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Cycle-times and Cycles of Acquisition Reform

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Abstract

This paper assesses the relationship between cycles of acquisition reform and cycle-times (i.e., the time to field new capabilities). First, we characterize the history of defense reform in terms of cycles that centralize or decentralize oversight. Next, using schedule data from over 200 Major Defense Acquisition Programs (MDAPs), we evaluate past reforms' impact on MDAP cycle-time. We observe that, historically, centralized oversight correlates with lower rates of cycle-time growth but that cycle-times have remained relatively unchanged throughout defense reform cycles. Finally, we conclude that, similar to past reform cycles which decentralized oversight, today's reforms may not increase the speed with which the Defense Department acquires MDAPs.

Introduction

In defense acquisition, reform is constant. Over the past five decades, reforms have been initiated, implemented, and evaluated, only to be initiated all over again. This pattern—and its repetition throughout history—has led some researchers to describe acquisition reform as a "never-ending cycle" (Levine, 2018, p. 3) whereby discrete periods of time are characterized by different initiatives (Fox, 2011; Hunter, 2018; Levine, 2018; Lewis et al., 2019; McCormick, Hunter, & Sanders, 2015; McNicol & Wu, 2014). Although these initiatives consistently seek to reduce cost, shorten schedule, and increase performance, reformers' priorities—and the mechanisms they use to achieve their objectives—have varied over time.

The most recent cycle of defense reform, for example, prioritized acquisition speed. To reduce the time to field new capabilities, reformers decentralized acquisition oversight by delegating decision authorities and leveraging non-traditional requirements and contracting processes. Importantly, however, past reform cycles have moved in the opposite direction by centralizing oversight instead. The cyclical nature of defense reform—which has historically oscillated between periods of centralized and decentralized oversight—creates an opportunity to assess the relationship between reform cycles and acquisition speed, or cycle-time (i.e., the time to field new capabilities).

Accordingly, this paper assesses the relationship between reform cycles and cycle-times by first characterizing the history of defense reform in terms of cycles that centralize or decentralize oversight. Next, using schedule data from over 200 Major Defense Acquisition

Programs (MDAPs), we evaluate past reforms' impact on MDAP cycle-time. We observe that, historically, centralized oversight correlates with lower rates of cycle-time growth but that cycle-times have remained relatively unchanged throughout defense reform cycles. Finally, we conclude that, similar to past reform cycles, which decentralized oversight, today's reforms may not increase the speed with which the Defense Department acquires MDAPs.

Assessing Acquisition Reform

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. When requirements can be satisfied via materiel (i.e., capabilities that can be created or bought), the DoD manages capability development and procurement using the acquisition process. The DoD determines what capabilities to procure, requests funding to support those capabilities, and executes capability acquisition via the PPBE process.

Acquisition reform, historically, has attempted to reduce the cost, improve the performance, and shorten the schedule of all three processes (Fox, 2011; Hunter, 2018; Levine, 2018; Lewis et al., 2019; McCormick et al., 2015; McNicol & Wu, 2014). In terms of cost, past reforms sought to reduce cost growth, to eliminate "waste, fraud, and abuse," and to increase competition between prospective contractors. In terms of performance, past reforms sought to strengthen and empower the industrial base and to leverage commercial and small business innovation. Finally, in terms of schedule, past reforms sought to reduce the time required to award contracts, to upgrade existing systems, and to field new systems.

Research shows that, despite a robust history of acquisition reform, individual reforms' impact has varied. For example, Gansler, Lucyshyn, and Spiers (2010) concluded that the Nunn–McCurdy amendment—which Congress passed to curb cost growth—did not significantly affect program outcomes. Christensen, Searle, and Vickery (1999) observed that Packard Commission reforms—also aimed at reducing program cost—instead had the opposite effect and appeared to increase cost growth. Research from the Center for Strategic and International Studies (CSIS) observed that although reformers have achieved some contracting-related objectives, they—at least at the time of publication—had made little progress achieving competition and small business-related goals (McCormick et al., 2015). Finally, the *Performance of the Defense Acquisition System*, a comprehensive report published by the Pentagon in 2016, offers a recent and holistic perspective on acquisition reforms and outcomes. For example, the report observed a statistically significant reduction in Nunn–McCurdy breaches and in MDAP cost growth since 2009 (Under Secretary of Defense, Acquisition, Technology, and Logistics, 2016).

To assess reforms' impact on program schedule, researchers use cycle-time, the duration between a program's earliest milestone and its initial operating capability (IOC). Both the Under Secretary of Defense, Acquisition, Technology, and Logistics (2016) and Tate (2016) found no statistically significant evidence that MDAP cycle-time or cycle-time growth has increased over time. Tate (2016), however, did observe that cycle-time growth for certain system types—particularly command, control, and communications systems—has worsened. Importantly, Tate (2016) also observed that several recent, expensive programs had longer than average cycle-times and concluded that these cases may drive the *perception* that acquisition is too slow. In reaching these conclusions, both researchers

analyzed MDAPs that started after 1980. Our research expands upon this work by constructing a larger database that includes MDAPs from 1962 to the present.

