Updates to Selected Analyses from the *Performance of the Defense Acquisition System* Series

2020 Update

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Principal Contributor: Katherine Houston
AIRC Contributors: Philip S. Anton, Paul DiRenzo, and Kaylee Kehler
Software Contributor: Sean Brady

Brian Joseph
Deputy Director, Data Analytics
OUSD(A&S)/Acquisition Analytics & Policy

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1. Introduction and Summary

In 2013, 2014, 2015, and 2016 the Department of Defense (DoD) produced annual reports on the *Performance of the Defense Acquisition System (PDAS)*, along with partial updates with 2017, 2018, and 2019 data.[1] We encourage the interested reader to consult those volumes for background on defense acquisition, spending levels, and trends as well as a range of analyses on cost, performance, and schedule of Major Defense Acquisition Programs (MDAPs). Additional analyses look at contractor performance, the acquisition workforce, and source selection practices.

In January 2020 the Office of the Under Secretary of Defense for Acquisition and Sustainment (OUSD(A&S)) introduced the Adaptive Acquisition Framework (AAF). This policy acknowledges that there is not a one size fits all solution for managing acquisition programs. The AAF provides different acquisition pathways so program managers are better equipped to tailor their strategies and delivery capabilities at the speed of relevance. This report previously focused on MDAPs which are part of the Major Capability of Acquisition (MCA) pathway, along with lower ACAT programs. In addition to the MCA pathway, there are five other pathways; Urgent Capability Acquisition, Software Acquisition, Defense Business Services, Acquisition of Services, and Middle Tier of Acquisition (MTA). As these pathways and their data mature, this report will evolve to report on the various pathways.

Previous PDAS reports examined four areas for MDAPs using data from the annual Selected Acquisition Report; Nunn-McCurdy Breaches, Program Cost Performance (Development), Program Cost Performance (Procurement), and Growth of Program Cycle Time. This year's PDAS will be a bit different. The FY 2022 President's Budget did not include a detailed future-year spending forecast and as a result the annual December 2020 SARs were not submitted. Instead of focusing on cost performance and cycle times for MDAPs, this PDAS will include information on the MTAs, Other Transaction Authority (OTA), Digital Acquisition Strategy, and the Acquisition Innovation Research Center.

Here, we update the Nunn-McCurdy Breaches section from the *Performance of the Defense Acquisition System* series with recent data. To provide continuity, we use the methodologies established in the original reports, noting corrections and improvements in the relevant sections.

We provide updates on five topics:

Nunn-McCurdy Breaches. We present the Department of Defense's official list of Nunn-McCurdy breaches (Table 1) categorized by Component (Figure 2 and Table 2) and commodity type (Table 3). The counts of both critical and significant Nunn-McCurdy breaches have continued their downward trend since 2006, with the decreasing trend in critical breaches being statistically significant. This could be due to better program management, better baseline cost estimates, or a combination of these factors.

Middle Tier of Acquisition (MTAs). We introduce the Middle Tier of Acquisition with the number of active MTA programs by type and component (Table 4) and the MTA funding by type and component (Table 5). As this is a new pathway it should be noted that there are still some issues with the data as the components become familiar with guidance and data entry.

Other Transaction Authority (OTA). We look at the Department of Defense's Prototype Other Transaction use. From FY 2007 to FY 2019 the number of new Prototype OTs increased as did the obligations through

[1] See Under Secretary of Defense for Acquisition, Technology, and Logistics (USD[AT&L]) (2013), USD(AT&L) (2014), USD(AT&L) (2015), and USD(AT&L) (2016); Office of the Under Secretary of Defense for Acquisition and Sustainment [OUSD(A&S)], 2019.

Prototype OTs. FY 2020 showed a slight downtick in the number of new Prototype OTs, less than 5 percent decrease (Figures 4 and 5).

Digital Acquisition Strategy. We provide an overview of the DoD's new vision and strategy for Digital Acquisition to improve acquisition outcomes against agile adversaries and the increasing pace and availability of technology. In addition to working to improve acquisition performance it will increase the ability of data and analysis, increasing our ability to measure and report on those outcomes in future editions of this report.

Acquisition Innovation Research Center (AIRC). Finally, we provide an important new strategic effort in response to 10 U.S. Code [U.S.C.] 2361a, engaging academia to assist the DoD in improving acquisition outcomes. This overview of AIRC sets the stage for additional efforts to measure and improve the performance of the defense acquisition system.

2. Nunn-McCurdy Program Breaches

Each Major Defense Acquisition Program (MDAP) is required by law to submit a comprehensive annual Selected Acquisition Report (SAR) to Congress within 30 days after the annual President's budget (PB) submission. Quarterly SARs are required under various other circumstances and shall be submitted within 45 days after the end of the fiscal-year quarter (see 10 U.S.C. § 2432). A SAR reflects what is included in the PB as well as a comprehensive summary of MDAP cost, schedule, and technical performance (requirements) measures. Historical SAR data serve as the primary sources for much of our program-level analysis due to their relative availability and comprehensiveness.

Common program cost metrics[2] (such as Program Acquisition Unit Cost (PAUC)[3], which considers total acquisition costs (i.e., RDT&E, procurement, military construction, and acquisition operation and maintenance costs)—and total (i.e., fully configured development and procurement) quantities, and Average Procurement Unit Cost (APUC)[4], which includes only procurement dollars and quantities) are codified in statute. The statute also requires that programs exceeding certain thresholds (measured by PAUC or APUC changes relative to their original and current program baselines) must go through a rigorous reexamination and, in some cases, certification to Congress along a variety of specified criteria. This process is commonly referred to as the "Nunn-McCurdy" process, named for the original sponsors of the legislation dating back to 1982 (see 10 U.S.C. § 2433a).

Two types of breaches are called out in the Nunn-McCurdy process: *significant* and *critical*. A significant breach is the lower threshold and is intended to warn Congress that a program is experiencing significant unit-cost growth relative to its baseline. A critical breach signifies the cost growth is even higher, triggering the formal reexamination and certification process mentioned above. The criteria for a significant breach are either 15 percent from the current baseline, or 30 percent cost growth in APUC or PAUC from the original baseline. A critical breach occurs when the program experiences 25 percent cost growth from the

[2] Here, "cost" is synonymous with the total amount of funding because it reflects the prices paid on contracts as well as program execution costs.
[3] 10 U.S.C. § 2432(a)(1), defines PAUC as "the amount equal to (A) the total cost for development and procurement of, and system-specific military construction for, the acquisition program, divided by (B) the number of fully configured end items to be produced for the acquisition program."
[4] 10 U.S.C. § 2432(a)(2), defines procurement unit cost as "the amount equal to (A) the total of all funds programmed to be available for obligation for procurement for the program, divided by (B) the number of fully configured end items to be procured."

current baseline, or 50 percent cost growth from the original baseline. Figure 1 shows the Nunn-McCurdy breaches year-by-year from 1997 through 2020 by severity.

As with the previous PDAS update [OUSD(A&S), 2020), we continue to report Nunn-McCurdy statistics based on the DoD's official list of breaches from 1997 through December 2020 (see Table 1). The numbers of breaches per year are slightly different than in the DoD's 2013 and 2014 reports.[5] It is important to note that the National Defense Authorization Act (NDAA) for FY 2006 made changes to the Nunn-McCurdy statute by adding the requirement to report unit-cost growth from the original baseline in addition to the current baseline. This additional requirement caused a large spike in 2005 when 11 programs had to report preexisting significant breaches. Thus, for historical comparisons, we need to compare performance in years since 2006.

[5] The DoD's prior reports used quarterly SARs, whose dates may not align with the exact breach reporting dates to Congress. The DoD also used to report breaches by SAR years, which do not align completely with calendar years because SARs can include information from the beginning of the next calendar year. In addition, canceled programs may not have a final SAR, and programs stop reporting at 90 percent of cost expended or quantity delivered.

Table 1. Official DoD List of Nunn-McCurdy Breaches (SAR Years 1997–2020)

Year	Critical	Significant#
1997		• Chem Demil-Legacy/NSCMD
1998		• FMTV • Javelin • Longbow Apache
1999	• ATIRCM/CMWS • B-1B CMUP	• NAVSTAR GPS/Satellite
2000		
2001	• CH-47F • Chem Demil-CMA/CSD • F-22 • GMLRS • H-1 Upgrades (4BW/4BN) • LPD 17 • Navy Area TBMD[a] • SBIRS High	• B-1B CMUP • MH-60R • V-22
2002	• ATACMS-BAT:BAT P3I[b]	• Comanche • SSN 774
2003	• EELV	• F-35
2004	• Chem Demil-CMA • Chem Demil-CMA Newport	• AEHF • RQ-4A/B UAS Global Hawk • SBIRS High
2005*	• NPOESS • RQ-4A/B UAS Global Hawk • SBIRS High	• ATIRMC/CMWS* • C-130 AMP* • Chem Demil-CMA* • Chem Demil-CMA Newport* • EFV* • F/A-18E/F* • JASSM* • JPATS* • MH-60S* • SSN 774* • ASDS[b] • GMLRS • F-35*
2006	• C-130 AMP • Chem Demil-ACWA • EFV • GMLRS • JASSM • JPATS • Land Warrior[b] • WIN-T	• FBCB2
2007	• C-5 RERP	• AEHF • ARH • JAVELIN • JTRS GMR
2008	• AEHF • ARH[a] • VH-71[a,d]	• H-1 Upgrades (4BW/4BN)
2009	• Apache Block III (AB3) • ATIRCM/CMWS • DDG 1000 • E-2D AHE • F-35 • RMS • WGS	• C-130 AMP
2010	• Chem Demil-ACWA • EFV[b] • Excalibur • RQ-4A/B UAS Global Hawk	• C-27J • Inc1 E-IBCT[b] • JLENS • NPOESS
2011	• AIM-9X Block I[b] • C-130 AMP[b] • JLENS[c] • JTRS GMR[a]	
2012	• EELV	
2013	• JPALS Inc 1A • VTUAV	• AWACS Block 40/45 Upgrade • JTRS HMS
2014	• JSOW[b]	• WIN-T (Inc 2)
2015	• RMS[b]	
2016	• OCX	• Chem Demil-ACWA
2017	• AAG[e] • IDECM[f]	• LCS MM
2018		• OASuW Inc 1 LRASM • F-15 EPAWSS
2019		• SDB II • AGM-88E AARGM
2020		

Programs that declared a significant breach and subsequently a critical breach in the same SAR year are listed only as critical breaches. Programs that declared multiple significant breaches in the same SAR year are listed only once.

