonstrated that the workforce is not only smaller than in previous years, but also substantially more junior in terms of years of experience (see Figure 14). Coupled with the ever more complex evolution of the acquisitions field, those knowledge gaps are significant hurdles to success (Bouffard, 2017).

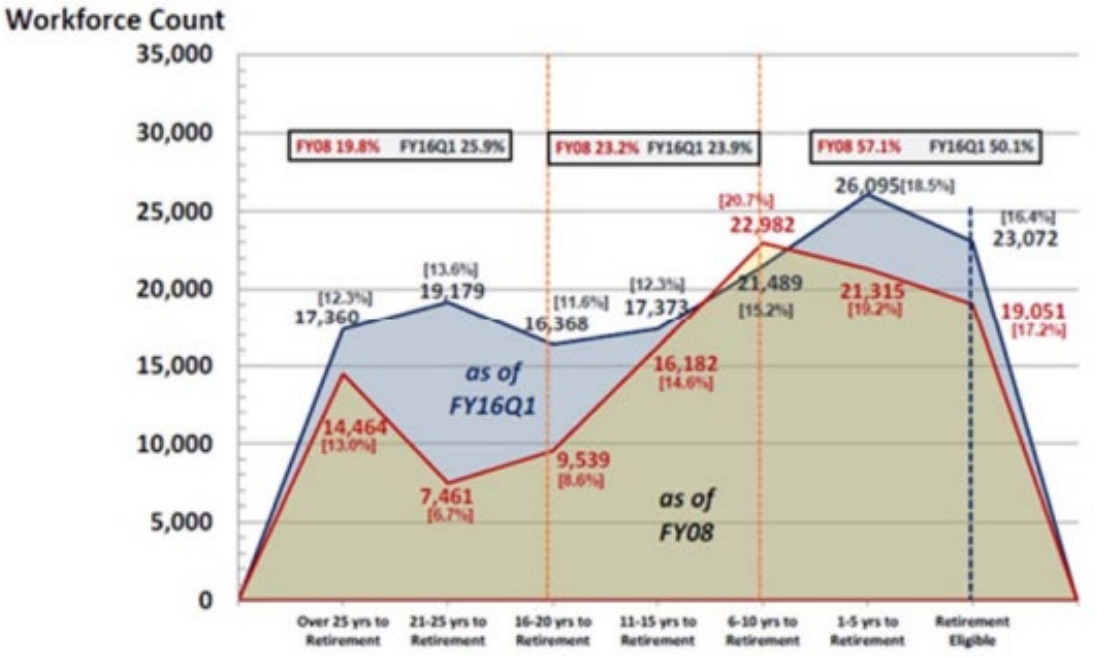


Figure 2. Civilian Acquisition Workforce Demographics (FY 2008–2016Q1)
(USD[AT&L], 2016)

Figure 14. Smaller and Less Experienced Civilian Workforce. Source: Bouffard (2017).

Reasons for the lack of efficient DOD general application of best practices range from simple failure in the form of incomplete process implementation to chronic shortages of software and cybersecurity subject matter experts among our service members and even among DOD civilians and contractors as a whole. Importantly, this shortage was predicted well in advance, with the declaration that the "projected 2020 workforce of 135,000 developers would be less than half of the 290,000 developers required to write and maintain all of the code desired up to that point" (Tate, 2019).

Further, the problem of knowledge gaps becomes key to reinforcing other chronic problems within acquisitions. For example, in his 2022 article *Can we explain cost growth in Major Defense Acquisitions Programs?* former director of the Cost Analysis and Research Division of the Institute for Defense Analyses, David McNichol, postulates that the Acquisition Workforce lacks the requisite knowledge to confidently identify the complex causes of cost growth in MDAPs. That knowledge is essential "because an

explanation of the proximate causes of cost growth due to Errors of Inception provides a foundation for recommendations for changes in acquisition regulations and policies" (McNichol, 2022). Reforms are still implemented within areas of knowledge gaps, but successful improvements to cost, schedule, or performance are far less frequent or likely.

5. Culture

Organizational culture can be simply explained as a collection of values, behaviors, practices, and expectations that guide and inform the actions of all team members. Despite the recent spotlight on cultural change within acquisition reforms, most acquisition professionals agree that they have not been wholly successful, and that an overhaul of ingrained behaviors must occur across all levels within defense acquisition. Despite congressional legislation, program managers are still trained to maintain steady execution with a risk-averse approach. Fear of failure still prevents the innovation and change needed in product development of advanced solutions. Acquisition reform has yet to launch the DOD into a learning organization with a culture accepting and encouraging calculated risks over simple compliance to artificial rewards and consequences.

In 2020, the Adaptive Acquisition Framework was released, which aims to address these culture issues within defense acquisition. This initiative gives momentum and provides the opportunity for significant culture change. One of the key elements of the framework is to "empower and enable PMs with the broad authority to plan and manage their programs" (Schultz, 2021). DOD Instruction 5000.02, Operation of the AAF, instructs PMs to "employ a thoughtful, innovative, and disciplined approach to program management" and recognizes that the acquisition system is in desperate need of a culture of change. Although the turnover rates for PMs are frequent, they must embrace the culture change and take actions to move away from legacy cultures that they likely inherited in their program office (Schultz, 2021).

In the Defense Acquisition University article, "Please Change the Acquisition Culture!," the author's research shows that "poor communication, unclear roles and responsibilities, too many layers of management, excessive micro-management, lack of trust, and lack of empowerment" are common areas within defense acquisition that

desperately need improvement (Schultz, 2021). He goes on to explain that leaders must understand what behaviors need to be ingrained and reinforced within their organizations to ensure their efforts in culture change are effective. This requires leaders to view their organizations through a critical lens and ask themselves some hard questions, which is often difficult for one to do.

Changing the defense acquisition culture, which has been in existence for decades will not be an easy task. Many researchers have expressed that "changing the culture is the most difficult challenge in bringing about real change in acquisition" (Schultz, 2021). Acquisition leaders at all levels must set and reinforce the standard, and lead by example. Additionally, Schultz explains that acquisition leaders need to be consistent in enforcing the "desired behaviors" and not return to "old, familiar" behaviors. Although recent acquisition reforms have started to address the need for culture change, there is not a lot of data to prove that they are having a positive impact within defense acquisition.

III. OBSERVATIONS

The data gathered uncovered specific categories that acquisitions reforms should be addressing in order to improve the Acquisitions Process. The number of instances of occurrence in reforms in each of the NDAAs was recorded to determine if the category is being addressed and with what relative frequency. Five major categories (as shown in Table 1) make up the issues with the Acquisitions process that were exposed from the Literature review. Those categories are: Efficiency and Effectiveness, Speed, Budget and Funding, Knowledge, and Culture.

Table 1. Five Aggregate Categories and Nineteen Subcategories

#	Subcategory	Aggregate Category
1	Development	Efficiency and Effectiveness
2	Agility	
3	Performance	
4	Reviews Process	Speed
5	Delivery	
6	Fielding Time	
7	Critical Technologies	
8	Cost Overruns	Budget and Funding
9	Inflexibility	
10	Delays	
11	Responsiveness	
12	Training	Knowledge
13	New Capabilities	
14	Acquisition Workforce	
15	Knowledge-Based Practices	
16	Risk Aversion	Culture
17	Success Metrics	
18	Organizational Values	
19	Decision Making	

A. DATA COLLECTED

On examining the three latest NDAAs through the lens of acquisitions issues addressed and by utilizing the five categories determined from the literature review and the GAO Weapon Systems Annual Assessment and Report to Congressional Committees, we determined that the reforms therein could be accounted as shown in Table 2. Notably, many reforms affected multiple categories and were therefore counted multiple times. Similarly, many reforms did not fall into any of the issue categories determined from the literature review and the GAO Weapon Systems Annual Assessment and Report to Congressional Committees. Those instances will be discussed in greater depth in Chapter 4.