Finally, several researchers have characterized reform cycles and assessed their impact (Fox, 2011; Hunter, 2018; Levine, 2018; Lewis et al., 2019; McCormick et al., 2015; McNicol & Wu, 2014). For example, Levine (2018) concluded that reform cycles were most effective when they addressed the acquisition process's underlying incentives and worked to counter what he described as "the conspiracy of hope" (p. 132, 150). Hunter (2018) observed that the acquisition system responds slowly to reforms and therefore, often fails to achieve reformers' desired ends before their priorities shift. From a quantitative perspective, McNicol & Wu (2014) used five acquisition regimes to categorize MDAP cost growth data. Ultimately, they did not observe a sustained relationship between reform cycle and cost growth and instead concluded that other factors—budget climate in particular—had a larger impact on MDAP cost growth than acquisition reforms (McNicol & Wu, 2014).

Our research builds upon the analysis framework presented by McNicol & Wu (2014). Specifically, we augment and expand upon the acquisition cycles they identify and focus on program schedule, rather than on cost. Using our database of MDAP schedules, we are able to assess the impact that various cycles of acquisition reform, 1962 to the present, have had on MDAP program schedules.

Today's Cycle of Acquisition Reform

Today's cycle of acquisition reform aims to shorten program schedules. The DoD's (2018) *National Defense Strategy*, for example, states that the Department must "deliver performance at the speed of relevance" (p. 10) by prioritizing rapid capability fielding, adopting streamlined management approaches, and realigning incentive and organizational structures. The DoD's strategy, in turn, responds to multiple Congressional directives aimed at increasing acquisition speed (National Defense Authorization Act [NDAA] 2016 Secs. 804, 810, 821, 823, 825 and NDAA 2017 Secs. 805, 806, 807, 901). Congressional reformers' focus on speed appears to be motivated by a belief that U.S. technological advantage vis-à-vis its adversaries (namely China) is eroding[1] and that the timelines to field new capabilities are dramatically different between the DoD and the private sector.[2]

To increase acquisition speed, today's reformers decentralized the DoD's oversight of the acquisition process. Oversight—which often takes the form of reporting requirements

[1] For example, Senator John McCain stated, "America's technological advantage is eroding—and fast. Over the last decade, our adversaries have invested heavily in modernizing their militaries with a focus on anti-access and area denial technologies specifically to counter American military strengths. Our adversaries are building weapon systems while we shuffle paper. If we continue with business as usual, I fear the United States could lose its military technological advantage altogether" (Evans, 2015). He also stated that "for years, we have been warned that America is losing its technological advantage. … That is why the DoD needs acquisition reform. Not just for efficiency or to save money. Simply put we will not be able to address the threats facing this nation with the system of organized irresponsibility that the defense acquisition enterprise has become" (*Department of Defense Acquisition Reform Efforts*, 2017)

[2] For example, Assistant Secretary of the Air Force for Acquisition Will Roper stated, "We live in a world where we can't wait 10 years to get a program right ultimately because outside technology, commercial technology is driving this" (Pomerleau, 2016).

and reviews—can lengthen program schedules by adding activities that take time to complete. For example, the GAO (2015) found that, in a sample of 24 programs, staff spent an average of two years completing the steps necessary to pass an OSD-led milestone review and 5,600 total staff days documenting that work. Relatedly, research at RAND found that 5% of a program office staff's time was dedicated to regulatory and statutory compliance (Drezner et al., 2007) and Brainard and Szjanfarber (2017) found that 6% of a contractor's time was spent complying to explicit DoD oversight requirements.

The DoD's oversight of the acquisition process occurs primarily through two mechanisms: the Office of the Secretary of Defense (OSD) oversees the military services, and the military services, in turn, oversee contractors. Contractors build DoD systems, whereas the military services manage contractors and operate the systems they build. The OSD, on the other hand, manages military service policy, operations, procurement, and budget from an integrated, joint perspective.

Oversight centralization (or decentralization) can be characterized by the relationships between contractors, the military services, and the OSD. The OSD, for example, oversees MDAPs at specific milestones during their life cycle. Centralized OSD oversight, therefore, corresponds to the OSD reviewing more programs and conducting more reviews per program. In contrast, decentralized oversight corresponds to the OSD reviewing fewer programs and conducting fewer reviews per program. Today's reformers, for example, decentralized OSD oversight by delegating milestone decision authority for most MDAPs from OSD to the military services (NDAA 2016, Sec. 825).

Separately, the military services specify oversight requirements in the contracts they issue to industry. Centralized oversight corresponds to stricter control of contractor activities; for example, the DoD may require contractors to meet strict military specifications or to provide frequent reports on program status. In contrast, decentralized oversight corresponds to looser control of contractor activities; for example, the DoD may allow contractors to use commercial best practices rather than conform to military specifications. Today's reformers decentralized military service oversight by creating alternative acquisition pathways (NDAA 2016, Sec. 804) and encouraging programs to use other transaction authorities to bypass the DoD Directive 5000.1 and the Federal Acquisition Regulations, respectively.

Historic Cycles of Acquisition Reform

Reformers' move, in 2016, to decentralize DoD oversight came after nearly six decades and six cycles of acquisition reform. Although the specifics of each reform initiative are distinct, from a macroscopic perspective, it is possible to characterize past cycles in terms of repeated efforts to either centralize or decentralize acquisition oversight. Indeed, multiple scholars have viewed acquisition history through this lens (Fox, 2011; Hunter, 2018; Levine, 2018; Lewis et al., 2019; McCormick et al., 2015; McNicol & Wu, 2014).