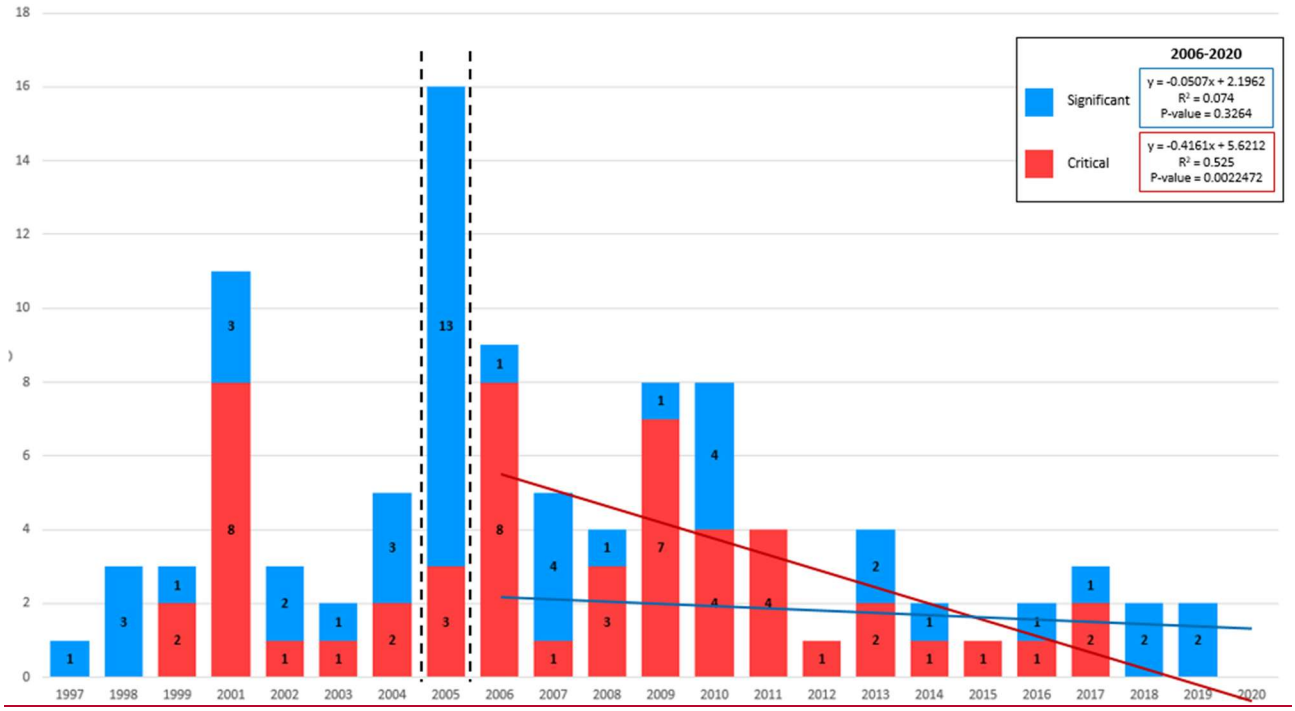
* Programs in purple shading (2006–2015 for critical; 2005–2015 for significant) breached against the original baseline as per the FY 2006 NDAA. Programs in blue shading (1997–2005 for critical; 1997–2004 for significant) breached according to prior criteria that allowed re-baselining. Eleven programs that did not have a breach prior to the new FY 2006 criteria had significant breaches as a result of this legislative change. The FY 2006 NDAA also permitted the following 25 programs to revise their original baselines to equal their current baseline estimates as of January 6, 2006, without declaring a critical breach: AEHF; AMRAAM; ASDS; Black Hawk Upgrade; Bradley Upgrade; C-17A; CH-47F; EELV; F-22A; FCS; FMTV; Global Hawk; GMLRS; Javelin; JSOW; H-1 Upgrades; Longbow Apache; LPD-17; MH-60R; Minuteman III Guidance Replacement Program; NPOESS; SBIRS High; T-45TS; Trident II Missile; V-22.

Program abbreviations are defined in Appendix A.
a Following a declared breach, the program was terminated rather than certified.
b Breach resulted from a decision to terminate the program.
c Breach resulted from a decision to terminate procurement phase; Engineering, Manufacturing and Development (EMD) units were completed.
d DoD did not submit a December 2008 SAR to Congress. The VH-71 breach was reported in the March 2009 SAR, but the breach occurred in the 2008 reporting period.

e AAG was directed to report a critical Nunn-McCurdy breach in the FY 2017 NDAA using their FY 2009 ACAT II APB as the original estimate. The out-of-cycle Nunn-McCurdy SAR was submitted on May 15, 2017 but is not used as the initial SAR for the program.

f Breach resulted from a quantity reduction.

Figure 1. Nunn-McCurdy Breaches by Severity (SAR Years 1997–2020)

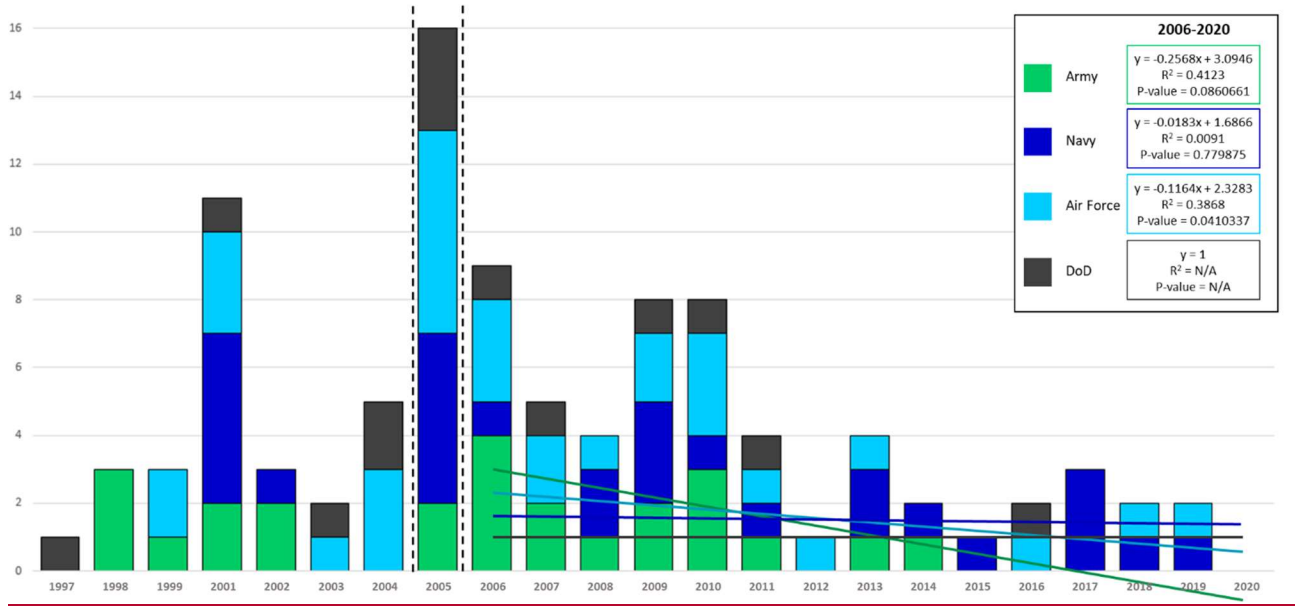


NOTE: The criteria for breaches were changed in NDAA 2006, so the counts before 2005 are different than those since 2006. 2005 was a transition year and is not comparable to the years before or after the enactment of the 2006 NDAA. Breaches are determined using "base- year" dollars (i.e., adjusting for inflation). This plot includes the number of breaches in each annual SAR cycle, which nominally equates to calendar year but may include updates early in the following calendar year from the President's Budget Request. Breaches in different years for different thresholds or baselines for the same program are included in each respective year. If a program reported both a significant and critical breach in the same year, only one breach is shown here. Nunn-McCurdy breaches are decreasing, with critical Nunn-McCurdy breaches decreasing at a faster rate than significant Nunn-McCurdy breaches since 2006. The critical Nunn-McCurdy breach trend line (red) is statistically significant (R^2 = 52.5%) while there is no trend in significant breaches from 2006–2019 (the blue line) given the very low R^2 of 7.4%. This suggests that the Department is doing a better job at preventing critical breaches since 2006. There is also a statistically significant downward trend in the combined number of critical and significant breaches.

2.1 Breaches by Component

One measure of acquisition program cost performance is the Nunn-McCurdy breach rate by DoD Component. In this analysis, "DoD" programs are programs categorized as such in the SARs, which include joint programs and programs (such as Chem Demil) overseen by an organization other than the Air Force, Army, or Navy.[6] Figures 1 and 2 show significant and critical Nunn-McCurdy breach numbers year-by-year from 1997 through 2020. Figure 1 shows Nunn-McCurdy breaches by severity, whereas Figure 2 shows Nunn-McCurdy breaches by service. The FY 2006 NDAA introduced the requirement to report unit-cost growth from the original baseline in addition to the current baseline. Figure 2 shows that, since the change in 2006, there has been a significant decline in Nunn-McCurdy breaches from the Air Force. These charts align with the DoD official breach list (Table 1). There were no Nunn-McCurdy breaches reported in 2020.

