



NATIONAL DEFENSE RESEARCH INSTITUTE

Analyses of the Department of Defense Acquisition Workforce

Update to Methods and Results Through FY 2017

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Preface

The defense acquisition workforce (AW), which included about 165,000 military and civilian personnel as of the end of fiscal year (FY) 2017, is responsible for providing a wide range of acquisition, technology, and logistics support for products and services to the nation's warfighters. For decades, the AW has received attention from policymakers seeking to improve the defense acquisition process—to ensure that it delivers high-quality, technologically superior goods and services to the military on schedule and at a fair price to taxpayers.

The Under Secretary of Defense for Acquisition and Sustainment (USD[A&S]), and previously the Under Secretary of Defense for Acquisition, Technology and Logistics (USD[AT&L]) prior to the reorganization of AT&L effective February 2018, is responsible for U.S. Department of Defense (DoD)–wide strategic human capital management for the AW. A&S's Office of Human Capital Initiatives (HCI) supports DoD human capital strategies and has directed deployment of a comprehensive workforce analysis capability to facilitate enterprise-wide and component assessments of the AW. RAND aids in this effort by providing ongoing updates on workforce gains and losses, as well as targeted analyses of specific topics of interest.

This report provides updates and improvements to the information presented in two previous RAND reports: Gates et al. (2008), which included data through FY 2006, and Gates et al. (2013), which included data through FY 2011. This report describes how our workforce analysis methodology has evolved over time. The data sources and original methods are described in our prior published reports. In addition, we present a descriptive overview of the AW as of the end of FY 2017, discuss changes to the AW since we began providing workforce analysis to DoD more than a decade ago, and describe the characteristics of recent cohorts of civilian AW personnel.

This report will be of interest to officials responsible for AW planning and management in DoD.

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Summary

Acquisition is defined by the U.S. Department of Defense (DoD) as “the conceptualization, initiation, design, development, test, contracting, production, deployment, integrated product support (IPS), 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” (Defense Acquisition University, undated). The defense acquisition workforce (AW) is charged with providing DoD with the management, technical, and business capabilities needed to execute defense acquisition programs from start to finish. This workforce is composed of military personnel, civilian employees of DoD, and contractors who perform functions related to the acquisition of goods and services for DoD.

In 2006, the RAND National Defense Research Institute (NDRI) began to collaborate with DoD, and in particular the Office of Human Capital Initiatives (HCI), within what was then the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics (USD[AT&L]) to develop data-based tools that would support analysis of the organic defense AW. The organic defense AW includes military personnel and DoD civilian employees but not contractors. In an NDRI report (Gates et al., 2008), we documented the construction of the data set and the analytical methods used to examine these data. That report provided descriptive analyses of the organic AW based on data through fiscal year (FY) 2006. In a second NDRI report (Gates et al., 2013), we discussed revisions that had been made to study methods, analyzed the AW through FY 2011, and detailed the methodology we use to generate projection models that estimate the size and shape of the AW under various assumptions about the future.

Since the publication of our 2013 report, we have continued to collaborate with DoD to improve the data and methodologies in order to make them more useful to DoD AW managers and to update the analyses as new data become available. In addition, we have continued to explore new questions with the data we have. Currently, we are providing DoD with updates to our core analytical products on a quarterly basis. As of February 2018, HCI now sits within the Office of the Under Secretary of Defense for Acquisition and Sustainment (USD[A&S]), one of the two successor organizations to USD(AT&L), along with the Office of the Under Secretary of Defense for Research and Engineering (USD[R&E]).

This report updates our past work by documenting revisions that we have made to our study methods over the past several years and providing descriptive information on the AW through FY 2017. We analyze how the AW has evolved over the decade that we have been collaborating with DoD, and we explore the characteristics of cohorts of new entrants to the AW over this period. Importantly, updates to our methodologies allow us to examine flows of military personnel into and out of the active duty AW, in addition to the flows of civilian members of the AW we have analyzed in the past. While we do not discuss the projection models in

detail in the body of this report, Appendix A provides readers with updated information on these models.