Table 1 identifies seven reform cycles—including today's—and classifies those cycles according to their preference for centralized or decentralized oversight. Before using this framework to assess the relationship between acquisition cycles and cycle-times, we briefly review the initiatives undertaken during each cycle and justify our decision to classify cycles as either centralized or decentralized.

Table 1. Cycles of Acquisition Reform

Oversight Approach	Years	Reform Cycle
Centralized	1970-1980	Defense Systems Acquisition Reform Council
	1990-1993	Defense Acquisition Board
	2008-2016	Weapon Systems Acquisition Reform Act
Decentralized	1961-1969	McNamara Reforms
	1981-1989	Acqusition Improvement Program
	1994-2007	Mandate for Change and Transformation
	2017-present	Restructuring AT&L

McNamara Reforms (1961–1969)

The *McNamara Reforms* cycle, which lasted from 1961 to 1969, was enabled by the DoD Reorganization Act of 1958 (Fox, 2011). Defense Secretary Robert McNamara first leveraged the Act's authorities in 1961 when he centralized the PPBE process, thereby increasing the OSD's authority over military service budgets (Fox, 2011). Although he centralized PPBE, McNamara left acquisition oversight largely decentralized. For example, during this period, the OSD only reviewed programs twice during their life cycle (Fox, 2011).

McNamara did, however, issue numerous policies and directives to intended to standardize and streamline acquisition processes across the military services (Fox, 2011). The military services' ability to implement these policies—and to effectively oversee contractors in general—was unfortunately quite limited. During this period, program managers were often former operators who lacked the training or experience required to effectively oversee contractors (Fox, 2011). Absent acquisition managers with requisite knowledge or experience, the military services essentially delegated responsibility and authority to their contractors—thereby implementing a decentralized oversight model.

Defense Systems Acquisition Reform Council (1970–1980)

A second cycle of acquisition reform began in late 1969, when Deputy Secretary David Packard created the Defense Systems Acquisition Reform Council (DSARC) to centralize and strengthen OSD's oversight.[3] The DSARC, a formal decision body in the OSD, reviewed acquisition programs at three milestones during their life cycle. After a successful review, the OSD allowed programs to proceed to the next phase of the acquisition process (Fox, 2011). Packard hoped that by reviewing and enforcing trade-offs between cost, schedule, and performance at specific milestones during a system's life cycle, the DSARC would reduce the cost overruns that had plagued the DoD in prior years (Fox, 2011).

The DoD formalized the DSARC review process in 1971, when it issued its first DoD 5000 policy (Fox, 2011). This policy granted the military services full authority to execute programs between milestones and the OSD authority to grant approvals at the milestones

[3] Per Fox (2011), Packard created the DSARC in May 1969 and issued policy guidance in the form of a memorandum in 1970. We adopted a cycle start date of 1970 to be consistent with McNicol & Wu (2014).

themselves. The OSD's milestone review authority was further centralized in 1977 when a fourth milestone was added for DSARC review (Fox, 2011; Lewis et al., 2019). A new under secretary for research and engineering was also added during this period, enabling the OSD to further centralize its oversight of early program milestones (Fox, 2011).

Outside the OSD, Packard also centralized military service oversight by addressing the training and experience deficiencies described above. For example, Packard created the Defense System Management School to train program managers (Fox, 2011). He also encouraged the military services to develop independent cost estimating capabilities (Fox, 2011) that could be used to verify contractor proposals and bills. In doing so, Packard centralized much of the authority and responsibility that the military services had previously delegated to their contractors.

Acquisition Improvement Program (1981–1989)

A third cycle began in 1981, when Deputy Secretary Frank Carlucci initiated the Acquisition Improvement Program (AIP).[4] AIP sought to reduce cost and shorten program cycle-times (Fox, 2011) through what Defense Secretary Caspar Weinberger called "controlled decentralization" (Fox, 2011, p. 91; Levine, 2018, p. 39) Carlucci decentralized OSD oversight by reducing the number of milestones requiring DSARC approval from four to two (Fox, 2011). He also reduced the number of programs that required DSARC review (Fox, 2011).

While more authority was delegated from OSD to the military services, few changes were made to contractor oversight. Rather, during this period, the DoD was instead plagued by media reports of contractor waste, fraud, and abuse (Fox, 2011; Levine, 2018). These reports motivated a flurry of acquisition reforms from 1982 to 1986, including the Goldwater–Nichols Act (Fox, 2011; Levine, 2018; Lewis et al., 2019).[5] Since most reforms were not fully implemented until 1990 (Levine, 2018; McNicol & Wu, 2014), we characterize the preceding period as one of relative decentralization (Fox, 2011; Levine, 2018; Lewis et al., 2019).

Defense Acquisition Board (1990–1993)

A short cycle of centralized (Lewis et al., 2019) oversight occurred from 1990 to 1993, when the DoD actually implemented the reforms that had been enacted in prior years.[6] In particular, Congress centralized OSD oversight by creating an under secretary of defense for acquisition (USD[A]) to oversee all aspects of the acquisition process (Fox, 2011; Levine, 2018; Military Retirement Reform Act of 1986; NDAA 1987 Sec. 901). An updated DoD 5000 policy further centralized the OSD's authority by increasing the number of milestones over which the Defense Acquisition Board (DAB, the replacement to the DSARC) had authority (Fox, 2011; Lewis et al., 2019).