Figure 2. Nunn-McCurdy Significant and Critical Breaches by DoD Component (SAR Years 1997–2020)



NOTE: The criteria for breaches were changed in NDAA 2006, so the counts before 2005 are different than those since 2006. 2005 was a transition year and is not comparable to the years before or after the enactment of the 2006 NDAA. Breaches are determined using "base- year" dollars (i.e., adjusting for inflation). This plot includes the number of breaches in each annual SAR cycle, which nominally equates to calendar year but may include updates early in the following calendar year from the President's Budget Request. Breaches in different years for different thresholds or baselines for the same program are included in each respective year. If a program reported both a significant and critical breach in the same year, only one breach is shown here.

[6] This analysis attributed programs to the same DoD Component as USD(AT&L) (2016). Additionally, the following Navy programs released their first SAR in 2016 or 2017: AAG, ACV 1.1, IRST, NGJ Inc 1, OASuW Inc 1 (LRASM), T-AO 205 Class, and SSBN 826. The following Army programs released their first SAR in 2016 or 2017: M88A2 HERCULES, CH-47F Block II, and CIRCM. The following Air Force programs released their first SAR in 2016: B-2 DMS-M, F-15 EPAWSS, and MGUE Inc 1.

Table 2 summarizes a different analysis of Nunn-McCurdy breaches by DoD Component. Here we do not "double count" programs that have breached multiple times. This allows us to get a sense of the tendency of programs to breach within each DoD Component. All breaches are listed regardless of cause. If a program had both a significant and a critical breach, it was included only in the "programs with critical breach" column.

Historically, about a third of MDAPs had at least a significant cost breach (and conversely, about two-thirds of the MDAPS have cost growth below 15 percent). Also, almost two-thirds of programs that breach at any level had a critical breach (i.e., fewer remain at the significant level), except for Army programs, which are more evenly split between significantly and critically breaching programs.

Table 2. Nunn-McCurdy Breach Rate by DoD Component (SAR Years 1997–2020)

Component	Total # Programs	# Programs that Ever Breached	Breach Rate	# Programs with at Most a Significant Breach	# Programs with a Critical Breach
DoD	8	6	75%	1	5
Army	63	18	29%	8	10
Navy	77	23	30%	9	14
Air Force	67	18	26%	5	13
Total	**215**	**65**	**31%**	**23**	**42**

NOTE: The analysis used DoD's December 31, 2020 official list of Nunn-McCurdy breaches. If a program had both a significant and critical breach, it was included only in the "# Programs with a Critical breach" column. Breaches are determined using "base-year" dollars (i.e., adjusted for inflation). This table includes all DoD programs that released a SAR with funding information during the time period and does not control for program maturity.

2.2 Breaches by Commodity

Table 3 below summarizes Nunn-McCurdy breaches by commodity.[7] As above, we do not "double count" programs that have breached multiple times. This allows us to compare the types of programs that have poor cost-growth performance (as evidenced by crossing any Nunn-McCurdy threshold) to those that have never breached during this period. All breaches are listed regardless of cause. If a program had both a significant and a critical breach, it was included only in the "programs with critical breach" column.

Table 3. Fraction of MDAPs by Commodity Type with Any Nunn-McCurdy Breach (SAR Year 1997–2020)

Commodity Type	Total # of Programs	# of Programs That Ever Breached	Breach Rate	# of Programs with at Most a Significant Breach	# of Programs With At Least One Critical Breach
Chem Demilitarization	4	4	100%	1	3
Space Launch	1	1	100%	—	1
Helicopter	20	10	50%	5	5
Fixed-Wing Aircraft	29	10	34%	3	7
Satellite	16	5	33%	1	4
UAV	7	2	29%	—	2
Ship/Submarine	24	6	26%	3	3
C4ISR	57	13	23%	4	9
Ground Vehicle	14	3	21%	2	1
Munition/Missile	34	10	29%	4	6
Missile Defense	9	1	13%	—	1
Total	**215**	**65**	**31%**	**23**	**42**

NOTE: The table compares number of programs that have crossed any Nunn-McCurdy threshold to those that have never crossed a threshold. Breaches are determined using "base-year" dollars (i.e., adjusted for inflation). This table includes all DoD programs that released a SAR with funding information during the time period and does not control for program maturity.

[7] This analysis uses the same commodity types as USD(AT&L) (2016).

3. Middle Tier of Acquisition (MTA)

In the past, different laws and organizations added layers of oversight to ensure programs were being managed appropriately by ensuring acquisition documents were checked off and approved, often at very high levels, before proceeding. Over time, the system became an impediment, rather than an enabler of delivering capability that outpaced the threat. With authorities Congress provided us for the Middle Tier of Acquisition, we learned that programs can 'get-out-of-the-gate' quicker by greatly streamlining previously required upfront planning, studies, and analyses; without sacrificing disciplined program management and technical rigor.. In January 2020 the Office of the Under Secretary of Defense for Acquisition and Sustainment (OUSD(A&S)) introduced the Adaptive Acquisition Framework (AAF). This policy acknowledges that there is not a one size fits all solution for managing acquisition programs. The AAF provides different acquisition pathways so program managers are better equipped to tailor their strategies and delivery capabilities at the speed of relevance.

In order to reduce the burden on program offices, the MTA path has tier thresholds for data reporting. Smaller programs have less reporting requirements than the larger programs. Programs that exceed MDAP dollar thresholds may be directed by the USD(A&S) to use an alternate pathway. Programs that exceed the MDAP dollar threshold and are approved to use the MTA pathway are required to submit yearly reports to Congress.

3.1 MTA Usage by Component

The MTA policy was the first approved pathway policy in the AAF. The MTA pathway is broken out into two paths, rapid prototyping and rapid fielding.

The rapid prototyping path provides for the use of innovative technologies to rapidly develop fieldable prototypes to demonstrate new capabilities and meet emerging military needs. The objective of an acquisition program under this path will be to field a prototype meeting defined requirements that can be demonstrated in an operational environment and provide for a residual operational capability within 5 years of the MTA program start date. Virtual prototyping models are acceptable if they result in a fieldable residual operational capability. MTA programs may not be planned to exceed 5 years to completion and, in execution, will not exceed 5 years after MTA program start without Defense Acquisition Executive (DAE) waiver (see DoDI 5000.80, Paragraph 1.2.c).

The rapid fielding path provides for the use of proven technologies to field production quantities of new or upgraded systems with minimal development required. The objective of an acquisition program under this path will be to begin production within 6 months and complete fielding within 5 years of the MTA program start date. MTA program production start date will not exceed 6 months after MTA program start date without DAE waiver. MTA programs may not be planned to exceed 5 years to completion and, in execution, will not exceed 5 years after MTA program start without DAE waiver (see DoDI 5000.80, Paragraph 1.2.d).

Table 4 shows the number of MTAs broken out into rapid prototyping (RP) and rapid fielding (RF) by lead component. Table 5 shows the amount of funding by MTA type and lead component.

Table 4. Active MTA Programs by Type and Component

Lead Component	Rapid Prototyping	Rapid Fielding	Total
Air Force	33	9	42
Navy	19	4	23
Army	15	4	19
USSOCOM	12	2	14
Total	**79**	**19**	**98**

Table 5. MTA Funding by Type and Component

Lead Component	Rapid Prototyping ($B)	Rapid Fielding ($B)	Total ($B)
Air Force	22.0	5.3	27.3
Navy	6.4	0.2	6.6
Army	7.2	3.3	10.5
USSOCOM	0.5	0.1	0.6
Total	**36.1**	**8.9**	**45.0**

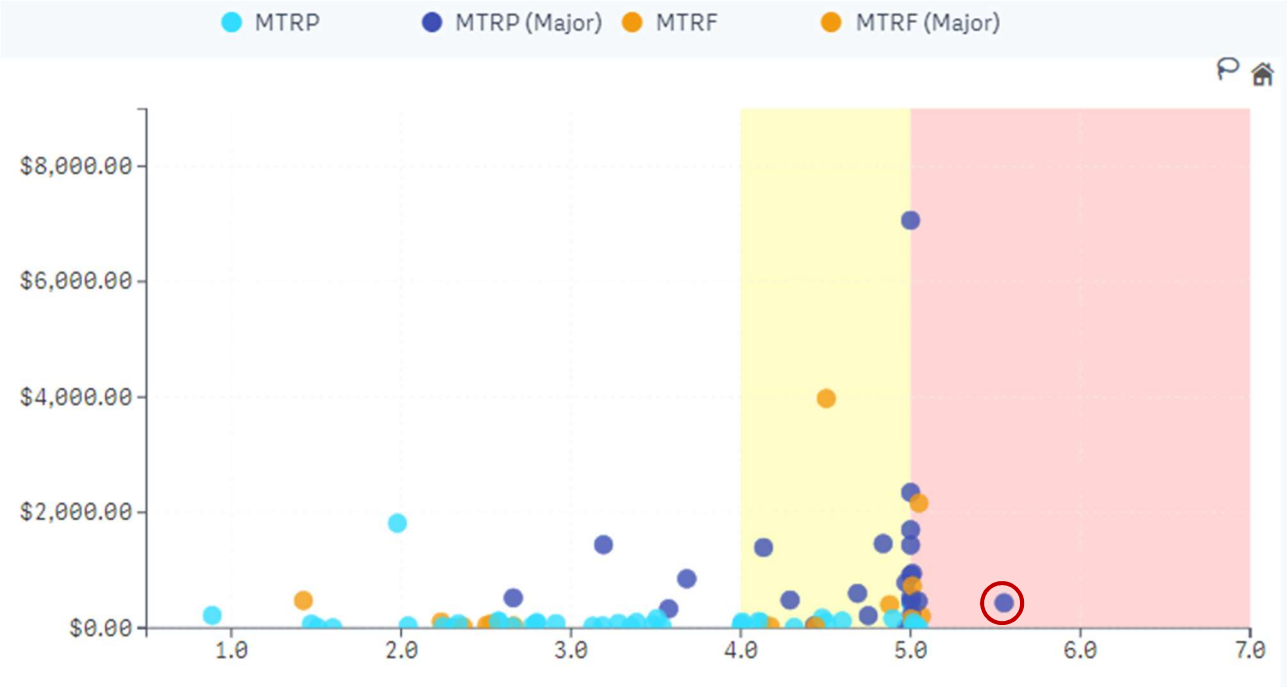
3.2 MTA Schedule

MCA programs document significant schedule events in their APBs and have various reporting requirements for schedule deviations like submitting a Program Deviation Report (PDR) for any APB breaches. If any schedule event that is included in the program's APB is in breach, the program must submit a PDR within 30 days. The PDR reports on causes of the deviation and requires an action plan moving forward.