Table 2. Frequency of Aggregate Categories and Subcategories

		Development	Agility	Performance	Reviews Process	Delivery	Fielding Time	Critical Technology	Cost Overruns	Inflexibility	Delays	Responsiveness	Training	New Capabilities	Acquisition Workforce	Knowledge-Based Practices	Risk Aversion	Success Metrics	Organizational Values	Decision Making
FY20	Total aggregate Category	8			25				12				20				2			
	Total Subcategory	2	3	3	11	2	7	5	4	2	3	3	5	4	11	0	0			2
FY21	Total aggregate Category	10			10				5				10				4			
	Total Subcategory	2	4	4	2	3	2	3	3	1	0	1	4	3	3	0	0			4
FY22	Total aggregate Category	11			7				11				6				3			
	Total Subcategory	4	6	1	2	1	3	1	1	6	3	1	1	0	3	2	2			1
All	Total of aggregate Categories	29			42				28				36				9			
	Total of Subcategories	8	13	8	15	6	12	9	8	9	6	5	10	7	17	2	2	0	0	7

This aggregated data of how frequently the five categories are addressed is also depicted visually in Figure 15.

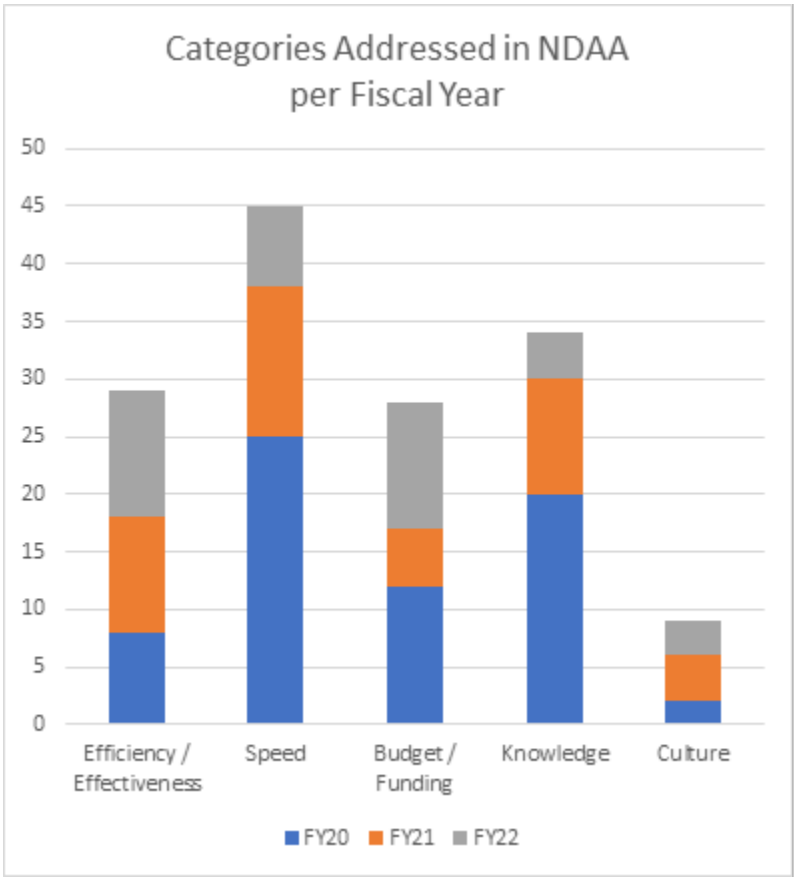


Figure 15. Frequency of Categories Addressed in NDAA by Fiscal Year

B. EFFICIENCY AND EFFECTIVENESS

The definitions in the following definitions tables show the relationship of the subcategories to the aggregate categories, starting with the relationship between aggregate category Efficiency and Effectiveness and its subcategories of Development, Agility, and Performance (Table 3).

Table 3. Efficiency / Effectiveness

Efficiency / Effectiveness	Development	"Defense acquisition—broadly defined—consists of three intersecting processes: the Joint Capabilities Integration and Development System (JCIDS) process, the Planning, Programming, Budgeting, and Execution (PPBE) process, and the Department of Defense (DOD) Directive 5000.1 acquisition process. The JCIDS process articulates and validates joint warfighting requirements" (Dwyer et al., 2020).
	Agility	"Agile acquisition is not a process; it is an innovative way of thinking to break down barriers and work with stakeholders to determine the most flexible, advantageous and cost-effective solution to a problem set" (Robinson, 2020).
	Performance	"Tracking the performance of [programs] helps provide decision makers in the department and in Congress insight into the extent to which DOD is achieving its overall goals of delivering, among other things, timely, affordable capabilities to the warfighter" (Oakley, 2021).

The data reforms in each NDAA by year are then collated by subcategory in the associated graph to follow, starting with aggregate category Efficiency and Effectiveness and its subcategories of Development, Agility, and Performance (Figure 16).

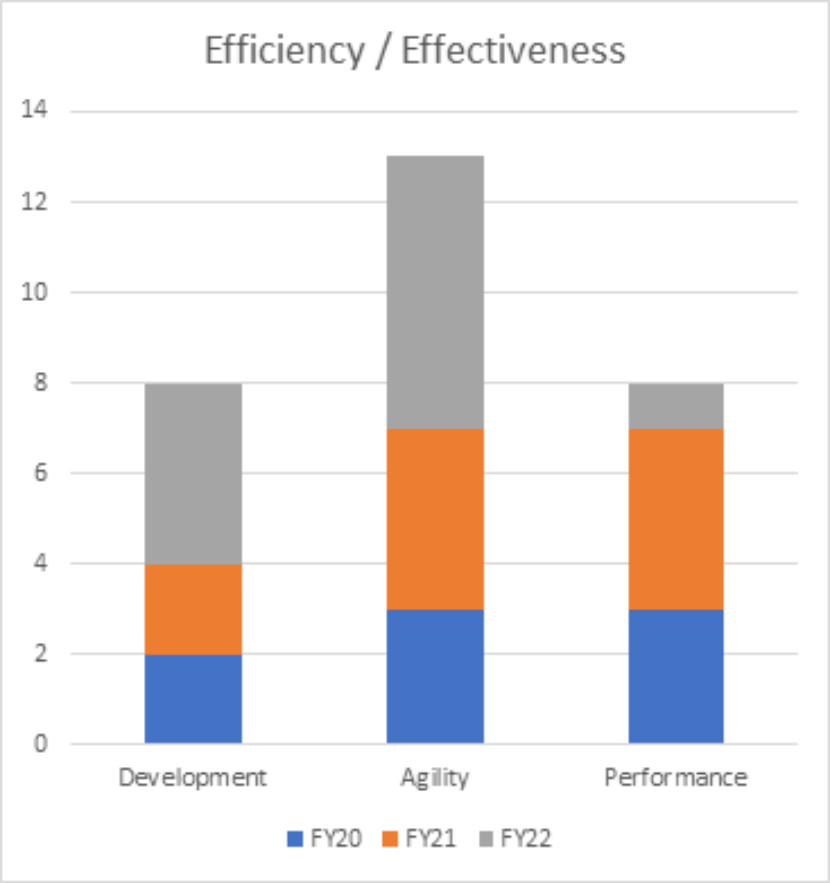


Figure 16. Efficiency / Effectiveness Category

C. SPEED

The Speed definitions table shows the relationship between the aggregate category Speed and its subcategories of Reviews Process, Delivery, Fielding Time, and Critical Technologies (Table 4).

Table 4. Speed

Speed	Reviews Process	"... reviews are predicated on certain development milestones being met. In [the current acquisitions process] these are labeled as the letters A, B, and C. These milestones mandate that certain levels of systems maturity must be achieved and a certain amount of administrative review and systems testing be conducted" (Miller, 2020).
	Delivery	"Deliver performance at the speed of relevance. Success no longer goes to the country that develops a new technology first, but rather to the one that better integrates it and adapts its way of fighting. Current processes are not responsive to need; the Department is over-optimized for exceptional performance at the expense of providing timely decisions, policies, and capabilities to the warfighter" (Department of Defense, 2018).
	Fielding Time	"In spite of these recommendations, many DOD acquisition programs still experience significant technical, cost, and schedule problems with respect to system development and fielding... Because of rapid changes in the threat, mission, and technological environments, a system may be ineffective in meeting mission needs or be deemed obsolete once it is fielded" (Coble et al., 2014).
	Critical Technologies	"Critical technologies—such as elements of artificial intelligence and biotechnology—are those necessary to maintain U.S. technological superiority. As such, they are frequently the target of theft, espionage, and illegal export by adversaries" (GAO, 2021.