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[4] McNicol & Wu (2014) selected 1983 as the start date for this cycle but provided no justification for their decision. We selected 1981 instead because Carlucci announced AIP in March 1981 and began implementing changes via a policy update that year (Lewis et al., 2019). Levine (2018) also summarizes AIP implementation challenges starting in 1981, thus suggesting that implementation was underway during that year.

[5] Lewis et al. (2019) provide a long list of relevant legislation.

[6] McNicol & Wu (2014) identified 1990 as the start of this cycle because the DoD did not begin implementing prior years' reforms until this time.

New Service Acquisition Executives (SAEs) were also created to centralize oversight in the military services; these SAEs reported to both their service secretaries and to the newly established USD(A) (Fox, 2011; Levine, 2018). Below the SAEs, new Program Executive Officers (PEOs) managed portfolios of programs, each of which was controlled by different program managers (Fox, 2011). Finally, military service oversight was further strengthened when Congress levied new experience and training requirements on acquisition professionals (Fox, 2011).

Mandate for Change and Transformation (1994–2007)

The short *Defense Acquisition Board* cycle was followed by a much longer cycle of decentralized oversight. This cycle was initiated by Secretary Bill Perry's 1994 "Mandate for Change" memo (Fox, 2011) and to a large extent, was employed to implement Secretary Donald Rumsfeld's "Transformation" strategy.[7] Reformers decentralized OSD oversight by eliminating one milestone review and opting to use integrated product teams to work directly with programs instead (Fox, 2011). More significantly, however, the military services delegated substantial responsibility and authority to their contractors and in doing so, eroded the entire department's ability to conduct oversight (Under Secretary of Defense, Acquisition, Technology, and Logistics, 2003; Younossi et al., 2008).

The 1993 Federal Acquisition Streamlining Act improved the DoD's ability to access the commercial marketplace (Levine, 2018). Although many related initiatives focused on the DoD's procurement of small, commercial items (i.e., not MDAPs), the DoD also encouraged commercial-like practices on MDAPs themselves (Levine, 2018). For example, Perry banned the use of military specifications (Fox, 2011) and created the Single Process Initiative to allow contactors to substitute commercial processes and standards for DoD-specific ones (Levine, 2018).

The military services also relied heavily on Total System Performance Responsibility (TSPR) contracts, which delegated nearly all program management authority from the government to its contractors. The philosophy behind TSPR held that by decentralizing oversight and delegating responsibility and authority, contractors could apply more efficient business practices and deliver higher value products to the DoD (Levine, 2018). Finally, the DoD's oversight was further weakened when nearly 50% of its acquisition workforce was cut (Levine, 2018; Office of the Inspector General, 2000) and the department was forced to rely almost entirely on contractors to manage its MDAPs (Levine, 2018).

Weapon Systems Acquisition Reform Act (2008–2016)

In response to cost growth during the *Mandate for Change and Transformation* cycle, reformers sought to strengthen and centralize oversight (Lewis et al., 2019)—particularly early in systems' life cycles (Levine, 2018)—during the 2008 to 2016[8] *Weapon Systems Acquisition Reform Act* cycle. In particular, the 2006 NDAA emphasized Milestone B by

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[7] McNicol & Wu (2014) separate the administrations into distinct cycles, even though they acknowledge that there were few acquisition changes between them. Levine (2018) echoes this sentiment. For this reason, we combine both administrations into a single reform cycle.

[8] Levin (2018) notes that the under secretary of defense for acquisition, technology, and logistics who prioritized early milestone management (John Young), was confirmed in late 2007. Hunter (2018) identifies 2008 as the start of this particular cycle of acquisition reform. For these reasons, we have set 2008 as our start date.

requiring the OSD (or the appropriate milestone decision authority) to certify programs' technical maturity, cost, and schedule before moving forward in acquisition life cycle (Levine, 2018; NDAA 2006, Sec. 801). The 2009 Weapon Systems Acquisition Reform Act further strengthened OSD oversight of early milestones by establishing organizations dedicated to independent cost estimating, developmental test, and systems engineering.

The military services also centralized and strengthened contractor oversight by abandoning TSPR and by implementing the Better Buying Power (BBP) initiative. BBP sought to improve program execution by sharing best practices and by encouraging sound management techniques throughout a program's life cycle (Levine, 2018). Centralized oversight continued throughout the department until 2017, when both Congress and the DoD moved to decentralize both the OSD (NDAA 2016, Sec. 825, 10 U.S. Code §133b) and military service oversight (Mehta, 2017). As described above, the subsequent period of decentralized oversight continues today.

Cycle-Times and Cycles of Reform

Characterizing reform cycles in terms of oversight centralization and decentralization provides a framework for observing the macroscopic effects of acquisition reform. To evaluate how reform cycles and oversight affect acquisition speed, we use MDAP schedule data, which is readily available and reported to Congress annually. If decentralized oversight increases acquisition speed—as hypothesized by today's reformers—we expect to observe lower cycle-times and less cycle-time growth during periods of decentralized oversight. We also expect to observe cycle-time and cycle-time growth rates changing over time, as reforms cycle between centralized and decentralized oversight.