MTA programs do not have APBs, but comparisons are made against initial data submissions every six months for insight into program progress. Some additional risk is accepted in order to deliver capability faster; it is about delivering capabilities at the speed of relevance. Aggregated reviews by an advisory board are held every six months following data updates from the programs following POM and PB submissions to OSD. The advisory board considers the strategic risks involved, the scope and criticality of the desired capability, and whether programs are well positioned to meet requirements based on review and input from relevant advisors.

Per DoD policy, "MTA programs may not be planned to exceed 5 years to completion and, in execution, will not exceed 5 years after MTA program start without DAE waiver." Figure 3 looks at the estimated duration and total program funding in $M for active MTA programs. All but one of the programs fall within the five-year limit; only the SM-6 Blk IB Phase IB program exceeds five years. This program is circled in red in Figure 3 and the program names, program type, and the estimated duration can be found in Table 6.

Figure 3. Estimated Duration and Total Program Funding ($M) for Active MTAs (POM 2023)



NOTE: The scatter plot is staggered to prevent complete overlap which could potentially hide programs. Only the programs circled in red have an estimated duration beyond five years.

Table 6. MTA Programs with an Estimated Duration Beyond Five Years

Program	Type	Estimated Duration (Years)
SM-6 Blk IB Phase IB	MTRP (Major)	5.6

4. Software Pathway (SWP)

DoD has made great strides over the last year to integrate modern software development practices into its acquisition policies, processes, and culture. Following the recommendations of the Defense Innovation Board and Defense Science Board, Section 800 of the FY2020 NDAA directed DoD to establish pathways as described to provide for the efficient and effective acquisition, development, integration, and timely delivery of secure software. The USD(A&S) issued an interim policy for software acquisition within 14 days of the NDAA being codified into law to supply the acquisition workforce with an initial structure and guidance to navigate this new paradigm. Nine months later, the USD(A&S) approved DoD Instruction (DODI) 5000.87, Operation of the Software Acquisition Pathway, formalizing the sixth acquisition pathway of the Adaptive Acquisition Framework.

The new policy, as described by the USD(A&S) in 2020, *"represents a substantial departure from the department's usual way of doing business*[8]*."* The Software Pathway is built on commercial principles found in Silicon Valley, such as Lean Startup, which enable innovation and rapid delivery of new Minimum Viable Products (MVPs) in response to conditions of uncertainty: rapidly changing user needs, disruptive technologies, and threats on the battlefield. This new pathway implements commercial best practices and principles related to Agile, DevSecOps, Lean, and human-centered design – adapted to the Department's context – to fundamentally transform and accelerate software deliveries. Software is developed in close collaboration with the users and delivers in small, frequent releases. This ensures development is responsive to changes in operations, threats, user priorities, system performance, budgets, and other factors.

For reporting on the Software Pathway, USD(A&S) has taken a streamlined approach to capture important basic program information and performance data to inform enterprise-level trends. These trends will provide important insights to Congressional stakeholders on how the Department is improving its ability to rapidly develop and deploy critical capability into the hands of the warfighter.

The Software Acquisition Pathway (SWP) is broken out into two paths: **Application** and **Embedded Software**. The Applications path provides for rapid development and deployment of software running on commercial hardware, including modified hardware, and cloud computing platform. The Embedded Software path provides for the rapid development, deployment, and insertion of upgrades and improvements to software embedded in weapon systems and other military-unique hardware systems.

The Software Acquisition Pathway currently (as of the date of the report) has **33 approved programs** from across DoD Components and the Services. Given the timing of their entry into the Software Pathway, only 22 programs were required to report this cycle. The Software Pathway has required reporting in the October and April cycles of each year.

Table 7 shows the breakout of approved software programs by path. The expectation is that the predominant usage will be on the application path with important capabilities developed on the Embedded Software path in conjunction with other acquisition pathways.

[8] https://www.nationaldefensemagazine.org/articles/2020/10/7/pentagon-signs-new-acquisition-pathway-to-streamline-software-development

Table 7. SWP Programs Use of the Different Paths

SWP Path	
Application	28
Embedded	5

Table 8 shows the breakout of approved software programs by organization and program phase. The purpose of the Planning phase is to better understand user needs and plan the approach to deliver software capabilities to meet those needs. The planning phase will be guided by a draft CNS developed by the operational community. The purpose of the Execution phase is to rapidly and iteratively design, develop, integrate, test, deliver, and operate resilient and reliable software capabilities that meet users' priority needs.

Table 8. SWP Programs Breakout by Acquisition Phase

Organization	Execution Phase	Planning Phase
Air Force	8	1
OSD	5	0
SOCOM	1	3
Army	4	1
Marine Corps	0	2
Navy	3	5
Total	**21**	**12**

Table 9 and 10 reflects the adoption of key DevSecOps practices that will enable faster and higher quality software development for the Department, namely adoption of automated testing tools and use of a continuous authority to operate (cATO). The Department expects progression in each of these areas as programs improve their processes and infrastructure.

Table 9. SWP Programs Adoption of a Continuous ATO

	Yes	No	Other
cATO Adoption	6	12	4

Table 10. SWP Programs Adoption Automated Testing Tools

	Extensive	Limited	No Use
Automated Test Tools Use	10	12	0

Table 11 captures the Value Assessment ratings that have been completed for programs on the Software Pathway. A Value Assessment is an outcome-based assessment of mission improvements and efficiencies realized from the delivered software capabilities, and a determination of whether the outcomes have been worth the investment. The sponsor and user community perform value assessments at least annually, to inform DA and PM decisions. More frequent value assessments are encouraged if practical.

Table 11. SWP Prgrams Value Assessment Ratings

	Exceptional	High	Moderate	Low	No
Value Assessment Ratings	1	6	1	0	0

In the spirit of full transparency, A&S is providing initial insights into the Software Pathway based on data received from programs in this first reporting cycle. A&S plans to refine inputs in collaboration with the programs and will provide additional insights and initial trends as part of the next reporting cycle.

5. Other Transaction Authority (OTA)

Other Transactions (OTs) are Federal transactions other than FAR-based procurement contracts, grants, cooperative research and development agreements, or cooperative agreements. They provide flexibility and increase DoD access to non-traditional government contractors. There are two OT statutory authorities, one for research (10 U.S.C. § 2371) and the other for prototype projects (10 U.S.C. § 2371b). These two authorities can result in three different types of OTs (1) research, (2) prototypes, and (3) production.

5.1 DoD Prototype OT Use

Excluding 2020, the number of OTs for prototyping has been increasing. In FY 2019, the DoD obligated just over $1B through Prototype OTs, almost four times the amount obligated in FY 2018 ($281M) and there was $593M obligated in FY 2020. Single entities (non-consortiums) received most new Prototype OT awards as well as a majority of the FY 2020 Prototype OT Obligations (95 percent). Figure 4 shows the number of new DoD Prototype OTs by vendor type, single entity or consortium. Figure 5 shows the amount of dollars obligated for new DoD Prototype OTs.