The Speed data reforms graph shows the frequency of address via NDAA reform for the aggregate category Speed and its subcategories of Reviews Process, Delivery, Fielding Time, and Critical Technologies (Figure 17).

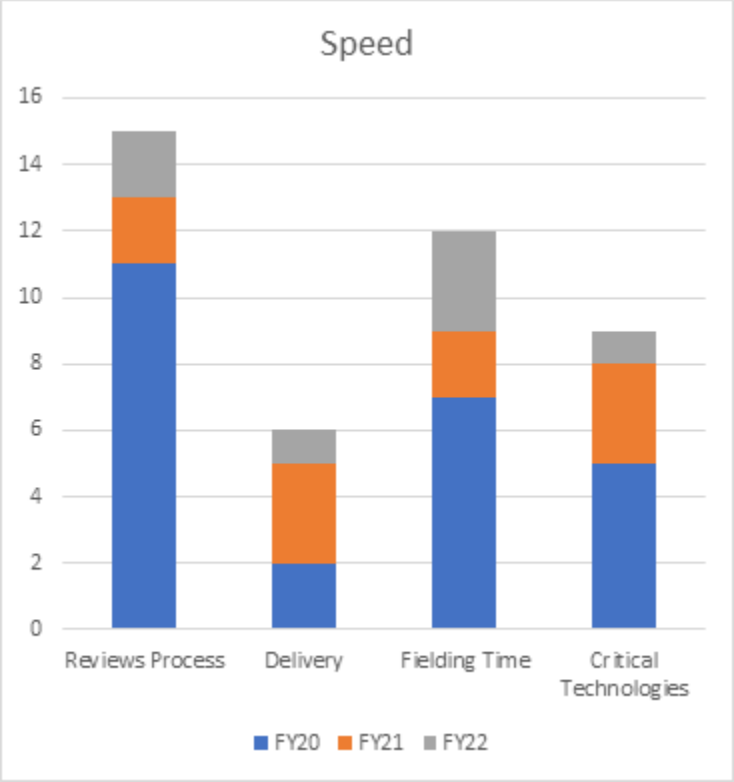


Figure 17. Speed Category

D. BUDGET AND FUNDING

The Budget and Funding definitions table shows the relationship between the aggregate category Budget and Funding and its subcategories of Cost Overruns, Inflexibility, Delays, and Responsiveness (Table 5).

Table 5. Budget / Funding

Budget / Funding	Cost Overruns	"Other examples of issues requiring reprogramming include incorrect cost estimates, wage-rate price adjustments where actual cost exceeds the budget's requested funding requested, and foreign currency fluctuations. Cost estimations are primarily based on historical data. In some cases, cost estimators are asked to come up with estimates based on one-of-a-kind major end items. These costs can increase rapidly, impacting current and future budget submissions" (Fritsch et al., 2020).
	Inflexibility	"The DOD uses the Planning, Programming, Budgeting, and Execution (PPBE) system to formulate and execute the defense budget. PPBE is a calendar driven process used by organizations that must be responsive to real-time unfolding events (Candreva, 2017, p. 169). While the DOD finalizes budgets up to two years in advance, this process is being continually modified due to events external to the DOD, whose new developments often require an immediate defense response" (Fritsch et al., 2020; Candreva, 2017).
	Delays	"Congressional authorization is scheduled to be given on October 1st each year but is routinely delayed due to disagreements on what should be funded and in what amount. When this timeframe exists between the beginning of the fiscal year and when the new appropriations are approved, the prior year's funding is maintained under a continuing resolution, but with restrictions. Continuing resolutions are a hindrance because it prohibits the DOD from entering into new acquisition contracts and increasing funding levels from the prior year's appropriated amounts. This causes a delay in each service's ability to take corrective measures addressing defense capability gaps identified in the current year's budget submission" (Fritsch et al., 2020).

	Responsiveness	"Current acquisition processes and strategies often result in the delivery of warfighter tools, whether aircraft, ships, weapons, or submarines, that do not meet current mission needs or usability standards. A causal factor is the lack of integration of end-users with the designers and developers throughout the acquisition process" (Bryan & Chin, 2021).

The Budget and Funding data reforms graph shows the frequency of address via NDAA reform for the aggregate category Budget and Funding and its subcategories of Cost Overruns, Inflexibility, Delays, and Responsiveness (Figure 18).

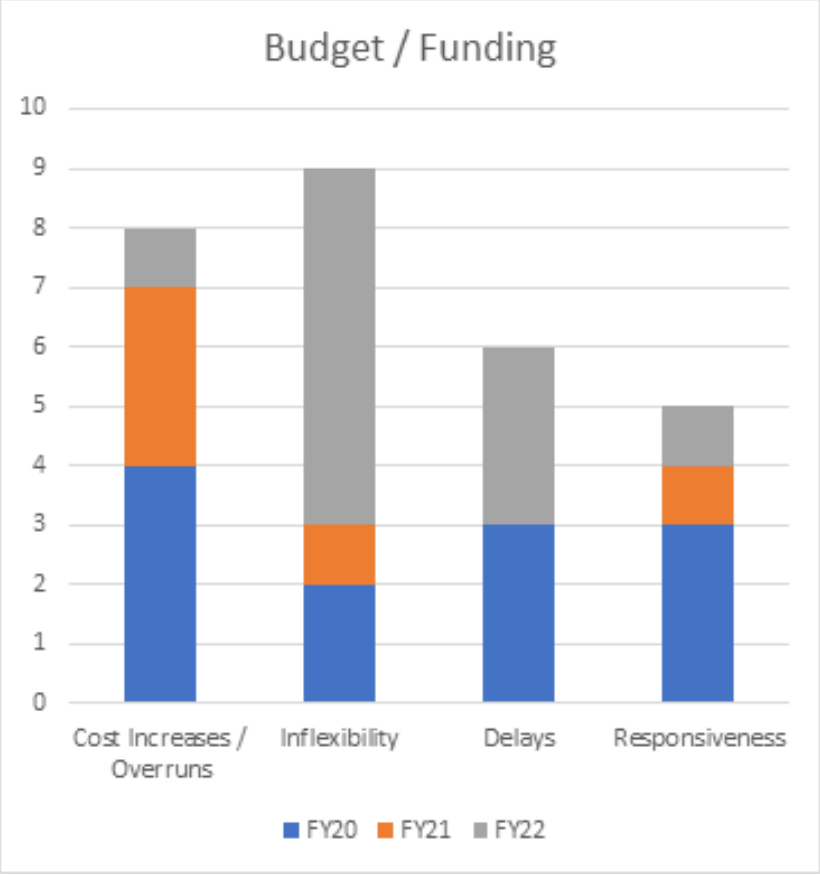


Figure 18. Budget / Funding Category

E. KNOWLEDGE

The Knowledge definitions table shows the relationship between the aggregate category Knowledge and its subcategories of Training, New Capabilities, Acquisition Workforce, and Knowledge-Based Practices (Table 6).

Table 6. Knowledge

Knowledge	Training	"Historically, training is the key to tactically fighting wars and maintaining effectiveness, retention, and promoting innovation in the ranks. Training improves a warfighter's operational performance and helps build knowledge to contribute to future developments" (Bryan & Chin, 2021).
	New Capabilities	"Our technological superiority is at risk, and we must respond... The combination of cutting-edge, strategic and increasing investments made by potential adversaries, coupled with our own budgetary stress and global commitments, are causes for alarm. We need to do everything we can to maximize the return on all our investments in new capability, wherever those iRonvestments are made" (Bryan & Chin, 2021).
	Acquisition Workforce	"In Preventing Fraud and Mismanagement in Government: Systems and Structures, Petrucelli and Peters (2016) stated a high level of internal controls, adequate training and staffing, formalized and documented procedures, and effective communication are required of a successful decentralization structure" (Kendall, 2017).
	Knowledge-Based Practices	"Acquisition leaders have a track record of too readily ignoring a lack of 'program knowledge' and forging ahead optimistically, hoping that missing knowledge will somehow materialize when necessary. Ignoring knowledge points appears misguided, however; the defense acquisition landscape is littered with programs that did not have sufficient 'knowledge' to support success at the next acquisition step but were authorized to move forward anyway" (Boudreau, 2017).

The Knowledge data reforms graph shows the frequency of address via NDAA reform for the aggregate category Knowledge and its subcategories of Training, New Capabilities, Acquisition Workforce, and Knowledge-Based Practices (Figure 19).