To study MDAP cycle-times, we collected data from two sources: the Defense Acquisition Management Information Retrieval (DAMIR) System and RAND's Defense Systems Cost Performance Database (Jarvaise, Drezner, & Norton, 1996). DAMIR aggregates data from the Selected Acquisition Reports (SARs) that the DoD has submitted since 1997. RAND's database contains SAR data from 1960 to 1994. To combine RAND's data with DAMIR, we eliminated duplicate information by deferring to the more recent DAMIR data.

Although the DoD intends for SAR data to be standardized across programs, the SAR's limitations—particularly for studying MDAP cost growth—are well-documented (Hough, 1992). Similar limitations exist when using SAR data to study MDAP cycle-times. For our analysis, we define cycle-time as the elapsed time between a program's first milestone (Milestone B or C) and IOC. We define cycle-time growth by calculating the percent change between a program's estimated cycle-time to its final cycle-time.[9] In several instances, however, SARs contained dates that were not explicitly identified as Milestones B, C, or IOC. Table 2 summarizes the assumptions that we made when selecting alternative dates to approximate the required milestones.

After cleaning our data using the above assumptions, we were left with cycle-time data from 237 complete (i.e., passed IOC) programs and 39 active (i.e., not past IOC and

[9] SARs typically provide two schedule estimates: development and production. When it was available, we used the development estimate, which programs make earlier in their life cycles. When development estimates were unavailable, we deferred to production estimates.

not canceled) programs. We excluded canceled programs from both samples because we found DAMIR's data to be unreliable after program cancellation. From our sample of complete and active programs, and subject to the availability of early program schedule estimates, we were able to calculate cycle-time growth for 189 complete and 37 active programs. Table 3 depicts cycle-times and cycle-time growth for all active and completed MDAPs, 1962 to the present.

Table 2. Schedule Milestone Assumptions

Milestone	Assumptions
Milestone B	· Milestone II
Milestone C	· Milestone III · Low rate initial production (LRIP) · Production start date
Initial Operating Capability	· Initial operational delivery or initial operational test and evaluation (IOT&E) complete, whichever came later (RAND database only) · IOT&E complete date · First unit equipped (FUE) · Required assets available (RAA) · 1st satellite launched

Table 3 shows that complete programs have shorter average cycle-times and lower rates of cycle-time growth than active programs. However, since active programs' durations are still estimated, we cannot use Table 3's results to draw conclusions about acquisition's speed today. Instead, to assess the potential for today's reforms to increase speed, we instead look at data from the historic cycles of acquisition reform.

Table 3. Cycle-Times and Cycle-Time Growth for Complete + Active MDAPs (1962–Present)

	Program Type	Mean	Median	Max.	Min	N
Cycle Time (years)	*Complete*	6.5 yrs	6.3 yrs	21.2 yrs	0.1 yrs	237
	Active	9.3 yrs	9.1 yrs	18.7 yrs	2 yrs	39
Cycle Time Growth (percent)	*Complete*	30.5%	14.6%	346.7%	-53.6%	189
	Active	33.6%	12.4%	180.0%	-1.3%	37

Figures 1 and 2 illustrate how MDAP cycle-times and cycle-time growth has changed over time. As is evident from both figures, we did not observe a statically significant relationship between cycle-times, cycle-time growth, and program start date (as measured from either Milestone B or C, depending on the earliest date available) for completed programs. Although a downward trend is apparent for active programs, it was not statistically significant (R^2=0.5 and 0.1 for cycle-times and cycle-time growth, respectively). One hypothesis that explains this trend is that active program cycle-times are only estimates and that as these programs mature, their cycle-times will grow (Under Secretary of Defense for Acquisition, Technology, and Logistics, 2016). Another hypothesis is that today's cycle of acquisition reform has already impacted program outcomes and shortened schedules.

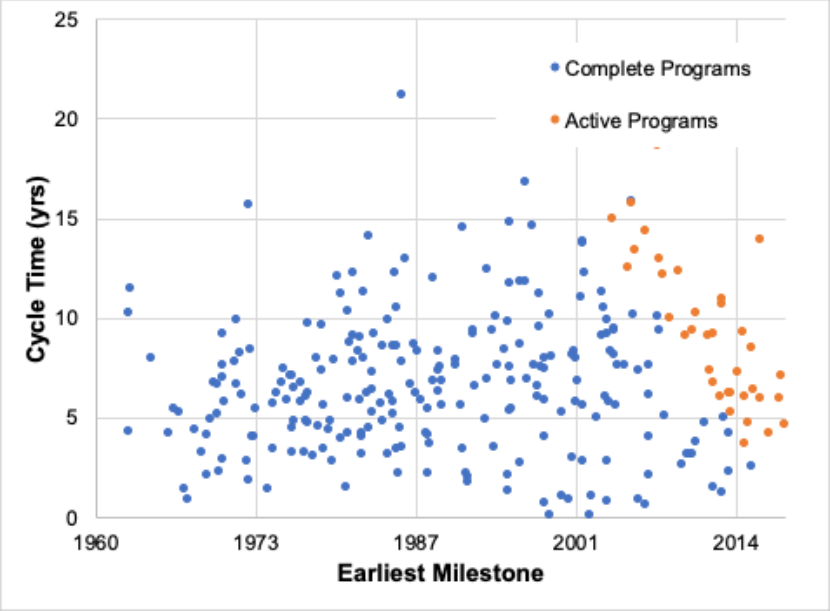

Figure 1. MDAP Cycle-Times, Active + Complete MDAPs (1962–Present)