Figure 4. Number of New DoD Prototype OTs

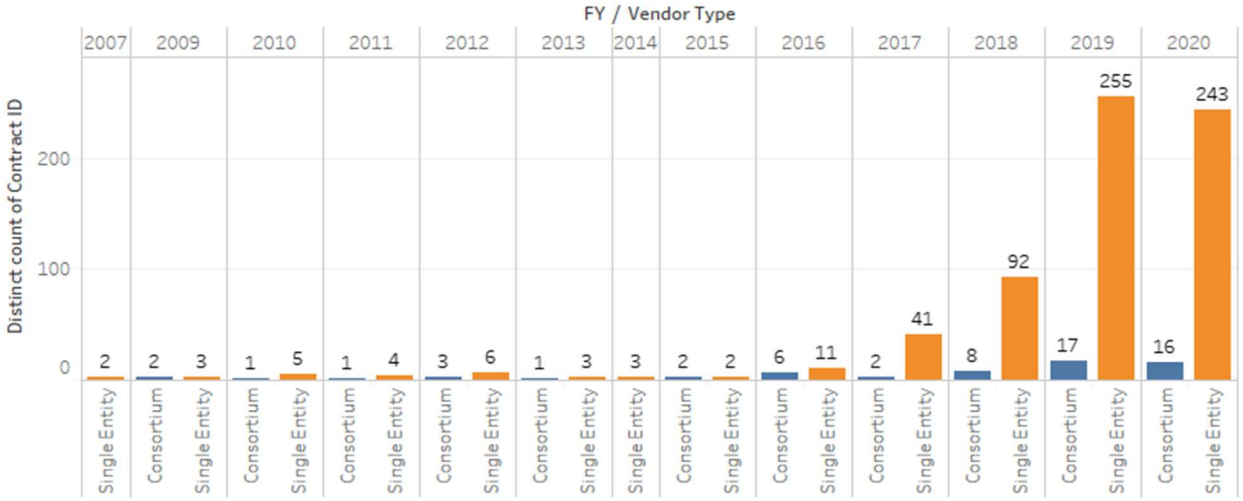
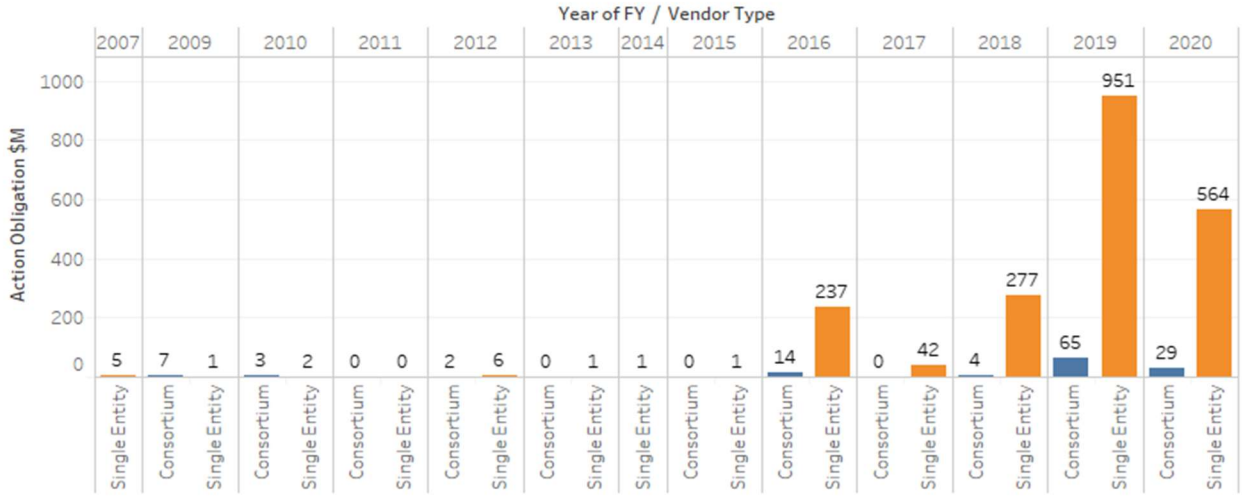


Figure 5. Dollars Obligated for New DoD Prototype OTs



OTs provide both products and services. Figure 6 shows that in FY 2020 consortiums provided services only, mainly R&D, the full list of PSC and their descriptions can be found in Appendix B. Single entities provided both products and services, though mostly services. Figure 7 shows the top prototype OT single entity PSC for FY 2020.

Figure 6. Top Prototype OT Consortium PSC for FY 2020

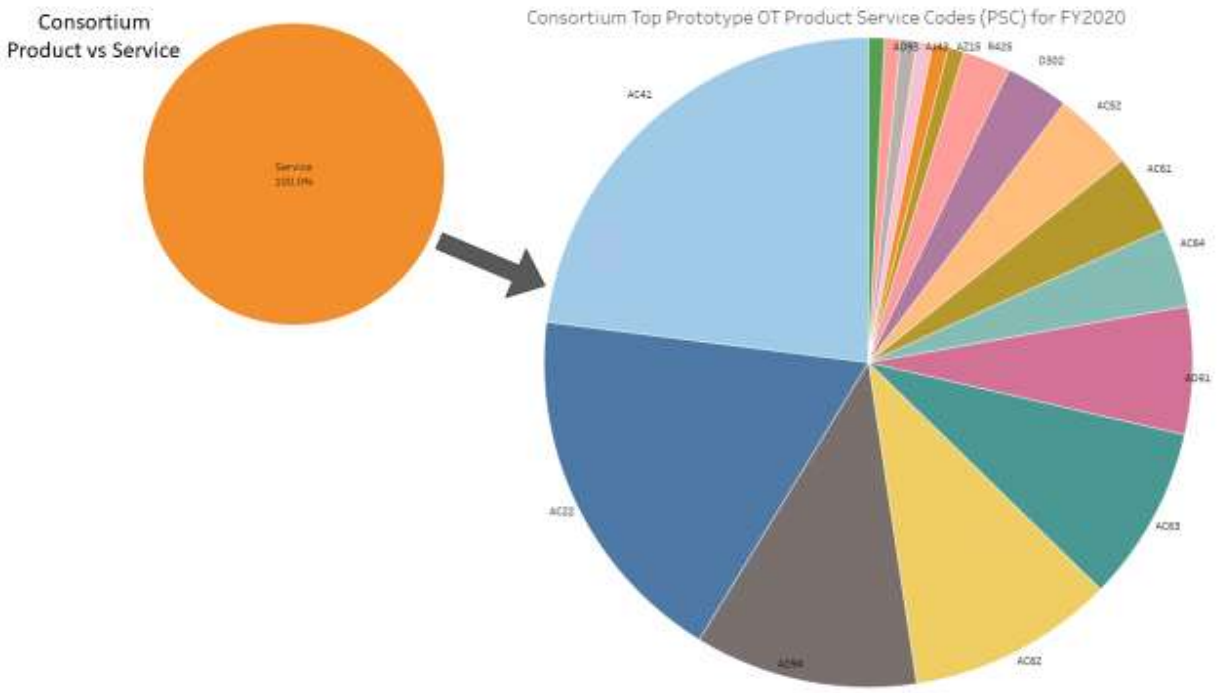
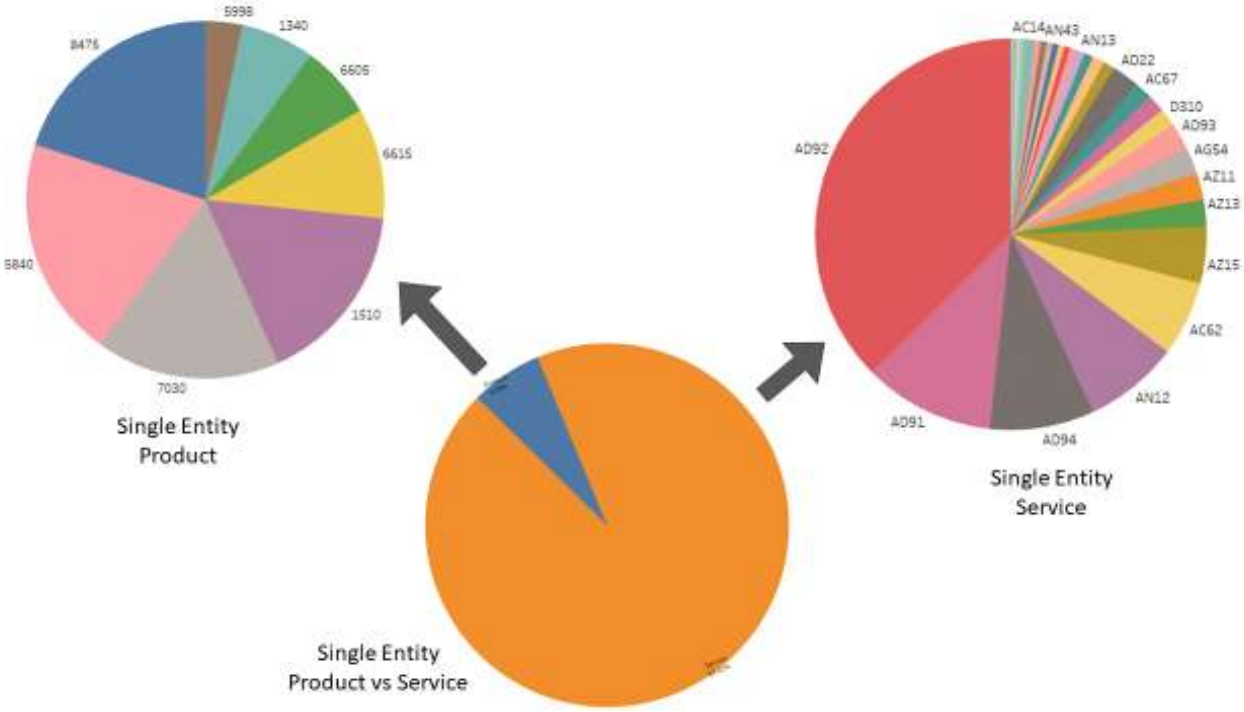


Figure 7. Top Prototype OT Single Entity PSC for FY 2020



6. DoD's Vision and Strategy for Digital Acquisition

The DoD's ***Digital Acquisition and Data Strategy*** lays out a new model for acquisition and sustainment of warfighting capabilities enabled by data and analysis.

The faster evolution of operational threats and the increasing pace of technology development and access by our adversaries require DoD acquisition and sustainment to be faster and better. Against this driving need, there is a tremendous opportunity to integrate innovative advances in acquisition approaches to improve outcomes for the warfighter. These approaches include functional engineering modeling; report automation; model-based solicitations and contract requirements; model-based cost estimating; data collection, curation, and sharing (machine interfaces and federation); big data generation and insights; data analysis; machine learning; and others.

The Defense Acquisition System needs to maintain reform momentum for the U.S. to more actively deterring a potential conflict. The lack of alignment between requirements, resources, and acquisitions prevents the Department from being flexible, fast, or innovative in acquiring capabilities to serve warfighter needs. The Department has an opportunity to leverage the current momentum from recent acquisition reforms to push for larger Department transformation across all stakeholders. The Defense Acquisitions System needs to build upon the reforms of the last four years and push for more deliberate change. Beyond the adoption of the more flexible adaptive frameworks, which "tailored in" pathways and toolkits to enable critical thinking from program managers to deliver capability at the speed of relevance, the DAS requires formal reviews of its resourcing, requirements, and innovation processes.

This chapter provides the first draft of a living vision and strategy that will be maintained and evolved by the acquisition and sustainment community over time. It provides a vision for digital transformation in acquisitions and sustainment, integrating all aspects of the defense acquisition system—including research, design, development, production, testing, contracting, deployment, sustainment, and disposal of systems—as well as the support of and interfaces with the requirements, intelligence, and financial management communities. This effort spans the entire DoD, including acquisition functions and responsibilities across the military services and the fourth estate (e.g., defense agencies, OUSD(A&S), OUSD(R&E), Comptroller, DOT&E, and CAPE).