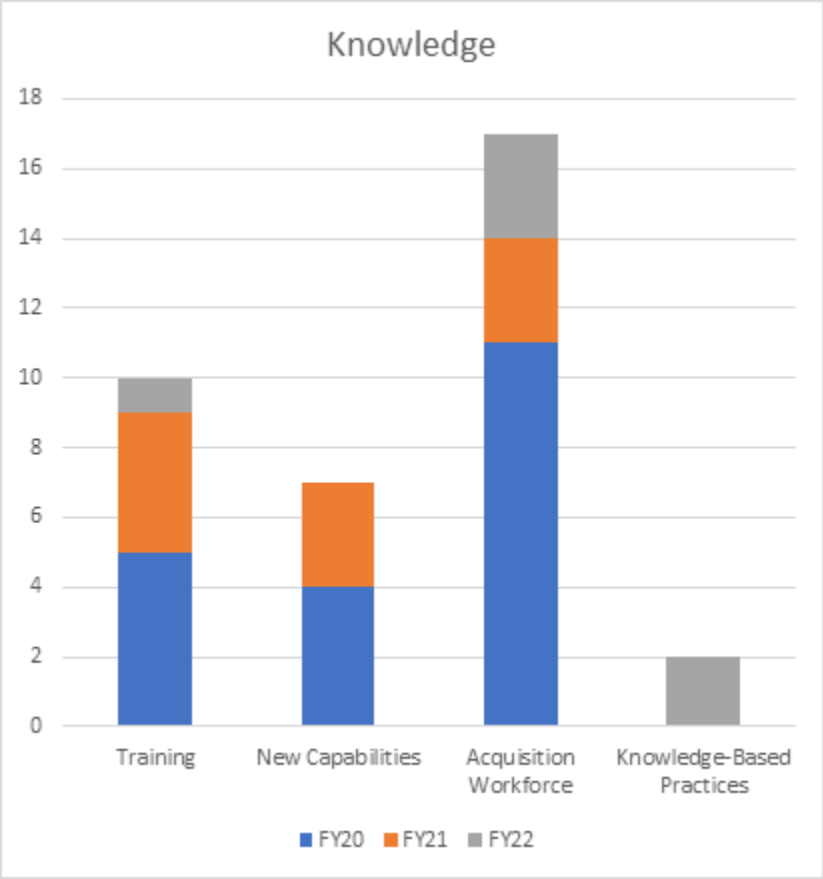


Figure 19. Knowledge Category

F. CULTURE

The Culture definitions table shows the relationship between the aggregate category Culture and its subcategories of Risk Aversion, Success Metrics, Organizational Values, and Decision Making (Table 6).

Table 7. Culture

Culture	Risk Aversion	"Leaders will have to release control, lessen policies, and empower subordinate teams and stakeholders. Teams will have to take ownership, collaborate, 'think outside the box,' and be empowered to take risks, and in some cases fail, in order to succeed" (Robinson, 2020).
	Success Metrics	"Pushing boundaries and taking risks must be rewarded. And finally, the primary goal should not be meeting milestones and staying within budget but providing the most flexible, adaptable, and efficient solution to the warfighter need and requirement" (Robinson, 2020).
	Organizational Values	"Develop and implement an organizational vision that integrates key organizational and program goals, priorities, values, and other factors"(Bryan et al., 2021).
	Decision Making	"..decisions require the decision maker to have a good understanding of the situation, deliberate between different potential solutions and choose among the most 10 satisfactory options"(Donahue et al., 2018).

The Culture data reforms graph shows the frequency of address via NDAA reform for the aggregate category Culture and its subcategories of Risk Aversion, Success Metrics, Organizational Values, and Decision Making (Figure 20).

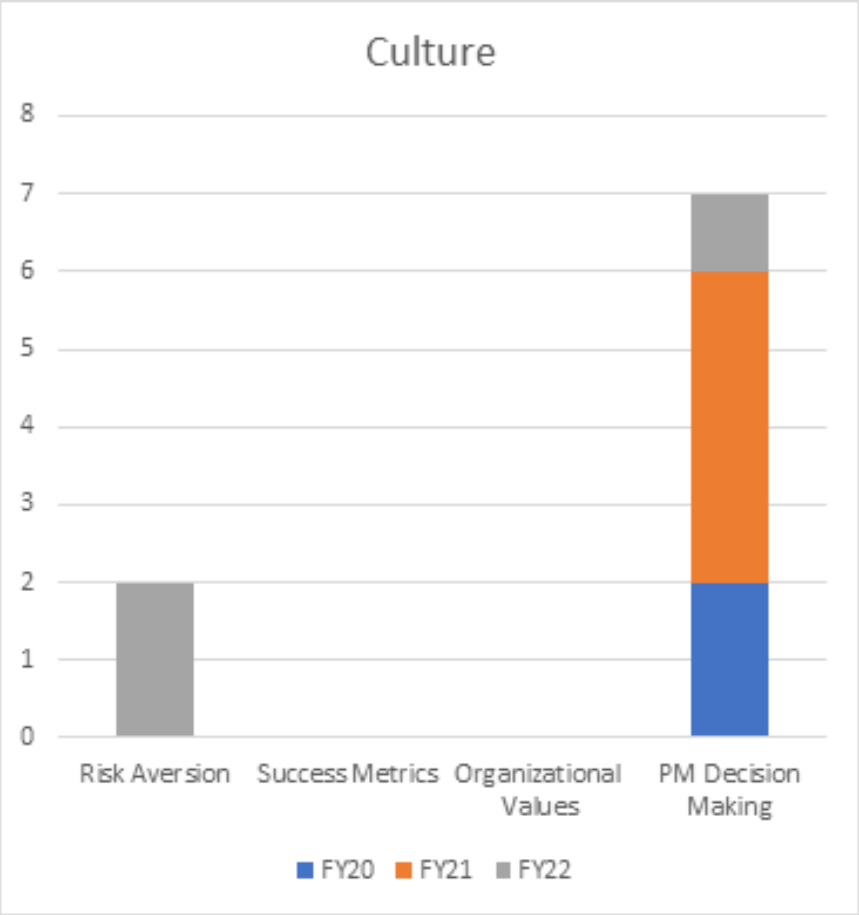


Figure 20. Culture Category

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IV. FINDINGS

Analysis and aggregation of those acquisitions topics addressed in recent NDAAs yielded mixed results to our second research question as to whether recent acquisitions reforms have addressed those issues of speed, efficiency and effectiveness, budget and funding, knowledge, and culture impeding innovation. Certainly, to an extent, many reforms have addressed many of the issues identified in our literature review and by watchdog agencies like the GAO, but debate is possible regarding how fully those issues have been addressed in order to improve DOD Acquisitions Workforce innovation acquisitions and contracting to support the warfighter.

A. ACQUISITION REFORM CATEGORIES BY FREQUENCY

Of the five aggregate categories which are most impeding or facilitating innovation for the Acquisition Workforce as determined by the literature review and delineated in Chapter 3, most were proportionately represented in the reforms produced in the last three consecutive NDAAs occurring in FY2020, FY2021, and FY2022 respectively. In our aggregation and assessment of the addressed innovation problems from those three congressional acts, we found that their acquisition reforms addressed the topically aggregated categories below in the following proportionate order:

1. Sourcing Reforms
2. Non-actionable Reforms
3. Speed Reforms
4. Efficiency and Effectiveness Reforms
5. Budget and Funding Reforms
6. Knowledge Reforms
7. Protest and Appeals Reforms
8. Culture Reforms

1. Sourcing Reforms

Sourcing reforms restrict contracting source options for contractors or resources to best support our national interests. They represent congressional efforts to ensure self-reliance, safeguard national security, and improve economic returns as a nation by reducing reliance on foreign resources, manufacturing, services, and supply chains and by increasing accumulation of our natural resources, small businesses, and industrial base. The nationally beneficial aims of these sourcing requirements are, of course, good and valid goals for Congress to pursue via NDAA, but don't affect the processes and personnel of the Acquisition Workforce beyond which sources and resources are available for contract. For example, in the FY20 NDAA, Congress required the limitation of tungsten use that might reduce our national reserve below a certain predefined level, (National Defense Authorization Act for Fiscal Year 2020 [NDAA], 2019). Further, the additional regulations which restrict suppliers and material sources add extra layers for acquisition professionals to consider and maneuver while procuring complex programs and equipment.