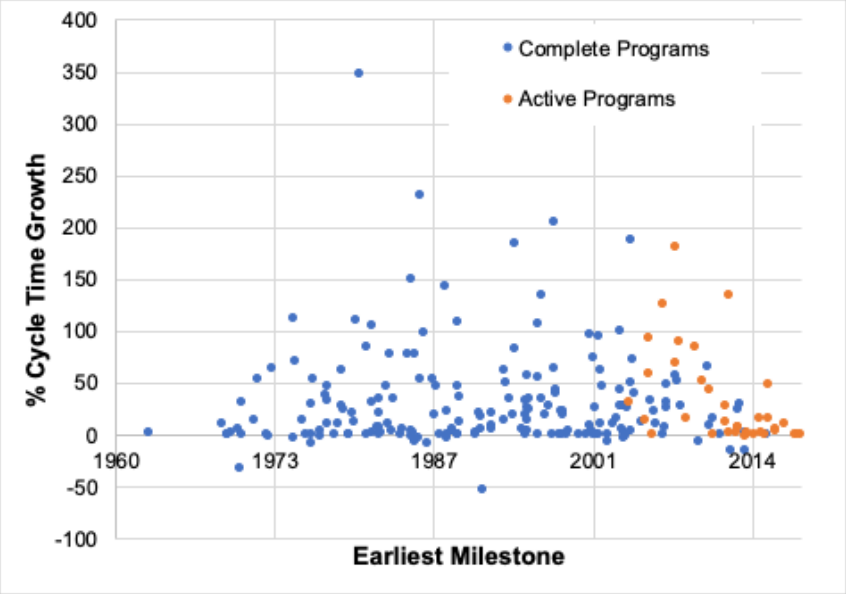

Figure 2. MDAP Cycle-Time Growth, Active + Complete MDAPs (1962–Present)

To assess the latter hypothesis and the potential that today's reforms will reduce cycle-times and cycle-time growth, we can compare these metrics across past cycles of acquisition reform. Tables 4 and 5 show cycle-time and cycle-time growth statistics for active and complete MDAPs that were initiated (i.e., passed their earliest milestone, either B or C) within given reform cycles. Although an MDAP may pass through multiple reform cycles during its life cycle, like McNicol & Wu (2014), we assume that MDAP outcomes are most significantly affected by the policies in place at the program's initiation.

Differences between reform cycles are not immediately obvious from Tables 4 and 5. Therefore, to further explore our hypothesis that different oversight approaches affect cycle-times, we grouped programs according to whether they were initiated during cycles of

centralized or decentralized oversight. Interestingly, Table 6 shows that MDAPs initiated under centralized oversight have shorter cycle-times and lower rates of cycle-time growth. Using a two-sample t-test assuming unequal variances, we did not find the differences in cycle-time to be statistically significant between MDAPs that were initiated during cycles of centralized or decentralized oversight (p=0.17). We did, however, find a statistically significant difference between the cycle-time growth that occurs when MDAPs are initiated in periods with centralized versus decentralized oversight (p=0.04). These results, of course, are subject to the assumptions that we summarized in Table 2 and to our decision to include both active and complete programs in our analysis.

Table 4. Cycle-Times and Cycles of Acquisition Reform (Active + Complete MDAPs, 1962–2016)

Reform Cycle	Years	Mean	Median	Max.	Min	N
McNamara Reforms	1961-1969	5.0 yrs	4.4 yrs	11.5 yrs	0.9 yrs	14
Defense Systems Acqusition Reform Council	1970-1980	6.0 yrs	6.0 yrs	15.7 yrs	1.4 yrs	54
Acqusition Improvement Program	1981-1989	7.1 yrs	6.5 yrs	21.2 yrs	1.5 yrs	62
Defense Acquisition Board	1990-1993	6.9 yrs	6.9 yrs	14.5 yrs	1.8 yrs	15
Mandate for Change and Transformation	1994-2007	7.6 yrs	7.6 yrs	16.8 yrs	0.1 yrs	83
Weapon Systems Aqusition Reform Act	2008-2016	7.2 yrs	6.3 yrs	18.7 yrs	1.3 yrs	42
ALL CYCLES	1961-2016	6.9 yrs	6.6 yrs	21.2 yrs	0.1 yrs	270

Table 5. Cycle-Time Growth and Cycles of Acquisition Reform (Active + Complete MDAPs, 1962–2016)