Data

Our analysis uses data on the DoD AW provided to RAND by the Defense Manpower Data Center (DMDC). These data are drawn from several DMDC files, including the acquisition workforce person file and the acquisition workforce position file, also known as the Defense Acquisition Workforce Improvement Act (DAWIA) files, after the 1990 law that, among other things, required DoD to track the AW. Presently, individuals are coded as part of the AW in accordance with the *Defense Acquisition Workforce Data Reporting Standards Guide* (DoD, 2017b), referenced in Department of Defense Instruction (DoDI) 5000.66 (2017). Our past reports have referred to these as the “5000.55 submission data,” after the DoDI that had previously guided their collection.

The number of individuals classified as part of the AW in these DAWIA files is known as the *DAWIA count*, one of several methods of counting the AW used since 1992. Numerous concerns were raised about the counting methodologies in the 1990s, leading to a major effort to improve them in the early 2000s. While the bulk of this report focuses on the period from 2006 to the present, when a consistent counting method has been used, to the extent that we discuss pre-2005 trends, readers are urged to use caution in interpreting our findings, because of limitations and changes to the workforce count information in the 1990s and early 2000s.

In addition to the DAWIA files, we also utilize data from DMDC’s civilian and military personnel files. We are able to link records across time and across the data sets using a unique identifier that is used consistently for each individual. This allows us to track movement of individuals into and out of the AW, as well as to investigate their prior work experience to determine whether they had past DoD civilian or military experience prior to joining the AW. These data, however, do not provide information on whether members of the AW have past experience as DoD contractors and may have worked side-by-side with the organic AW. This is an ongoing limitation to our work, as such knowledge would deepen our understanding of the AW.

Improvements to the Study Approach

A key objective of this report is to document refinements and improvements that have been incorporated into our analytical approach since the publication of our 2013 report (Gates et al., 2013). For example, RAND is now receiving updates to the key data files on a quarterly basis, which enables quarterly analyses of workforce gains and losses. Here, we present a brief description of methodology-related modifications.

Quarterly Updates to Core Analyses

Since the publication of Gates et al. (2013), we have begun to receive the key data files from DMDC on a quarterly basis, rather than annually at the end of each fiscal year, as we had in the past. As a result, we are now able to update our analyses on a quarterly basis to provide DoD with closer-to-real-time updates on gains and losses to the AW, to individual AW career

fields, and to the AWs within individual service branches and Fourth Estate agencies (i.e., DoD agencies other than the military services). RAND produces two sets of data workbooks that we transmit to DoD each quarter.

First, we generate data workbooks that update our analysis of annual gains and losses to the AW and subsets of the AW on a quarterly basis. This analysis compares the workforce at the end of a particular quarter in a fiscal year with the workforce at the end of that same quarter of the prior fiscal year—for example, from the end of Q4 2016 to the end of Q4 2017. We do this for both the civilian and military AW. In addition, for the civilian AW, we use these data to update our projection models on a quarterly basis, using historical data on workforce flows over the past five years through the end of the most recent quarter to project the size and shape of the AW over the next ten years through the end of the same quarter (in this example, through Q4 2027).

Second, RAND now generates data workbooks that analyze workforce gains and losses in a particular quarter based on a comparison of the workforce at the end of the quarter with the workforce at the end of the prior quarter—for example, from the end of Q3 2017 to Q4 2017. This analysis is updated quarterly for both the civilian and military AW, providing an up-to-date summary of recent changes to the workforce and enabling more-granular analysis of trends and patterns over time for particular workforce segments. A comparison of quarter-over-quarter changes with year-over-year changes also offers insight into whether there is a lag between when workers are hired into an AW position and when they are officially listed in the DAWIA files. We do not use quarter-over-quarter workforce changes in our projection models.

Analysis of Gains and Losses to the Military Acquisition Workforce

RAND’s analytical tools allow workforce managers not only to track the aggregate size of the AW over time but also to dig into the data to understand the flows of workers into and out of the AW. For example, the implications for workforce management are quite different if the AW increased by 5 percent as a result of gaining 8 percent of the baseline workforce in new entrants and losing 3 percent through attrition than if it increased by the same 5 percent as a result of new additions equaling 15 percent of the initial workforce and exits from the workforce of 10 percent of the baseline. We also track whether new entrants to the AW are new hires from outside DoD or transfers from another DoD position, as well as whether workers exiting the AW leave DoD entirely or transfer to a non-AW position.