Core strategic elements lay out how and when these approaches will be pursued and implemented. Key to this implementation is Component-level prototyping and testing in advance of wide-spread implementation to test out and refine concepts, identify costs and barriers, inform implementation and budgeting, and identify early gains. This vision, strategy, and roadmap will be regularly updated as these insights are gained and as new opportunities are identified for prototyping and experimentation.

Digital transformation in acquisitions and sustainment is an imperative. Anticipated outcomes for acquisition and sustainment include:

- Better identification and communication of what capabilities are needed and required to improve warfighter effectiveness
- Improved requirements and design tradeoffs between system cost, schedule, and performance
- Improved ability to manage and engineer sets of capabilities to better integrate individual systems to meet operational needs at the mission, portfolio, and kill-chain/web levels
- Improved access and integration of commercial innovation in DoD systems
- Improved intellectual property (IP) management (e.g., IP valuation, technical data rights, acquisition

decisions, and tracking)
- More agile development, production, fielding, and sustainment of DoD capabilities
- Faster acquisition and sustainment processes
- Streamlined workloads and improved reporting for program, portfolio, kill-chain, and mission management and oversight

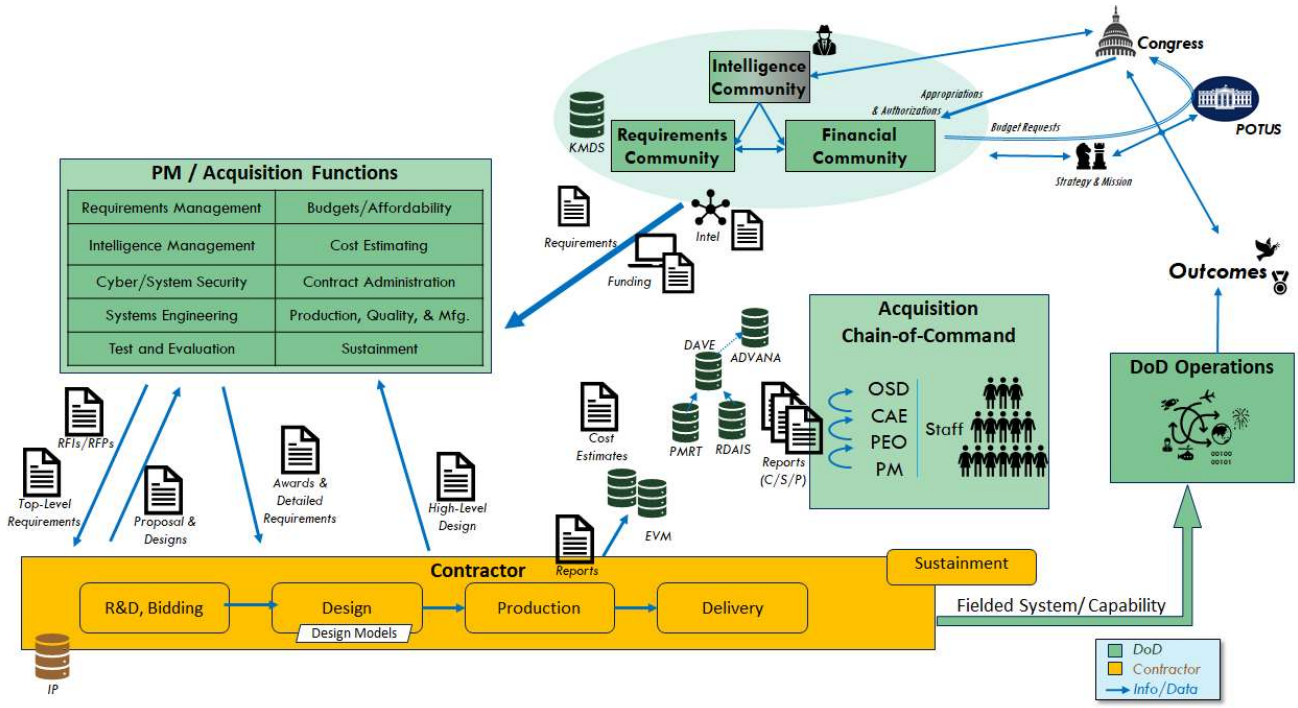
Near-Term Vision: Digitizing Current Practices

Currently, the department is pursuing multiple efforts to improve storage, sharing, and access to digital artifacts within acquisition functions. These artifacts include a mix of structured and unstructured data along with electronic versions of acquisition documents. Databases are either being merged into Advana[9] or are adding application programming interfaces (APIs) to enable machine-to-machine direct access and extraction of data. Data governance can be federated with a centralized body to facilitate standards and access, but such governance tends to be within individual acquisition functional domains (e.g., contract management) rather than across these domains.

Figure 8 illustrates the current document-driven acquisition system. It involves elements of structured and unstructured data, but sharing and access are mixed and often labor intensive as information is collated into new formats. Given the mixed status of APIs and access controls, reporting, processing, and analysis is a mix of automated and manual communications, often with fixed documents or reporting fields serving to communicate information or directives. For example, requirements are provided within approved documents rather than through direct communication between databases. Proposals are solicited through formal documents, and designs are mostly document-based. Cost estimates are produced using mixed access to individual data elements. Earned-value management (EVM) data are provided in fixed data formats (reports). There have been advances in data storage and access (e.g., the EVM Central Repository of EVM data for larger acquisition programs and the federated collection of program status data from Components to OSD), but many of these reports remain labor intensive to generate initially by PMs.

[9] *Advana* is the DoD's Advanced Analytics common platform for enterprise-wide authoritative data management and analytics for OSD.

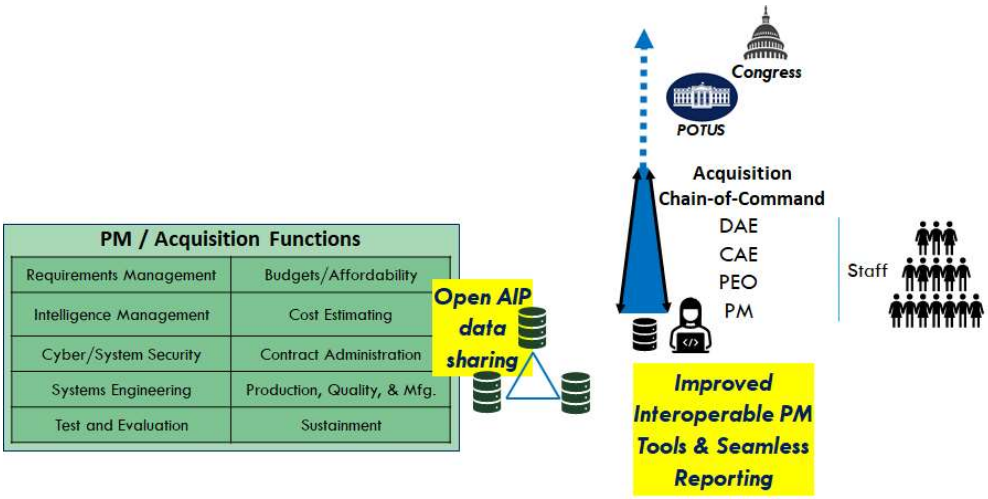
Figure 8: Document-Driven Acquisition



As illustrated in Figure 9, valuable efforts are underway to improve data sharing and analysis of these information, including the aforementioned centralized collection of enterprise information into Advana and the trend to adding APIs and access permissions to databases. Challenges remain, however, including accesses across organizational information networks, concerns of security and insider threats, and the inability of extramural analysts to gain access, including those in DoD laboratories, federally funded research and development centers (FFRDCs), university-affiliated research centers (UARCs), and other extramural analysts and support entities in academia and industry.

Guided by this strategy, the DoD will continue to pursue innovative improvements in data sharing and analysis. For example, the department will explore improved PM tool suites that could streamline information to the program manager (e.g., improved market research tools; direct access to DCMA insights on contractor production; direct access to the EVM Central Repository for EVM status reports). Such suites could also automate reports up the acquisition chain-of-command and reduce the burden of generating reports (see illustration in Figure 9).

Figure 9: Improved, Seamless Data Sharing and Reporting

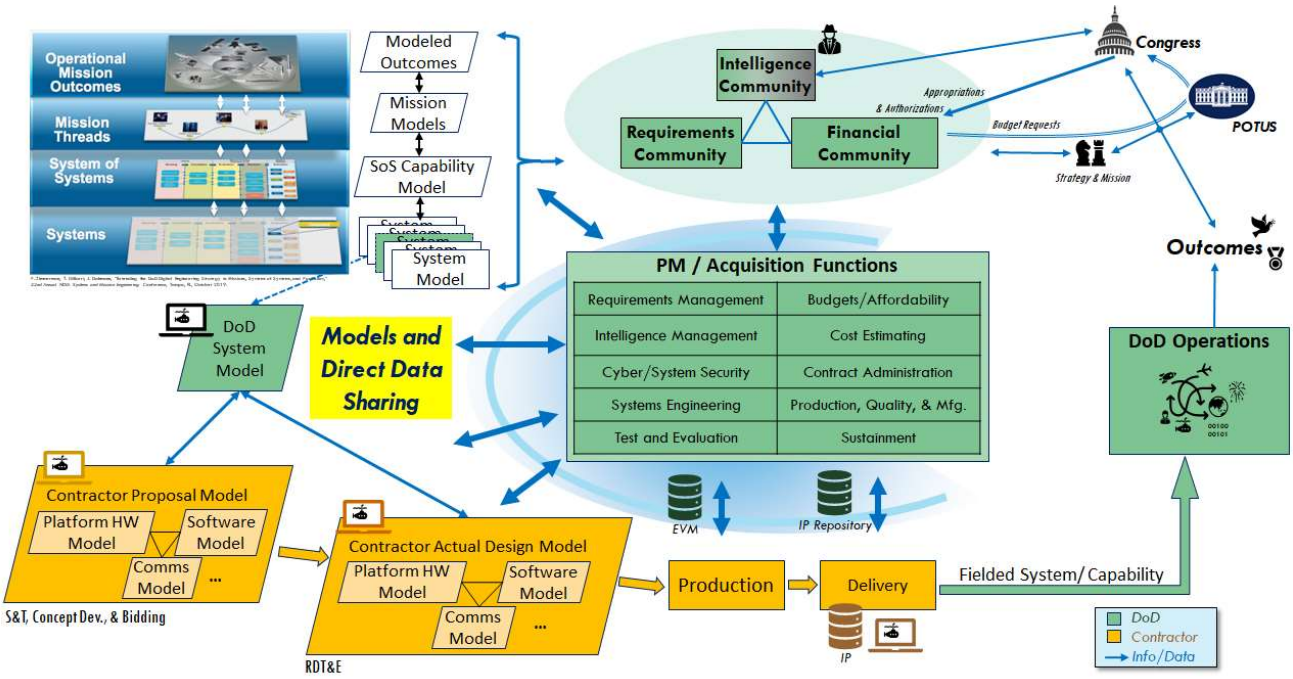


A Vision for Model-Based Acquisition: Integrating and Improving Acquisition Practices