FY20 NDAA: For the FY20 NDAA, most sourcing requirements involved either ensuring national security or bolstering small businesses. National security concerns seemed to center on the defense industrial base and validating the best practices and regulatory requirements of our industry partners, especially in regards to cybersecurity matters with unvetted or foreign contractors. As an example, DOD was directed to "assess the extent to which existing systems of record relevant to risk assessments and contracting are producing, exposing, and timely maintaining valid and reliable data for the purposes of the Department's continuous assessment and mitigation of risks in the defense industrial base" (NDAA, 2019.) Small business concerns, on the other hand, seemed to focus on encouraging expanding the roster of American small business partners providing goods or services for the DOD in an effort to garner for small businesses a greater portion of the economic pie that DOD contracting represents. As an example, the DOD is directed to—within particular programs and initiatives—show "[a] preference under the program for funding small business concerns."

FY21 NDAA: The identified sourcing restrictions in the FY21 NDAA focused significantly on minimizing the reliance on foreign financing, manufacturing, services, and

supply chains. Shipbuilding construction contracts, components of specific naval vessels, and strategic and critical materials needed in the defense industrial base were the key focus of these sourcing restrictions. In instances where the usage of foreign resources were appropriate, conditions were implemented to monitor and provide oversight of DoDs foreign business dealings in major defense acquisition programs. For example, the Navy is directed to disclose any vendor seeking a shipbuilding contract if "any part of the planned contract performance will or is expected to include foreign government subsidized performance, foreign financing, foreign financial guarantees, or foreign tax concessions" (NDAA, 21a). Additionally, the DOD is directed to "acquire strategic and critical materials" for the defense industrial base from sources located within the United States before attempting to procure from alternate sources. These provisions are intended to strengthen national security through management and oversight, while supporting sourcing within the United States.

FY22 NDAA: The FY22 NDAA sourcing reforms highlighted the "Made in America" laws for producing and relying on domestic suppliers and resources. This was mostly presented as a way to build and enhance the domestic industrial base, tackle supply chain issues, and protect strategic industries. These restrictions focused on an overall reduction of U.S. reliance on materials, supplies, and services from North Korea, Iran, Russia, China, and the Xinjiang Uyghur Autonomous Region, but also specifically addressed personal protective equipment, welded shipboard anchors and mooring chains, and printed circuit boards, among others (NDAA, 2021b). The report also focused heavily on transparent reporting about adherence to these provisions, violations, and waivers. Complementing these reforms was a increased focus on small businesses.

2. Non-actionable Reforms

Non-actionable requirements are those that extend current efforts, make clarifying changes, request more information, or direct such targeted surgical action as to not alter conditions or regulations for the Acquisition Workforce. Congressional efforts to make administrative changes—such as adding or removing required reporting, emphasizing existing requirements, or extending deadlines—are all grouped into this category for lack

of effect on other categories. So too are congressional efforts to make even substantive or drastic changes affecting only individual programs. For example, the FY2020 NDAA authorized the reallocation of DDG shipbuilding funding to bolster the Columbia shipbuilding program, which - while a necessary and beneficial change to two specific program budgets which enabled a high priority acquisition—did not produce changes which would affect the greater processes and personnel of the Acquisition Workforce as a whole, (NDAA, 2019).

FY20 NDAA: In the FY20 NDAA, the largest portion of non-actionable reforms were Congress directing the DOD or entities within the DOD to supply them with reports on various topics of concern. Many of those requested reports could potentially apply to one of the five aggregated categories and, taking that logic a step further, many of those reports could eventually be utilized to develop actionable reforms in future NDAAs. Still, none of the standalone reports immediately changed the requirements for the processes or personnel of the Acquisitions Workforce (NDAA, 2019).

FY21 NDAA: As noted within the FY20 NDAA above, the majority of the non-actionable reforms were the addition or modification of various reporting requirements directed by Congress. Additionally, in line with previous years NDAAs, these reports could potentially be beneficial in the development of future acquisition reforms. As it stands with the FY21 NDAA, none of the reports called for an immediate change that would have significant impacts on the current Acquisition Workforce or acquisition process (NDAA, 2021a).

FY22 NDAA: The FY22 NDAA included many non-actionable requirements which were made up of adding reporting requirements, modifying reporting requirements from past reforms, and extending previous deadlines. None of the changes to reporting requirements made any significant changes to acquisition policy. The extensions further indicate that acquisitions reforms are accommodating a slow process rather than creating reforms to speed it up.

3. Speed Reforms

Speed reforms are those that endeavor to reduce the whole time or a portion of the time between the identification of an innovation need and the issuing of that innovation for use by the warfighter. Conversely, these reforms can (and arguably have) negatively affected the duration between identification and issuing as well. Most reforms directly addressing speed, however, have both the stated and intended goal of facilitating the more rapid advancement and application of innovations by the DOD. For example, in the FY20 NDAA, the DOD was directed by Congress to establish in certain pilot programs "frequent, regular interaction between the program office and milestone decision makers, in lieu of documentation reviews, to help expedite the process [of milestone decisions,]" (NDAA, 2019). Other reforms have, arguably, negatively affected the speed of acquisitions.

FY20 NDAA: Within the FY20 NDAA, most of the acquisitions reforms targeting speed involved modifications to the acquisitions process, many of which can appear minor to those unfamiliar with the intimate details of the procedural requirements for acquisitions and contracting per regulations. As a prime example, Congress empowered heads of agencies to "document the results of market research in a manner appropriate to the size and complexity of the acquisition," which can save untold thousands of manhours every fiscal year in draconian documentation of small sums for agencies which award hundreds or more contracts in support of military missions, especially those that involve the increased speed necessary for valuable and successful innovation reaching the warfighter prior to rapidly approaching modern obsolescence (NDAA, 2019).

FY21 NDAA: In the FY21 NDAA, the majority of the provisions that addressed "speed" relate specifically to quickly acquiring innovative technologies and rapid fielding for critical capabilities. Acquiring Space Systems was discussed significantly as it relates to speed of acquisitions. For example, Section 807 of the NDAA directs the SECDEF to "ensure the adaptive acquisition framework includes one or more pathways specifically tailored for Space Systems Acquisition in order to achieve faster acquisition, improve synchronization, and more rapid fielding of critical end-to-end capabilities" (NDAA, 2021a). Also of note, Section 832 grants a two year extension of a "pilot program for streamlined awards for innovative technology programs" which was implemented in the

FY16 NDAA, (NDAA, 2021a). This program was designed to "reduce barriers to entry of innovative entities through streamlining the awards process for research-and-development contracts" (Bigani et al., 2018).

FY22 NDAA: The FY22 NDAA includes numerous reforms that modify and expand the authority to use Other Transaction Agreements (OTAs). An OTA "...is a non-traditional contracting process designed to increase acquisition efficiency in emerging technology areas. The OTA process is less restrictive than the traditional FAR process and allows for increased collaboration and competition amongst industry vendors for desired capabilities from the warfighter" (Berry et al., 2020). While the use of OTAs help speed up the contracting timeline, they are, as noted, not FAR-based contracts. Expanding the use of non-FAR contracts may be the right choice in some cases, expanding the use of OTAs may be regard as a quick fix to attempt to circumnavigate the acquisitions process rather than transforming it.

4. Efficiency and Effectiveness Reforms

Efficiency and Effectiveness reforms are those that focus on realigning or revising the presumed or proven inefficient or ineffective parts of the acquisitions process for the entire life cycle of innovations. Congressional efforts in this category in particular tend to produce rather mixed results. The primary problem is that one of Congress's primary means of creating change is to direct departments like the DOD to take additional actions and to report on those actions in order to defend the efficiency of the originally required actions. Or worse, to defend the effectiveness of measures of effectiveness for originally required actions. In this way, Congress can fall into the trap of reducing the very efficiency and effectiveness they endeavor to improve through reform. For example, in the FY20 NDAA, the DOD was instructed to, "update existing guidance for analyses of alternatives conducted pursuant to a material development decision for a major defense acquisition program to incorporate... [p]rocedures for waiver of the timeline requirements of this subsection on a case-by-case basis," which essentially created a requirement designed to improve analyses of alternatives while simultaneously instructing the DOD to create their own waiver process to avoid it, (NDAA, 2020).