Since our last published report, we have begun to analyze these flows for the military AW in addition to the civilian AW, providing greater insight into the level of turnover in active duty AW and the source of new entrants to this workforce. It should be noted that if someone moves directly from the military AW to the civilian AW or vice versa, the individual is counted as a new hire rather than an internal transfer. As described above, we now track these flows on a quarterly basis, updating both year-over-year and quarter-over-quarter analyses.

Use of Active Duty File in Lieu of the Work Experience File for Analysis of the Military Acquisition Workforce

In producing our new analyses of the military AW, RAND has transitioned to using DMDC’s Active Duty Master File (ADMF) in lieu of its Work Experience File (WEX), which DMDC stopped producing in 2016. The ADMF is the primary personnel data file for individuals who are part of the active duty military, providing personnel inventory “snapshots” on a quarterly basis. The WEX was a transaction file derived from the Active Duty Transaction File

(ADTF), the transaction file version of the ADMF, capturing changes in individuals' records. Thus, using the ADMF results in our using data closer to the original source. A comparison of ADMF and WEX data from years when the WEX was being produced suggests that using the ADMF data systematically lowers our count of the military AW by up to about 3.5 percent, a result of methodological differences between the two data sources and unexplained variation.

Documenting RAND's Adjustments to the DAWIA Count

In this report, we describe the process we go through to merge the various DMDC data files and associate an individual's record with the military or civilian acquisition workforce. This process involves some adjustments to account for discrepancies among data files that result in differences between the workforce count that RAND uses in analyzing workforce gains and losses and the count included in HCI's Data Mart (DoD's data repository), which is derived from the DAWIA files. In general, we give priority to the information in the civilian and military personnel files when there is a discrepancy between those files and the DAWIA files. This is because we have found that there can be a lag between when personnel transactions occur and when they are reflected in the DAWIA files.

Updates to the Projection Model

Gates et al. (2013) describes our projection model in detail, including its limitations and how it can be manipulated by workforce managers to explore how changing certain assumptions about hiring and separation rates would impact its output. As described above, we now generate updated projection models on a quarterly basis. In addition, we have refined the model to account for several ways that workers' retirement plans affect workforce flows that were not included in the model in the past. Specifically, we now include workers who are not in the Civil Service Retirement System (CSRS) or Federal Employees Retirement System (FERS) retirement plans in the projection model, though we do not calculate gain and loss rates separately by years relative to retirement eligibility for this group because of its small size. We also adjust for transfers between retirement plans, most commonly from CSRS or "Other" retirement plans into FERS, by assuming that historical average transfer rates will persist in the future. As we have noted in our past reports, separation rates vary by retirement plan.

Analysis of Cohorts of Entrants to the Civilian Acquisition Workforce

We have developed a methodology to identify cohorts of new entrants to the civilian AW in a given fiscal year and have analyzed characteristics of these recent cohorts. We have focused in particular on categorizing members of cohorts into one of several prior career experience profiles, using our ability to link DMDC data sets to determine whether workers joining the AW were coming from another DoD position and whether they had any DoD experience in the past, even if it was not their most recent position. Because the DMDC data cover only organic DoD positions, whether civilian or military, we are unable to identify when members of incoming cohorts may have other relevant work experience—for example, as a DoD contractor or in a position in private industry that may require a similar skill set. Despite this limitation, we believe that analyzing the prior DoD work experience and other characteristics of recent cohorts will be useful to workforce managers, helping them to understand how cohorts that entered the AW in a certain year differ from other years' cohorts and to track their career progression over time.

Findings from Analysis of Data Through FY 2017 Using Revised Methods

The other key objective of this report is to use our revised methods to update our descriptive analyses of the AW through FY 2017. In particular, we look back at how the AW has evolved over the decade that RAND has been collaborating with DoD on AW workforce analysis, a period that has included both a major AW growth initiative and significant changes to the economic, budgetary, and policy environment. Here, we present a synopsis of our key findings.