Beyond the near-term efforts to further improve data sharing and analysis to better inform program management and oversight decisions, the department is also pursuing approaches to move beyond practices based on document and data-elements to one based on models. Such models move beyond *descriptive* information of what the acquired capabilities can do to a *functional* representation. Such functional representations provide richer information on what the capabilities should be (i.e., requirements) to better inform source solicitations, contracts, and subsequent engineering designs. They should also improve the communication back to the requirements community on issues and costs to better inform Integrated Acquisition Portfolio Reviews, requirements tradeoffs, and configuration steering board management of requirements. Moreover, models could be used to better understand the interactions between acquired systems from mission, portfolio, and kill-chain/web perspectives (i.e., in mission engineering and portfolio management). From an acquisition practices point of view, models will also provide richer information for cost estimating, budgeting, and resource tradeoffs.

Figure 10 illustrates how a model-based acquisition system might inform acquisition functions and processes as well as improve communication with the requirements and budgeting communities. Here the models of the systems to be acquired constitute “digital twins” that can more directly inform acquisition, sustainment, requirements, and budgeting practices and decision making. Models would also constitute improved information between the DoD and contracts to facilitate solicitation and contract requirements.

Figure 10: Model-Based Acquisition



Implications for Measuring the Performance of the Defense Acquisition System

This strategy should not only help integrate and improve the DoD's ability to acquire and field needed capabilities but also increase the ability to objectively measure the extent of those improvements and any unforeseen negative consequences. This will help inform subsequent strategy and planning, prioritize investments, and identify additional challenges requiring innovation and improvement. Key, of course, is continued improvements in data access to enable analysis and inform decision making.

Guiding Principles

In addition to supporting USD(A&S)'s strategy and goals for improving defense acquisition, this effort supports the DoD-wide Data Strategy[10] and congressional statutes and directives for digital modernization. In particular, this effort aligns with the eight DoD guiding principles of the DoD-wide Data Strategy: data is a strategic asset; collective data stewardship; data ethics; data collection; enterprise-wide data access and availability; data for artificial intelligence training; data fit for purpose; and design for compliance. This effort also recognizes the DoD's seven goals necessary for making DoD data centric, namely, making data visible, accessible, understandable, linked, trustworthy, interoperable, and secure.

As the vision and strategy evolve, the DoD will provide clarity through specific steps plus sufficiency and integration across acquisition and sustainment to not only improve specific acquisition functions but achieve improved measurable outcomes as a whole to the warfighter.

Clarity. The DoD has been pursuing improved acquisition and leveraging data science for years, but some strategy statements along these lines have lacked clarity in what the department (and Congress) could do specifically to pursue data-informed decision-making, digital modernization, or even innovation. This strategy increases transparency by identifying specific steps and approaches while providing realistic perspectives in

[10] To implement the DOD Data Strategy (defense.gov), individual Components and DoD functions are developing measurable Data Strategy Implementation Plans, overseen by the DoD CDO and DoD Data Council.

when approaches are mature and resourced enough (in technically, financially, and human resources) to pursue implementation at scale. Such planning is important for the department to move forward.

Sufficiency. This strategy also seeks to break out of the mold of current data collection and reporting. Current data collection efforts are not enough. While an important step forward, improving decision-making and acquisition outcomes requires more than centralizing some current data in Advana. Also, transparency and proper acquisition oversight require more information than provided by Selected Acquisition Reviews (SARs) and Defense Acquisition Executive Summary (DAES) reporting to OSD and monthly acquisition reports at the Component level. This strategy will lay out specific steps and approaches for what information is needed and how it can be accessed and assessed.

Most importantly, the department needs to help acquisition "on the ground" by helping program managers (PMs) and the supporting acquisition functions that acquire, field, and sustain the systems. This strategy seeks better ways to enable acquisition through improved acquisition functions and disciplines—all enabled by data science.

Integration across acquisition and sustainment. Note that defense *acquisition* is the "conceptualization, initiation, design, development, test, contracting, production, deployment, integrated product support, modification, and disposal of weapons and other systems, supplies, or services (including construction) to satisfy DoD needs, intended for use in, or in support of, military missions." (DoDD 5135.02, "Under Secretary of Defense for Acquisition and Sustainment," July 15, 2020, p. 26). Thus, this strategy will evolve to integrate across all of these domains (including sustainment) to improve outcomes for the warfighter.

Roadmap

A few elements of the DoD's Digital Acquisition and Data Strategy for Acquisition and Sustainment that have already been put in motion, include:

- Pursuit of innovative methods to improve data sharing, access, and analysis by the extramural analysts and support entities in FFRDCs, UARCs, academia, and industry;
- Centralization of acquisition, sustainment, and related data in the DoD's Advana, coupled with pursuits for interoperability with related datasets hosted outside Advana.

Additionally, resources are in place to develop DoD Component-level prototyping and testing in advance of wide-spread implementation to test out and refine concepts, identify costs and barriers, inform implementation and budgeting, and identify early gains.

Schedule

Below are key elements in pursuing the development and implementation of the strategy:

- Rapid iteration on the DoD's Digital Acquisition and Data Strategy for acquisition and sustainment: fall 2021.
- Identification of Component-level prototyping projects: December 2021.
- Initial issuance of the DoD's Digital Acquisition and Data Strategy for Acquisition and Sustainment: winter 2022.
- Initial prototyping project concepts and lessons learned: May 2022.
- Prototype project reports, gains, and leave behind capabilities: September 2022.
- Identification of next phase of the strategy: March 2022.

7. How the Acquisition Innovation Research Center (AIRC) Is Engaging Academia for DoD Acquisition Innovation

As exemplified by the recent creation of the Adaptive Acquisition Framework, continued evolution of acquisition policies, and the associated analyses to understand the drivers for improved performance, the DoD continues to seek innovative ways to improve acquisition outcomes.

An important new strategic effort is the engagement of academia to assist the DoD in this endeavor. This effort includes Congressional support and direction. The FY 2020 NDAA codified in 10 U.S.C. 2361a that the Secretary of Defense shall establish and maintain an extramural acquisition innovation research activity in academia. In response and in alignment with the DoD's strategic effort, the Under Secretary of Defense for Acquisition and Sustainment, in collaboration with the Under Secretary of Defense for Research and Engineering, created AIRC as part of the Systems Engineering Research Center (SERC) University Affiliated Research Center (UARC). Initiated on September 30, 2020, AIRC involves 20 extramural U.S. universities plus collaboration with two military universities[11] to provide innovative academic research, analysis, experiments, prototypes, and demonstrations on enduring challenges in defense acquisition policies, practices, education, and training. Academic disciplines involved include Artificial Intelligence, Business, Computer Science, Data Science, Economics, Education, Engineering, Management, Operations Research, Law, and Public Policy.

AIRC pursues new ways for the DoD to improve acquisition outcomes through four types of activities illustrated in Figure 11. *Incubate* involves external idea generation around priority themes identified by the DoD. *Respond* are research tasks on specific topics and problems from DoD organizations. *Ideate* is a collaborative innovation process involving both DoD and AIRC organizations. Finally, *Connect* is a mechanism for identifying subject-matter experts in academia for consultation with a DoD organization.

[11] The AIRC collaborator universities are: Auburn, Carnegie-Mellon, Georgetown, Georgia Tech, Massachusetts Institute of Technology (MIT), Missouri University of Science & Technology, North Carolina Agricultural and Technical State, Old Dominion, Penn State, Purdue, Stevens Institute of Technology (lead), Texas A&M, Alabama Huntsville, Massachusetts Amherst, Maryland, University of Southern California (USC), University of South Florida, University of Virginia, Virginia Tech, and Wayne State. Collaborating military universities include the Air Force Institute of Technology and the Naval Postgraduate School. AIRC also seeks participation with other Historically Black Colleges and Universities and Other Minority-Serving Institutions besides North Carolina A&T State.

Figure 11. AIRC Processes for Developing and Applying Innovation to Defense Acquisition

Concepts from the 2021 Incubate Cycle

A major AIRC activity for FY 2021 is the Incubate process. AIRC's advisors from OSD and the Military Services identified *Digital Transformation and Acquisition* as the theme within which to postulate new approaches and prototypes. AIRC established an Innovation Panel of 14 external thought leaders from academia, industry, and former DoD and Congressional stakeholders, who brainstormed over 30 novel application concepts with the theme. AIRC's advisors focused on three of these concepts and added two more for collaborative development at the Spring Incubate Forum:

- Workforce upskilling under continuous change.
- Management and business knowledge representation for improved decisions.
- Aligning workforce and organizational incentives for agility and innovation.
- Innovative test approaches to enhance organizational agility.
- Return-on-investment (ROI) from digital transformation to inform decisions and investments.