Reform Cycle	Years	Mean	Median	Max	Min	N
McNamara Reforms	1961-1969	3.0%	1.7%	11.4%	0.0%	5
Defense Systems Acqusition Reform Council	1970-1980	23.6%	12.9%	112.5%	-31.7%	34
Acqusition Improvement Program	1981-1989	41.3%	11.1%	346.7%	-8.0%	48
Defense Acquisition Board	1990-1993	14.7%	13.5%	62.0%	-53.6%	13
Mandate for Change and Transformation	1994-2007	35.1%	22.2%	204.2%	-7.1%	81
Weapon Systems Aqusition Reform Act	2008-2016	26.7%	10.5%	180.0%	-15.2%	40
ALL CYCLES	1961-2016	31.2%	14.6%	346.7%	-53.6%	221

As active programs mature, their schedules may grow or shrink and affect our analysis accordingly. We included active programs, however, so as not to bias our results by including only the shorter programs that were initiated during the *Weapon Systems Acquisition Reform Act* cycle. Indeed, when we included only complete programs in our analysis, we noticed that MDAPs initiated during the *Weapon Systems Acquisition Reform Act* cycle had shorter cycle-times than programs initiated during previous cycles.

That said, using only our analysis of active and complete MDAPs, it still possible to draw several conclusions. First, the historic cycles of acquisition reform have had a limited impact on MDAP cycle-times. One potential explanation is that oversight—whether it is centralized or decentralized—is not a key driver of MDAP schedules. MDAPs produce some of the Department's most complex and mission-critical capabilities. Therefore, it's likely that the technology the DoD builds—rather than the approach the DoD uses to oversee that technology—is what actually drives MDAP program schedule. Rather than focusing on

oversight, to speed up acquisition, reformers should change the technology that the DoD builds rather than the oversight that the DoD uses.

Table 6. Cycle-Times and Cycle-Time Growth, Classified by Oversight Type, Active + Complete MDAPs (1962–2016)

	Oversight	Mean	Median	Max.	Min	N
Cycle Time (years)	*Centralized*	6.6 yrs	6.3 yrs	18.7 yrs	1.3 yrs	111
	Decentralized	7.2 yrs	6.8 yrs	21.2 yrs	0.1 yrs	159
Cycle Time Growth (percent)	*Centralized*	23.7%	12.4%	180.0%	-53.6%	87
	Decentralized	36.2%	19.0%	346.7%	-8.0%	134

Second, centralized oversight does result in more reliable schedule estimates. By adding more checks and balances to the program management process, centralized oversight may be more capable of countering organizations' tendency to create optimistic schedule estimates. Therefore, if schedule reliability becomes a priority in the future, reformers may wish to centralize oversight.

In terms of today's reforms, which recently decentralized oversight, the implications are twofold. First, recent initiatives to delegate authority away from the OSD, to further delegate authority within the military services, and to use alternative acquisition pathways or contracting approaches, will not necessarily achieve their objective of accelerating the time to field new MDAPs. To shorten MDAP cycle-times, the DoD may need to instead change *what* technology it buys, rather than how it buys technology. Second, rather than speeding up acquisition, today's reforms may instead decrease the certainty with which the DoD is able to predict acquisition speed.

Assessing Today's Reform Cycle

Although the above analysis suggests that today's reforms may not increase acquisition speed, it is still useful to assess reformers' specific objectives and the implications if the DoD fails to achieve them. As noted above, today's reformers appear to have prioritized speed in order to retain a technological advantage vis-à-vis China and to keep pace with the private sector.

Comparing cycle-times across the DoD, China, and the private sector is challenging, however, because there is limited open source data on both Chinese and private sector cycle-times.

The best we can do, therefore, is to compare our dataset of over 200 MDAPs to a handful of benchmark systems. Such comparisons occur frequently in policy discussions; for example, during a hearing, Senator Angus King stated, "By the way, on procurement, not only is there an issue of cost, there is an issue of time. … The time it takes Boeing to get a new aircraft from concept to flight is something like seven years. In the military, it is 23 years" (*Hearing to Consider the Nomination of Patrick M. Shanahan to be Deputy Secretary of Defense*, 2017, pp. 32–33).

Table 7 illustrates that since 1962, it took the DoD an average of 6.3 years to field 52 different fixed-wing aircraft and an average of 7.7 years to field 17 different helicopters. There are two potential explanations for the difference between the senator's data and that which is shown in Table 7. First, Table 7 shows cycle-times, which are measured mostly from Milestone B to IOC. Since the DoD often pushes technological barriers in its systems,

research and development can occur before Milestone B and can therefore increase the time required to field a system. This time is not included in our cycle-time calculation. Second, the senator could have confused worst-case cycle-times—measured from Milestone B to IOC—with the average cycle-times for all other systems. Our data shows that the V-22 helicopter did indeed have a cycle-time of approximately 21 years.

Table 7. Cycle-Times by Platform Type, Complete MDAPs (1962–Present)

Platform Type	Mean	Median	Max	Min	N
Aircraft	6.3 yrs	5.7 yrs	14.5 yrs	0.9 yrs	52
C4I/Electronic	5.6 yrs	6.2 yrs	14.8 yrs	0.1 yrs	44
Helicopter	7.7 yrs	6.8 yrs	21.2 yrs	0.9 yrs	17
Missile / Munitions	6.7 yrs	6.5 yrs	14.6 yrs	1.5 yrs	70
Satellite	8.8 yrs	7.9 yrs	16.8 yrs	4.2 yrs	16
Ship / Sub	6.8 yrs	4.9 yrs	15.7 yrs	1.3 yrs	28
Vehicle	4.3 yrs	4.4 yrs	8.7 yrs	0.7 yrs	10

DARPA, on the other hand, has compared multiple DoD and commercial systems' cycle-times. Although DARPA's cycle-time definition is unclear, DARPA reports that since 1960, commercial aircraft cycle-times increased from approximately five to seven years (Grayson, 2018). DARPA found that commercial vehicle cycle-times decreased during this time, from approximately seven to two years. From Table 7, we can see that the DoD's average aircraft and vehicle cycle-times are consistent with the private sector, but that the DoD's worst case MDAPs significantly exceeded private sector cycle-times.