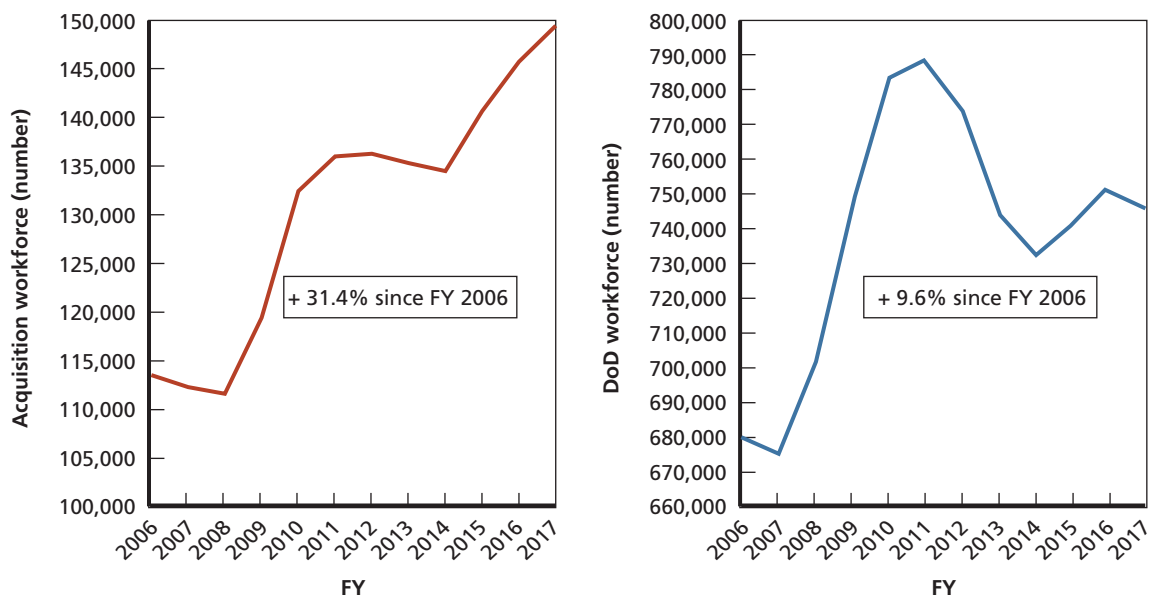
The Civilian Acquisition Workforce Has Grown Considerably

Consistent with the AW growth initiative launched in 2009, we found that the civilian AW has grown by more than one-third, from a low of 111,495 at the end of FY 2008 to 149,280 at the end of FY 2017 (see Figure S.1). There was rapid growth in FYs 2009 to 2011 before growth leveled off in FYs 2012 to 2014. Strong growth resumed in the most recent fiscal years. Continued growth in the AW contrasts with the trend in the DoD civilian workforce overall. As Figure S.1 shows, after sharp growth in the early part of the past decade, the DoD civilian workforce has experienced losses on net. As a result of the comparatively stronger growth in the AW, the AW as a share of the total DoD civilian workforce has increased over the past decade, reaching 20 percent in FY 2017, the highest share on record dating back at least to 1992. Our analysis of the source of gains to the AW reveals that new hires exceeded switches in from other DoD civilian positions in most years over the past decade.

Patterns in Gains and Losses Have Varied by Agency and Career Field

While the size of the civilian AW increased in most services and agencies over the past decade, a notable exception is the Army, which saw its civilian AW decrease by about 7,000 people between FYs 2006 and 2017, with losses concentrated between FYs 2011 and 2015. As a result

Figure S.1
Number of Civilians in the DoD Acquisition Workforce and the DoD Workforce, FYs 2006–2017



NOTE: The y-axes do not start at zero, and the y-axis ranges differ in two chart panels.

of these diverging trends, the Navy now employs the largest share of the civilian AW (36 percent). In FY 2006, the Army had the most civilian AW members (39 percent); this share was 25 percent at the end of FY 2017. With regard to the AW career field, the four largest career fields were the same at the end of FY 2017 as they were at the end of FY 2006: engineering, contracting, life-cycle logistics, and program management. However, growth rates for these career fields varied from FY 2006 through 2017. Life-cycle logistics and program management grew faster than the civilian AW overall, growing by about 65 percent and 50 percent, respectively. Engineering and contracting grew more slowly than the civilian AW overall, growing by about 25 percent and 10 percent, respectively.