Efficiency and Effectiveness reforms factored notably as NDAA trends in:

FY20 NDAA: For the FY20 NDAA, the most prevalent method Congress seemed to use in an attempt to improve efficiency and/or effectiveness within the acquisitions processes or personnel was to institute a series of pilot programs to attempt to codify new test systems, methods, or techniques for portions of acquisitions pathways or completely original pathways. As a major example, DOD was directed to pilot initiatives that "use teams that, with the advice of expert third parties, focus on the development of complex contract technical requirements for services, with each team focusing on developing achievable technical requirements that are appropriately valued and identifying the most effective acquisition strategy to achieve those requirements" (NDAA, 2019).

FY21 NDAA: The FY21 NDAA repeatedly addressed effectiveness and efficiency and the need for improvement in these areas within defense acquisition programs. The development and implementation of various assessments was the most prevalent method used to attempt such improvements. Most notably, was the assessment of the "process for developing capability requirements for DOD acquisition programs," (NDAA, 2021a). This assessment is not intended to only evaluate the process for developing capability requirements, but to also develop and provide recommendations on how the DOD can "improve efficiency of developing and approving capability requirements" and provide "recommendations for legislation, regulations, or policies" that can potentially improve the process (NDAA, 2021a). The SECDEF is required to report the findings and recommendations as the result of the assessment to Congress.

FY22 NDAA: The FY22 NDAA contains reforms aimed at addressing efficiency and effectiveness by establishing pilot programs and a focus of commercial acquisitions. The numerous pilot programs include one on "acquisition practices for emerging technologies...implementing unique contracting mechanisms for emerging technology that can increase the speed, flexibility, and competition of DOD acquisition process...accelerating the procurement and fielding of innovative technologies...[and] mission management," as well as modifications to pilot programs "for development of technology-enhanced capabilities with partnership intermediaries" and "for streamlining awards for innovative technology projects" (NDAA, 21b). Further, the NDAA calls for the

establishment of at least two more pilot programs which could theoretically support innovation, but with no deadlines given. The government clearly favors pilot programs as a means of creating efficiencies and in increasing effectiveness, but there is no information available on whether or not they work. Requesting the creation of a pilot program does not, in and of itself, fix efficiency and effectiveness. Those programs need to be successfully completed and scaled across the Department of Defense. This warrants further study.

5. Budget Reforms

Budget reforms are those that modify the processes and restrictions of acquisitions and contracting in terms of funding and budgetary rules and procedures. Specifically, this is not to include one-time realignment of funds between programs or even colors of money, but rather changes to how and when that money is disbursed year to year, and what administrative gymnastics are required to gain, control, spend, and justify those funds throughout the DOD through successive years. Importantly, congressional major reforms are stymied by nonconcurrence on corrective courses of action on the larger problems of expiring colors of money and the arduous annual PPBE process. Congress has conscientiously made several objectively good steps to address many of the more minor aspects of costs to the taxpayer and thereby made some inroads toward more overarching budget controls. For example, in the FY20 NDAA, Congress determined that "in the event the contracting officer is unable to determine proposed prices are fair and reasonable by any other means, an offeror who fails to make a good faith effort to comply with a reasonable request to submit data in accordance with paragraph (1) is ineligible for award," which is a huge win for individual contracting officers on many, many contracts, but doesn't address internal governmental budget problems troubling the Acquisitions Workforce more broadly and hampering the cause of innovation (NDAA, 2019).

FY20 NDAA: For NDAA FY2020, very few and very limited reforms were added within the acquisitions reforms section which had a broad effect on acquisitions as a whole. Most instituted particular changes to price ceilings or to deadlines. As one noteworthy example within this trend of tweaking ceilings and deadlines which stood to have an effect and did directly address the problem of budget (for good or ill) was the mandate on the

DOD as a whole that "not more than 75 percent may be obligated or expended for the Office of the Chief Management Officer until the date on which the Chief Management Officer submits to the congressional defense committees" cost savings data specifically required in NDAA FY19 (NDAA, 2019).

FY21 NDAA: The FY2021 NDAA is very similar to the FY2020 NDAA in that the reform had very limited mention of budget requirements as it relates to the context of the aggregate category as previously described. The majority of areas that addressed "budget" refer more to projected budget line items for specific defense acquisition systems or comparisons of previous years budgets for the same line items. Ultimately, the acquisitions reforms section of the FY2021 NDAA does not address the budget problems that continue to plague the Acquisitions Workforce and the acquisition process as a whole.

FY22 NDAA: While the FY22 NDAA did not have any significant budget or funding reforms, Section 1004 does establish a committee to evaluate the PPBE process. The commission is notified to "develop a consensus on an effective and strategic approach to Department of Defense resource budgeting and allocation, by conducting an examination of the planning, programming, budgeting, and execution methodology of the Department and by considering potential alternatives to such methodology to maximize the ability of the Department to equip itself in a timely manner to respond to current and emerging threats" (NDAA, 2021b). While this is a direct acknowledgment that the PPBE process is not equipped to respond to emergent requirements, it is still only a committee and no actual change or reform to the PPBE is guaranteed in a timely manner, or ever.

6. Knowledge Reforms

Knowledge reforms are those that apply to the education, training, manning, and recruiting of the Acquisitions Workforce and, concurrently, the enforcement of both governmental and commercial best practices in developing, producing, and dispersing innovative products and services through their life cycle. As a natural opposite side of the coin, the knowledge category also includes addressing known or suspected knowledge gaps which impede the Acquisition Workforce across the board from capitalizing on innovative opportunities and recognizing potential risks to timely innovation. For example, in the

FY20 NDAA, Congress stated that the DOD "shall establish and maintain extramural acquisition innovation and research activities...which shall include an acquisition research organization within a civilian college or university that is not owned or operated by the Federal Government... to provide and maintain essential research and development capabilities," (NDAA, 2019).

Knowledge reforms factored notably as NDAA trends in:

FY20 NDAA: In the FY20 NDAA, the overwhelming majority of the knowledge trending reforms focused on the Back-to-Basics initiative and in defining and refining the expected changes to training and credentialling for both military and civilian employees of the DOD and in some cases contractors. As a very compelling example, Congress directly addresses the innovation concerns of known and suspected software knowledge gaps by instituting a requirement for the DOD to, "establish software development and software acquisition training and management programs for all software acquisition professionals, software developers, and other appropriate individuals (as determined by the Secretary of Defense), to earn a certification in software development and software acquisition," (NDAA, 2019).

FY21 NDAA: In the FY21 NDAA, most knowledge requirements were primarily mentioned in relation to the training and development of the Acquisition Workforce, and the reporting of the assessment results to Congress. Of note, these assessments were not specifically geared towards training and development specifically, they were primarily single line items of a larger assessment. For example, one particular assessment titled "assessment of the process for developing capability requirements for DOD acquisition programs" directed the SECDEF to conduct an assessment on the "training and development of the workforce in capability requirements development and evaluation," (NDAA, 2021a). Although, this reform addresses the knowledge of the workforce through assessments, there was not a common trend of addressing knowledge requirements specifically. Nor were there any implementations of new policies addressing knowledge requirements as a result of previous acquisition reforms and/or assessments.

FY22 NDAA: The FY22 NDAA had only a couple mentions of reforms relating to knowledge. Section 801 directed DAU to create a program that would partner with outside experts and "extramural institutions" to make changes to their curriculum in order "to support educational, training, and research activities in support of acquisition missions of the Department of Defense," (NDAA, 2021b). This program aims to create a collaborative relationship with industry that will enable "training and continuous development of members of the acquisition workforce," (NDAA, 2021b). The only other reform that addressed the Acquisition Workforce was simple an extension of ACQUISITION PERSONNEL MANAGEMENT POLICIES from 2023 to 2026.

7. Protest and Appeals Reforms

Protest and appeals reforms are those that alter processes or timelines for litigation actions by contractors or government agencies in protesting or appealing either the decisions made or the solicitations produced in the arduous process of contracting and acquisitions for specific programs or portfolios of programs, an extremely lucrative field of inquiry for many companies and a very costly field of inquiry for the American taxpayer. Congressional efforts to improve the current protest and appeals processes for contractors and the government are far from vain as they are certainly a currently imperfect set of laws that are very worthy of address and reform. They are not, however, among the five aggregate categories we identified through analysis of the GAO/IG reports and literature review as being the most emergent issues for the Acquisitions Workforce in achieving timely innovation.