That DARPA's analysis only includes aircraft and vehicles illustrates the challenge of comparing DoD MDAP cycle-times with those in the private sector: for many MDAPs, there is no commercial equivalent. This makes the DoD's goal of fielding systems "at the speed of relevance" (DoD, 2018, p. 10) particularly hard to set and assess. China's acquisition speed, however, can provide a useful benchmark for establishing the "speed of relevance" (DoD, 2018, p. 10) in a purely military context.

For some platform types, the DoD's average cycle-times appear to outpace comparable Chinese systems—even though China frequently accelerates its technology development process using espionage, intellectual property theft, and foreign military procurement (Gilli & Gilli, 2019). For example, although the DoD fields aircraft in an average of 6.3 years, China fielded the J-20 and the Y-20 in approximately 16 and 11 years, respectively (Chan, 2018; Gilli & Gilli, 2019; Majumdar, 2017; Minnick, 2016; Roblin, 2018). Compared to the DoD aircraft shown in Table 7, China's cycle-times are closer to the DoD's worst-case cycle-time for aircraft. Furthermore, the J-20 and Y-20 are also reportedly inferior to comparable U.S. systems. For example, compared to the F-22, the J-20 is less stealthy and suffers from engine design issues (Gilli & Gilli, 2019). Compared to the C-17, the Y-20 has less range and payload capacity and also suffers from engine issues (Roblin, 2018).

The DoD's average cycle-time for subs and ships—6.8 years—also outpaces some open-source examples from China. For example, China fielded the Type 093 Shang-class submarine, which reportedly still has problems with detectability in approximately nine years (Office of Naval Intelligence, 2015; Zhen, 2018). China also fielded its Type 052 destroyer in approximately nine years (Erickson, 2017; Global Security, n.d.; Naval Technology, 2020; Sino Defense, 2017); although notably, upgrades to this ship are reportedly comparable to

DoD capabilities (Chan, 2019; Yoshihara & Holmes, 2012). Finally, China fielded its new aircraft carrier, the Type 001A Shandong (CV-17) rather quickly, in six years (Blanchard, 2019; Chan, 2019; CSIS, 2019; Huang, 2019; Joe, 2019). Compared to DoD capabilities, however, China's carrier lacks comparable endurance, lift capability, and capacity (China Power Team, 2019; Gady, 2017; Panda, 2019). In each of these examples, however, China's cycle-times did outpace the DoD's worst case cycle-times.

While our conclusions are obviously limited by the availability of data, private sector and Chinese cycle-times provide a benchmark for determining "the speed of relevance" (DoD, 2018, p. 10) on MDAPs. For MDAPs, it appears that the DoD has historically operated at average speeds that are at least comparable to both the private sector and to China. In several instances, however, the DoD's worst case cycle-times did significantly exceed cycle-times in both private sector and Chinese cycle-times. These observations suggest that recent reforms—which decentralized oversight to accelerate acquisition across all MDAPs—may have been unnecessary. Rather than reforming the process for all MDAPs, the DoD could have instead addressed the specific—oftentimes technical reasons—that certain MDAPs have large cycle-times. And for all other MDAPs, the DoD could have kept pace with commercial and adversary timelines simply by fielding MDAPs at average rates comparable to those in the past.

Potential for Current and Future Reforms

The DoD is only three years into the current reform cycle, so it is too soon to tell whether these reforms will accelerate acquisition. Unfortunately, our analysis of past reform cycles suggests that today's reforms—which decentralized oversight—may not reduce MDAP cycle-times and instead, are likely to decrease the certainty with which the DoD can predict acquisition speed. Luckily, compared to private sector and adversary cycle-times, the DoD has historically fielded MDAPs close to or faster than its desired "speed of relevance." Thus, even if today's reforms fail to accelerate MDAP acquisition, the national security implications are not necessarily dire.

Perhaps the most important takeaway from our analysis, though, is that not only is acquisition reform a "neverending cycle," but that reformers repeatedly use similar mechanisms to achieve varied objectives. In particular, we characterized reform cycles in terms of centralized and decentralized oversight and leveraged this framework to assess how reform cycles' impacted MDAP cycle-times. From this analysis, we suggest that decentralizing oversight is not necessarily an effective means to decrease MDAP cycle-times or cycle-time growth. Prior to initiating future reforms, we hope that reformers will undertake similar analyses and after doing so, will be able to select the most effective mechanisms to achieve their objectives.

Disclaimer

The Center for Strategic and International Studies does not take specific policy positions. Accordingly, all views, positions, and conclusions expressed in this publication should be understood to be solely those of the author(s).

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