The Retirement Wave Has Abated to Some Extent

In Gates et al. (2008), which analyzed the AW through FY 2006, we highlighted a pending retirement wave that could pose a challenge for AW workforce managers. One of the major goals of the AW growth initiative was to affect the distribution of the AW with regard to proximity to retirement by bringing younger and mid-career workers into the AW. We find that the distribution of the AW has changed over the past decade and that it is now less skewed toward late-career workers than it was in FY 2006. Specifically, at the end of FY 2017, 54.5 percent of the AW had at least a decade to go until becoming eligible for retirement, up from 46.0 percent at the end of FY 2006. Moreover, while as of FY 2006, about 4 percent or more of the AW was set to become eligible for retirement in each of the next ten years (FYs 2007 to 2016), the share of the current AW that will reach full retirement age in a given year is below 4 percent in every year over the next decade and falls below 3 percent toward the end of the coming decade.

The Educational Attainment of the Acquisition Workforce Has Increased, on Average

Over the past decade, share of the civilian AW with higher levels of educational attainment has increased. In FY 2017, 85 percent of the civilian AW had at least a bachelor's degree, compared with 74 percent in FY 2006. The increase in the share of the civilian AW with an advanced degree has been especially pronounced—up from 23 percent in FY 2006 to 39 percent in FY 2017. Compared with the DoD civilian workforce overall, the civilian AW has a much larger share of workers with higher levels of education, with less than half (48 percent) of the DoD-wide civilian workforce holding a bachelor's degree as of FY 2017.

Acquisition Workforce Attrition Rates Remain Low but Vary Across Subpopulations of the Workforce

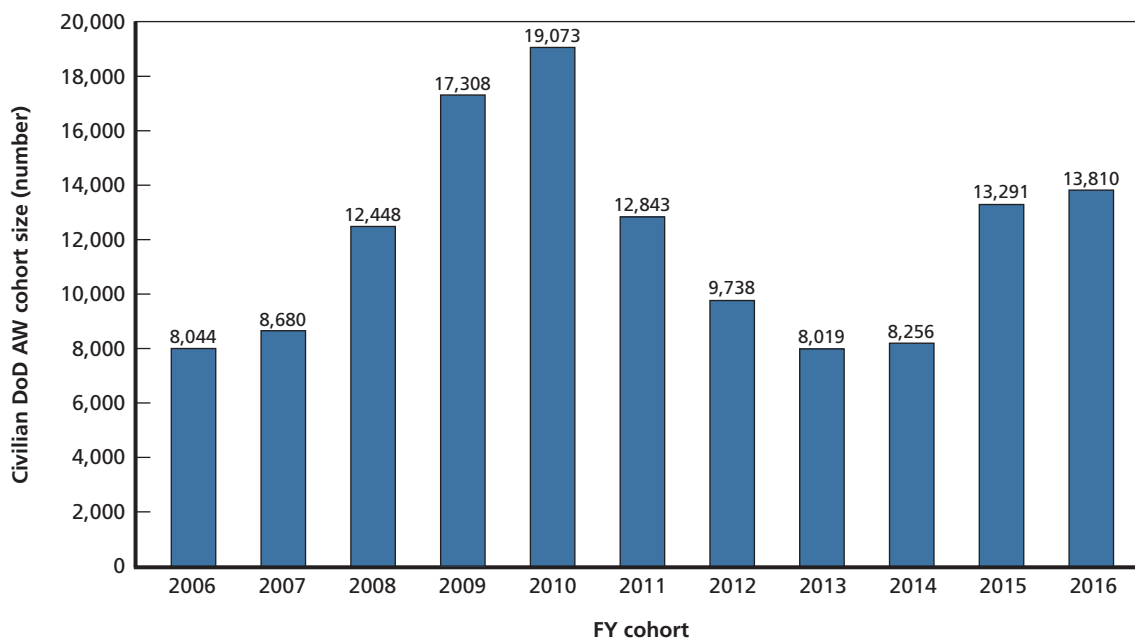
In our past reports, we have noted that AW attrition, defined in terms of the percentage of the AW that leaves DoD civilian employment in a given year, was consistently lower than attrition for the DoD civilian workforce overall. This finding held in the most recent years, with AW attrition of about 5 to 5.5 percent from FY 2012 through FY 2017, compared with DoD civilian attrition of around 8 percent. As in the past, this difference was driven by lower rates of voluntary and involuntary separation; attrition due to retirement was similar (about 3 percent) in both the AW and the DoD-wide civilian workforce. In Gates et al. (2013), we noted a decline in attrition in both the AW and DoD-wide civilian workforce in FYs 2009 and 2010, to 4.3 and 4.4 percent for the AW and 7.2 and 7.5 for the DoD-wide civilian workforce, and suggested that this was due in part to the economic recession driving down retirement account values and diminishing outside employment options. Here, we find that attrition bounced back, as expected, in subsequent years as the economic recovery advanced. Despite generally