FY20 NDAA: For the FY20 NDAA, protest and appeals reforms prominently featured the question of data rights both during and after the contract period. As a specific example, contractors are no longer allowed to maintain propriety over data during the latter portions of losing challenges and "if the asserted restriction is found not to be substantially justified, the contractor or subcontractor asserting the restriction shall be liable to the United States for payment of the cost," (NDAA, 2019)

FY21 NDAA: The FY21 NDAA acquisitions reform section does not specifically address bid protest or appeals reforms. However, Section 886 of the NDAA repeals the

"pilot program on payment of costs for denied GAO bid protests," which was implemented in the FY18 NDAA. This pilot program required the SECDEF to "carry out a pilot program to determine the effectiveness of requiring contractors to reimburse the DOD for costs incurred in processing covered protests" (NDAA, 2017).

FY22 NDAA: The two protest and appeals reforms in the FY2022 NDAA focused on small businesses. While Section 863 addressed eligibility of small business concerns, Section 864 established that small business appeals will now be decided at the Office of Hearings and Appeals (NDAA, 2019b).

8. Culture Reforms

Culture reforms are those that will or should produce a change in the underpinning cultural conventions and mores of the Acquisition Workforce in order to shape the community goals and ideals. Congressional efforts to address systemic cultural problems identified in the by the GAO/IG reports and literature review as most emergent to the Acquisitions Workforce can be perhaps most charitably characterized as chronically unfocused. Interestingly, not only was culture the least frequently or clearly addressed of the identified aggregate category problems, it was also the least directly addressed throughout all three analyzed NDAAs. Even though cultural concerns permeate our literature review and the FY18, FY19, and FY20 GAO reports, it was not proportionately or straightforwardly addressed in FY20, FY21, or FY22 NDAAs. Most reforms affecting culture seemed somewhat inadvertent or second-order. For example, in FY20, the DOD was directed to provide better standardized and quicker data in order for policymakers to make program decisions, which would in turn allow program managers to make better decisions within their own programs assuming that the data is also provided to them. Similarly, in the same year, DOD was directed to "use a risk-based approach for the consideration of innovative technologies and new capabilities," which is a sound modern business approach, but doesn't address the underlying cultural problem of the adverse career consequences of risks that don't "pan out" at the root of most DOD risk aversion, (NDAA, 2019).

FY20 NDAA: Within the FY20 NDAA acquisitions reform section, the word "culture" does not appear and none of the subcategories ascribed to culture are addressed directly either. At best, it can be argued that some reforms may have a beneficial down-range effect on one or more subcategories of culture, but no trend could be identified specifically addressing the problem of culture.

FY21 NDAA: As noted within the FY20 NDAA above, the word "culture" does not appear in the acquisitions reform section of the FY21 NDAA. Additionally, no trends could be identified specifically addressing the problem of culture.

FY22 NDAA: The words culture, value, and decision making are not mentioned in the FY22 NDAA acquisitions reforms. There is one section that specifically addressed education and training of the Acquisition Workforce to "accelerate the adoption, appropriate design and customization, and use of flexible acquisition practices by the acquisition workforce by expanding the availability of training and on-the-job learning and guidance on such practices and incorporating such training into the curriculum of the Defense Acquisition University" (NDAA, 2019b). Other provisions only peripherally address culture.

B. CONGRESSIONAL ADDRESS OF ACQUISITION REFORM

The five categories identified as most impeding or facilitating of innovation for the Acquisition Workforce were not the most frequently addressed by Congress via reforms in the last three consecutive NDAAs occurring in FY2020, FY2021, and FY2022 respectively, with the most frequent two categories being sourcing requirements and non-actionable requirements. Nonetheless, four identified categories—speed, efficiency and effectiveness, budget and funding, and knowledge—were addressed with a relatively high proportionate frequency that can fairly show that Congress is addressing those chronic areas of concern determined through literature review and GAO reports. The exception is culture, which is never addressed directly nor are its subcategories addressed directly and which has lower indirect address frequency in the reforms than even protests and appeals.

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V. CONCLUSION

A. SUMMARY OF RESEARCH

In investigating our two research questions for this MBA project—firstly whether there are acquisitions issues of speed, efficiency and effectiveness, budget and funding, knowledge, and culture impeding innovation, and secondly, if so, whether recent acquisitions reforms have addressed those issues—we were reasonably sure of the first, but decidedly less certain of the second. Extensive research is available to answer our first research question with a firm yes, as is shown in our second chapter via literature review. Fewer studies or even anecdotal evidence examples are published to close the loop, so to speak, in terms of providing a satisfactory answer to the second research question, but our findings in our fourth chapter demonstrate through analysis of NDAAs that Congress is attempting to address the problems areas of speed, efficiency and effectiveness, budget and funding, and knowledge which impede innovation by the Acquisition Workforce, but not the problem area of culture.

B. RECOMMENDATIONS

Our MBA project confirmed that speed, efficiency and effectiveness, budget and funding, knowledge, and culture were impediment areas for innovation and that Congress addressed all five excepting culture via proportionately frequent reforms. Our focused scope suited the time and resources allotted, but further research as enumerated below would be useful to understanding how innovation can be facilitated for DOD acquisitions:

1. Study the impact of NDAA individual acquisition reforms by identified category in addition to proportionate frequency.
2. Expand the comparable years of GAO reports and NDAAs to determine if reforms repeat or extend until expired without effect.
3. Integrate surveys of current and former Acquisitions Workforce members to acquire firsthand accounts of both import and impact of categories.

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LIST OF REFERENCES

Berry, J. H., & Mulski, J.D, (2020). *Other transaction authority (OTA) application for warfighting development.* [Master's thesis, Naval Postgraduate School]. NPS Archive: Calhoun. http://hdl.handle.net/10945/66585

Biagini, R., Fenster, H., & Hoe, S. (2018). Pilot program will streamline contracting. *National Defense, 102*(772), 13–13. https://www-jstor-org.libproxy.nps.edu/stable/27022120?pq-origsite=summon&seq=1

Boudreau, M. (2017). *Been there, done that: Strategic acquisition.* U.S. Army Acquisition Support Center. https://asc.army.mil/web/news-alt-jfm17-been-there-done-that-strategic-acquisition/#:~:text=Knowledge%2DBased%20Acquisition.,alternatives%2C%20prior%20to%20program%20initiation

Bouffard, A., & Murphy, C. (2017). *Understanding defense acquisition workforce challenges.* Acquisition Research Program. http://hdl.handle.net/10945/58836

Boyle, C., Rajchel, B., & Ruiz., A. (2020). *Analysis of the purchasing structure, roles and authority and authority within large, private-sector organizations and their potential applications and benefits within air force contracting.* [Master's thesis, Naval Postgraduate School]. NPS Archive: Calhoun. http://hdl.handle.nat/10945/66592

Bryan, E. R., & Chin, H. A. (2021). *Business logic of the warfighter.* [Master's thesis, Naval Postgraduate School]. NPS Archive: Calhoun. http://hdl.handle.net/10945/68301

Candreva, P. J. (2017). *National defense budgeting and financial management: Policy and practice.* Information Age Pub. https://content.infoagepub.com/files/fm/p590e43aabbeb4/9781681238722_FM.pdf

Castellano, N. E. (2019). "Other transactions" are government contracts, and why it matters. *Public Contract Law Journal, 48*(3), 485–514. https://libproxy.nps.edu/login?url=https://www.proquest.com/scholarly-journals/other-transactions-are-government-contracts-why/docview/2391977907/se-2?accountid=12702

Clark, C. (2012, February 6). *F-35 production move was 'acquisition malpractice': Top DOD buyer*. Breaking Defense. https://breakingdefense.com/2012/02/f-35-production-was-acquisition-malpractice-top-dod-weapons-b/

Coble, M., Royster, J., Glandon, D., Stewart, P., Pham, P., Taylor, B., Bailey, D., & Herndon, K. (2014). *Improving the prototyping process in department of defense acquisition.* [Master's thesis, Naval Postgraduate School]. NPS Archive: Calhoun. http://hdl.handle.net/10945/42718