The Incubate Forum engaged over 126 leaders, faculty, and researchers from 61 organizations—primarily from academia and the DoD but also including congressional staffers, industry, and federally funded research and development centers. AIRC issued a call for proposals from academia, receiving 66 proposals from 30 university faculty, researchers, and laboratories for 3-month Phase I studies for initial research and active engagement with DoD users and stakeholders to deeply understand the department's challenges. Examples of Phase I study concepts include:

- Cognitive assistants (software applications) that help to train and advise cost estimators.
- Gamification of training in emerging acquisition methods such as Agile development and DevSecOps.
- Employ a transparent Decisions Options Register integrated intelligent database system to capture historical decisions going forward, including their assumptions, data inputs, constraints, limitations, competing objectives, and decision rules.

- Diagnose risk-averse behaviors then devise and evaluate interventions to incentivize system-wide innovative behavior while addressing disincentives to enable a culture of critical and creative thinking.
- Use probabilistic success trees to design test and evaluation cases that maximize test coverage of operational conditions and measure remaining latent risks.
- Use parallel Monte Carlo runs of an agent-based "digital-twin" of a system being tested to generate and identify rare events where complexity leads to "normal accidents" in which components function properly but the system fails.
- Reduce the number of samples needed to test AI/ML models to an acceptable level by assessing underlying models, algorithms used to train the models, and the systems models, functional architectures, and other artifacts of the digital engineering process.
- Adapt private-sector best practices and non-DoD public sector's ROI calculations to reflect the unique, non-monetary DoD benefits.

Future Results

This overview provides preliminary insights on the AIRC, its activities focused on innovation, and some early concepts being explored. Ultimately, the AIRC endeavor to engage academia in improving acquisition policies and processes through creative approaches will be successful if it has a significant and measurable effect on acquisition outcomes. Future reports will seek quantitative and qualitative evidence of progress from the applications of individual AIRC experiments, prototypes, and ultimately institutionalized strategic restructuring, policies, processes, training, and cultural reforms. It will take time to complete research and prototyping, so early measures will reflect inputs and functional activity (e.g., the engagement measures above). The focus will be on linking seminal and innovative research with mission outcomes, represented by focused use cases. In parallel, AIRC and the DoD will develop measures to reflect the impact and the effects of its innovation activities on improving mission effectiveness within and across acquisition functions.

Appendix A: Program Name Acronyms

Program Acronym[12]	Definition	Compone	Type
AAG	Advanced Arresting Gear	Navy	MDAP
AEHF	Advanced Extremely High Frequency Satellite	Air Force	MDAP
AGM-88E AARGM	Advanced Anti-Radiation Guided Missile	Navy	MDAP
AIM-9X BLOCK I	Air Intercept Missile, Block I (Sidewinder)	Navy	MDAP
ARH	Armed Reconnaissance Helicopter	Army	MDAP
ASDS	Advanced Seal Delivery System	Navy	MDAP
ATACMS-BAT	Army Tactical Missile System-Brilliant Anti-Tank	Army	MDAP
ATIRCM/CMWS	Advanced Threat Infrared Countermeasure/Common Missile	Army	MDAP
AWACS Blk 40/45 Upgrade	Airborne Warning and Control System Block 40/45 Upgrade	Air Force	MDAP
B-1B CMUP	Conventional Mission Upgrade Program	Air Force	MDAP
C-130 AMP	Avionics Modernization Program	Air Force	MDAP
C-27J	Joint Cargo Aircraft	Air Force	MDAP
C-5 RERP	Reliability Enhancement and Re-engining Program	Air Force	MDAP
CH-47F	Improved Cargo Helicopter	Army	MDAP
Chem Demil-ACWA	Chemical Demilitarization, Assembled Chemical Weapons	DoD	MDAP
Chem Demil-CMA	Chemical Materials Agency	DoD	MDAP
Chem Demil-CMA Newport	Chemical Materials Agency Newport	DoD	MDAP
Chem Demil-CMA/CSD	Chemical Stockpile Disposal	DoD	MDAP
Chem Demil-Comanche	Legacy/Non-Stockpile Chemical Materiel Project	DoD	MDAP
CS21 ITN-RF	Comanche Helicopter	Army	MDAP
DDG 1000	Capability Set 21 Integrated Tactical Network - Rapid Fielding	Army	MTRF
E-2D AHE	Destroyer, guided-missile, Zumwalt class	Navy	MDAP
EELV	Advanced Hawkeye Aircraft	Navy	MDAP
EFV	Evolved Expendable Launch Vehicle	Air Force	MDAP
Excalibur	Expeditionary Fighting Vehicle	Navy	MDAP
F/A-18E/F	Excalibur Precision 155mm Projectiles	Army	MDAP
F-15 EPAWSS	Super Hornet Aircraft, E/F variant	Navy	MDAP
F-16 EW Suite	Eagle Passive Active Warning Survivability System	Air Force	MDAP
F-22	F-16 Electronic Warfare Suite	Air Force	MTRP
F-35	Raptor Advanced Tactical Fighter Aircraft	Air Force	MDAP
FBCB2	Lightning II Joint Strike Fighter (JSF) Program	DoD	MDAP
FMTV	Force XXI Battle Command Brigade and Below Program	Army	MDAP
GMLRS AW	Family of Medium Tactical Vehicles	Army	MDAP
H-1 Upgrades	Guided Multiple Launch Rocket System/Alternative Warhead	Army	MDAP
IDECM	Upgrades (4BW/4BN)	Navy	MDAP
INCREMENT 1 E-IBCT	Integrated Defensive Electronic Countermeasures	Navy	MDAP
JASSM	Increment 1 Early Infantry Brigade Combat Team	Army	MDAP
JAVELIN	Joint Air-to-Surface Standoff Missile	Air Force	MDAP
JLENS	Advanced Anti-Tank Weapon System, Medium	Army	MDAP
JPALS	Joint Land Attack Cruise Missile Defense Elevated Netted Sensor	Army	MDAP
JPATS	Joint Precision Approach and Landing System	Navy	MDAP
JSOW	Joint Primary Aircraft Training System	Air Force	MDAP
JTRS GMR	Joint Standoff Weapon	Navy	MDAP
JTRS HMS	Joint Tactical Radio System: Ground Mobile Radios	Army	MDAP
Land Warrior	Joint Tactical Radio System: Handheld, Manpack, and Small Form-	Army	MDAP
LCS MM	Land Warrior	Army	MDAP
LONGBOW APACHE	Littoral Combat Ship Mission Modules	Navy	MDAP
LPD 17	Longbow Apache AH-64D Helicopter	Army	MDAP
MH-60R	San Antonio Class Amphibious Transport Dock	Navy	MDAP
MH-60S	Multi-Mission Helicopter	Navy	MDAP
NAVSTAR GPS	Fleet Combat Support Helicopter	Navy	MDAP
	NAVSTAR Global Positioning System	Air Force	MDAP

[12] This table was adapted from USD(AT&L) (2016) and includes some programs that are not MDAPs.

Program Acronym[12]	Definition	Compone	Type
Navy Area TBMD	Navy Area Theater Ballistic Missile Defense	Navy	MDAP
NPES Recap RP	Nuclear Planning and Execution System Recapitalization Rapid	Air Force	MTRP
NPOESS	National Polar-orbiting Operational Environmental Satellite	Air Force	MDAP
OASuW Inc 1 (LRASM)	Offensive Anti-Surface Warfare Increment 1 (Long Range Anti-	Navy	MDAP
OCX	Next-Generation Operational Control System	Air Force	MDAP
RMS	Remote Minehunting System	Navy	MDAP
RQ-4A/B Global Hawk	Global Hawk Unmanned Aircraft System	Air Force	MDAP
SBIRS High	Space-Based Infrared System High	Air Force	MDAP
SDB II	Small Diameter Bomb, Increment II	Air Force	MDAP
SM-6 Blk IB Phase IB	STANDARD Missile -6 Block IB Phase IB All Up Round	Navy	MTRP (Major)
SSN 774	Virginia Class Submarine	Navy	MDAP
V-22	Osprey Joint Services Advanced Vertical Lift Aircraft	Navy	MDAP
VH-71	Presidential Helicopter Fleet Replacement	Navy	MDAP
VTUAV	Vertical-Takeoff-and-Landing Tactical Unmanned Aerial Vehicle	Navy	MDAP
WGS	Wideband Global SATCOM	Air Force	MDAP
WIN-T	Warfighter Information Network, Tactical	Army	MDAP
WIN-T Inc 2	Warfighter Information Network, Increment 2	Army	MDAP

Appendix B: Abbreviations

(See also the program names defined in Appendix A.)

ACAT—Acquisition Category

APB—Acquisition Program Baseline

APUC—Average Procurement Unit Cost

AT&L—Acquisition, Technology, and Logistics

C4ISR—Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance

CY—constant year

DAMIR—Defense Acquisition Management Information Retrieval

DAVE—Defense Acquisition Visibility Environment

DoD—Department of Defense

EMD—Engineering, Manufacturing and Development

FY—fiscal year

IQR—interquartile range

MDAP—Major Defense Acquisition Program

MS—Milestone

MTA—Middle Tier of Acquisition

MTRF—Middle Tier Rapid Fielding

MTRP—Middle Tier Rapid Prototyping

NDAA—National Defense Authorization Act

OT—Other Transaction

OTA—Other Transaction Authority

PAUC—Program Acquisition Unit Cost

PB—President's budget (request)

RDT&E—Research, Development, Test, and Evaluation

RF—Rapid Fielding

RP—Rapid Prototyping

SAR—Selected Acquisition Report

USD—Under Secretary of Defense

U.S.C.—United States Code

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