low attrition for the civilian AW, there continue to be differences in attrition across career fields; the contracting career field, for example, consistently has a higher attrition rate than the rate for the AW overall, with an average attrition rate of 6.7 percent from FY 2012 through FY 2017. This may be due in part to the higher demand for contracting workers in other federal agencies—separation code data show that members of the civilian AW in the contracting career field who leave DoD are disproportionately likely to move directly from their DoD position to a position in another federal agency.

Larger Recent Cohorts Had Higher Shares of New Hires from Outside DoD

The size of incoming cohorts varied over the past decade, as Figure S.2 shows, with larger groups of new entrants joining the AW in the years immediately following the launch of the AW growth initiative in 2009 and again in the most recent fiscal years. (For methodological reasons we describe in the report, our cohort analysis stops with FY 2016). Our analysis of the prior career experience of members of the cohorts reveals that the number of switches in from other positions in the DoD civilian workforce held steady at around 3,000 to 4,000 annually over the FY 2006–FY 2016 period, with the variation in the size of the cohorts depicted in Figure S.2 driven by changes in the number of new hires from outside DoD. A majority of new hires from outside of DoD did not have any prior DoD experience, though among those with prior experience, by far the most common prior experience was in a non-AW active duty military position, with about two-thirds of outside-of-the-DoD hires with prior DoD experience having this experience and another roughly 10 percent having military AW experience. Overall, including both new hires from outside DoD and switches in, about one-third of members of entering cohorts over the past decade have prior active duty military experience.

Figure S.2
DoD Civilian Acquisition Workforce Entrants, FYs 2006–2016



The Military Acquisition Workforce Is Smaller and Experiences More Turnover Than the Civilian Acquisition Workforce, but Its Members Are More Likely to Serve in Program Management Roles

The military AW—the members of the active duty military who serve in acquisition-related positions—is an order of magnitude smaller than the civilian AW (about 15,000 people in the military AW, compared with about 150,000 people in the civilian AW). In addition, this workforce has not experienced the same rate of growth as the civilian AW over the past decade. While the civilian AW grew by more than 30 percent from FY 2006 to FY 2017, the military AW grew by less than 5 percent, and there has been virtually no net growth since FY 2011 (the latest data in our 2013 report), consistent with steady or declining active duty military end strength levels overall. Updates to our methodology that allow us to look at the flow of workers in and out of the military AW uncover other important differences between the military AW and the civilian AW. There is much more turnover in the military AW, given that active duty military typically rotate positions periodically as part of their career progression, with about twice the share of this workforce turning over each year than is the case for civilians in the AW. In addition, about 90 percent of gains to the military AW are switches in from non-AW military positions, while only about 10 percent are new to the military entirely. By contrast, about half of gains to the civilian AW are switches in from another DoD civilian position, and about half are new hires to DoD.

Our analysis of members of the military AW also reveals that these individuals are more than three times as likely to be in the program management career field than their civilian AW counterparts. As of the end of FY 2017, 31 percent of the military AW was in program management, compared with 8 percent of the civilian AW.

Conclusions and Recommendations

The AW is an important workforce for DoD and one that continues to be subject to significant congressional and public scrutiny. In this report, we describe some of the workforce supply analyses that can be undertaken using DoD data sources.

We find that DoD has been successful in growing the size of the organic AW over the past decade, with gains concentrated in the civilian AW. An infusion of new hires from outside DoD coupled with the ongoing retirement of baby boomers has led the distribution of the civilian AW to skew younger than it was one decade ago, while workers are on average better educated. Attrition rates remain lower among the acquisition workforce than among the DoD-wide civilian workforce. The size of the military AW has held fairly steady over the past several years, though it experiences more turnover than the civilian AW. Military AW members are more likely than their civilian counterparts to serve in program management roles.