Defense Acquisition University. (n.d.). *Planning, programming, budgeting & execution process (PPBE)*. https://www.dau.edu/acquipedia/pages/ArticleContent.aspx?itemid=154

Department of Defense (2018). *Summary of the 2018 National Defense Strategy.* https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf

Donahue, J. R., Duong, T. N., & Ameh, F. E. (2018). *Why do programs fail? An analysis of defense program manager decision making in complex and chaotic program environments.* [Master's thesis, Naval Postgraduate School]. NPS Archive: Calhoun. http://hdl.handle.net/10945/61352

Dwyer, M., Blivas, A., Hunter, A., & Tidwell, B. (2020). Cycle times and cycles of acquisition reform. *Acquisition Research: Creating Synergy for Informed Change*, 1–18. http://hdl.handle.net/10945/64750

Fox, J. R., Allen, D. G., Lassman, T. C., Moody, W. S., & Shiman, P. L. (2011). *Defense Acquisition Reform 1960–2009 an elusive goal*. Center of Military History, U.S. Army

Franck, R., Hildebrandt, G., Pickar, C., & Udis, B. (2018) In the fullness of time: Towards realistic acquisition schedule estimates. *Acquisition Research: Creating Synergy for Informed Change*, 472–490. http://hdl.handle.net/10945/58787

Frick, D. E., U.S.A. (2010). Embracing uncertainty in DOD acquisitions. *Defense AR Journal, 17*(3), 355–374. https://libproxy.nps.edu/login?url=https://www.proquest.com/scholarly-journals/embracing-uncertainty-dod-acquisition/docview/722557790/se-2?accountid=12702

Fritsch, R. A., Mcmurtrey, J. J., & Sullivan, J. F. (2020). *The nature of DOD reprogramming and associated trend analysis.* [Master's thesis, Naval Postgraduate School]. NPS Archive: Calhoun. http://hdl.handle.net/10945/65522

Government Accountability Office. (2018). *Weapon systems annual assessment: Knowledge gaps pose risks to sustaining recent positive trends* (GAO-18-360SP). The Government Accountability Office.

Government Accountability Office. (2019). *Weapon systems annual assessment: Limited use of knowledge-based practices continue to undercut DoDs investments* (GAO-19-336SP). The Government Accountability Office.

Government Accountability Office. (2020). *Defense acquisitions annual assessment: Drive to deliver capabilities faster increases importance of program knowledge and consistent data for oversight* (GAO-20-439). The Government Accountability Office.

Government Accountability Office. (2021). *DOD critical technologies: Plans for communicating, assessing, and overseeing protection efforts should be completed* (GAO-21-158). The Government Accountability Office.

Grazier, D. (2020, March 11). *F-35 design flaws mounting, new document shows*. Project On Government Oversight. https://www.pogo.org/investigation/2020/03/f-35-design-flaws-mounting-new-document-shows/

Hunter, A. (2018). The cycles of defense acquisition reform and what comes next. *Texas A&M Journal of Property Law*, *5*(1), 37–56. https://doi.org/10.37419/jpl.v5.i1.3

Insinna, V. (2021, October 26). *The F-35 at 20: How its successes, and failures, shaped the aerospace industry*. Breaking Defense. https://breakingdefense.com/2021/10/the-f-35-at-20-how-its-successes-and-failures-shaped-the-aerospace-industry/

Kadish, R.T., Abbott, G., Cappuccio, F.M., Hawley, R., Kern, P.J., & Kozlowski, D. (2006). *Defense Acquisition Performance Assessment Report*.

Kamp, J. C. (2019). *Integrating immature systems and program schedule growth* (Publication No. 10979355). [Doctoral dissertation, George Washington University]. ProQuest Dissertations Publishing

Kendall, F. (2017). *Getting Defense Acquisition Right.* Defense Acquisition University Press. https://dod.defense.gov/Portals/1/Documents/pubs/Getting-Acquisition-Right-Jan2017.pdf

Kenning, R. J. (2021). *How the U.S. Navy can become a better learning organization*. [Master's thesis, Naval Postgraduate School]. NPS Archive: Calhoun. http://hdl.handle.net/10945/67144

Levine, P. K. (2019). *Annual weapons acquisition assessment - GAO needs to step up its game* (Report No. P-10692). Institute For Defense Analyses. https://www.ida.org/research-and-publications/publications/all/a/an/annual-weapons-acquisition-assessment

Light, T., Leonard, R. S., Smith, M. L., Wallace, A., & Arena, M. V. (2018). *Benchmarking schedules for major defense acquisition programs* (Report No. RR2144). RAND. https://www.rand.org/pubs/research_reports/RR2144.html

Lorge, M. (2018) *Comparison of naval acquisition efficiency between the united states and china.* [Master's thesis, Naval Postgraduate School]. NPS Archive: Calhoun. http://hdl.handle.net/10945/58738

McInnis, K. J. (2018). *The 2018 national defense strategy* (CRS Report No. IN10855. Congressional Research Service. https://crsreports.congress.gov/product/details?prodcode=IN10855

McNicol, D. L. (2022). Can we explain cost growth in major defense acquisition programs? *Defense AR Journal, 29*(1), 2–21. https://doi.org/10.22594/dau.21-867.29.01

Miller, A. W. (2020). *Integrating develops into navy combat systems development.* [Master's thesis, Naval Postgraduate School]. NPS Archive: Calhoun. http://hdl.handle.nat/10945/66688

Modigliani, P. & Ward, D. (2019). Acceleating defense acquisition: Faster acquisitions produce a stronger force. *Acquisition Research: Creating Synergy for Informed Change,* 557–564. http://hdl.handle.net/10945/62937

Mun, J. (2020). Risk-based ROI, capital budgeting, and portfolio optimization in the department of defense. *Defense AR Journal, 27*(1), 61–107. https://doi.org/10.22594/dau.19829.27.01

National Defense Authorization Act for Fiscal Year 2018, Pub. L. No. 115–91, 131 Stat. 1283 (2017). https://www.congress.gov/115/plaws/publ91/PLAW-115publ91.pdf

National Defense Authorization Act for Fiscal Year 2020, Pub. L. No. 116–92, 133 Stat. 1198 (2019). https://congress.gov/116/plaws/publ92/PLAW-116publ92.pdf

National Defense Authorization Act for Fiscal Year 2021, Pub. L. No. 116–283, 134 Stat. 3383 (2021). https://www.congress.gov/116/plaws/publ283/PLAW-116publ283.pdf

National Defense Authorization Act for Fiscal Year 2022, Pub. L. No. 117–81, 135 Stat. 1541 (2021). https://www.congress.gov/117/plaws/publ81/PLAW-117publ81.pdf

Oakley, S. (2021). *DOD acquisition reform: Increased focus on knowledge needed to achieve intended performance and innovation outcomes* (GAO-21-511T). Government Accountability Office.

Peters, H. M and Moshe S. (2018). *Acquisition Reform in the FY2016-FY2018 National Defense Authorization Acts (NDAAs)*. (CRS Report No. R45068). Congressional Research Service. https://crsreports.congress.gov/product/details?prodcode=R45068

Reilly, B. (2022, March 8). *F-35 full-rate production decision not likely until at least 2023*. Inside Defense. https://insidedefense.com/daily-news/f-35-full-rate-production-decision-not-likely-until-least-2023

Robinson, C. (2020). *Embracing agile acquisition with an agile mindset.* [Master's thesis, Naval Postgraduate School]. NPS Archive: Calhoun. http://hdl.handle.net/10945/65431

Schultz, B. (2021, March 23). Please Change the Acquisition Culture! *Defense Acquisition University*. https://www.dau.edu/library/defense-atl/blog/Please-Change--the-Acquisition-Culture!

Schwartz, M. (2014). *Defense acquisitions: How DOD acquires weapon Systems and recent efforts to reform the process* (CRS Report No. RL34026) Congressional Research Service. https://crsreports.congress.gov/product/pdf/RL/RL34026

Tate, D. M. (2020). Software productivity trends and issues. *Defense AR Journal, 27*(2), 143–167. https://doi.org/10.22594/dau.19-838.27.02

Weisberger, M. (2014, November 11). *Slow and steady is losing the {defense acquisition} race*. Government Executive. https://www.govexec.com/feature/slow-and-steady-losing-defense-acquisition-race/

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