As DoD proceeds with the reorganization of AT&L into A&S and R&E and considers changes to how acquisitions are conducted across the department and how the AW is structured, DoD-wide analyses of the AW can inform the decisionmaking process. For example, DoD-wide analyses can help officials to understand how the size and composition of the AW is changing across services and agencies, and where DoD-wide human capital shortages or surpluses may be developing. These analyses can also provide useful information on trends in AW career fields across agency lines and inform the development of best practices. At the same time, DoD should consider mechanisms to make data on AW gains and losses available

to managers in the military services and Fourth Estate agencies in a timely manner. Finally, DoD should continue efforts to better understand the role of the contractor workforce and the prior career experiences of new AW hires who come from outside DoD.

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Abbreviations

AW	acquisition workforce
ADMF	Active Duty Master File
CSRS	Civil Service Retirement System
DAWDF	Defense Acquisition Workforce Development Fund
DAWIA	Defense Acquisition Workforce Improvement Act
DMDC	Defense Manpower Data Center
DoD	U.S. Department of Defense
DoDI	Department of Defense Instruction
FERS	Federal Employees Retirement System
FTE	full-time equivalent
FY	fiscal year
GAO	U.S. Government Accountability Office
GS	General Schedule
HCI	Office of Human Capital Initiatives
MDAP	major defense acquisition program
MRA	minimum retirement age
NDRI	RAND National Defense Research Institute
NSPS	National Security Personnel System
OPM	U.S. Office of Personnel Management
OSD	Office of the Secretary of Defense
RIM	RAND Inventory Model
SES	Senior Executive Service
SPRDE	Systems Planning, Research, Development, and Engineering
STEM	science, technology, engineering, and mathematics
USD(A&S)	Under Secretary of Defense for Acquisition and Sustainment
USD(AT&L)	Under Secretary of Defense for Acquisition, Technology and Logistics
USD(R&E)	Under Secretary of Defense for Research and Engineering
WEX	Work Experience File
YORE	years relative to retirement eligibility
YOS	years of service

Introduction

The U.S. Department of Defense (DoD) acquires goods and services totaling more than \$250 billion each year, more than all other federal agencies combined (Schwartz et al., 2016). DoD-awarded contracts cover everything from major weapon systems to computer software to transportation and medical services on military bases and much more. The objective of the defense acquisition process is to equip the military to be an effective fighting force while being good stewards of taxpayer dollars.

For decades, though, policymakers have expressed concerns that the defense acquisition process falls short in meeting the needs of the warfighter at a fair price to taxpayers. It has been more than 30 years since the infamous “\$435 hammer” and defense acquisition scandals of the 1980s led President Reagan to establish a Blue Ribbon Commission on Defense Management (the “Packard Commission”) (Fairhall, 1987). Despite recent progress in reining in cost growth in major acquisition programs (Under Secretary of Defense, Acquisition, Technology and Logistics, 2016), concerns remain. DoD weapon system acquisition has landed on the U.S. Government Accountability Office’s (GAO’s) “high-risk” list of “government operations with greater vulnerabilities to fraud, waste, abuse, and mismanagement” ever since the list was first compiled in 1990 (GAO, 2017a). GAO’s 2017 report stated that “many DOD programs fall short of cost, schedule, and performance expectations, meaning DOD pays more than anticipated, can buy less than expected, and, in some cases, delivers less capability to the warfighter” (GAO, 2017a).

Efforts to improve defense acquisition outcomes have regularly identified the size and capabilities of the defense acquisition workforce (AW)—the contract officers, cost estimators, systems engineers, and others who perform functions that are related to the acquisition of goods and services for DoD—as a driver of cost overruns and acquisition delays. As noted in past RAND work, a 2008 DoD review found that “almost every acquisition improvement study . . . concluded in some fashion or another that more attention needs to be paid to the acquisition workforce quantity and quality” (Gates, 2009). Since 1992, GAO’s “high-risk” list has included DoD contract management, with management of the AW now listed among the challenges DoD faces. The “high-risk” list has included government-wide strategic human capital management since 2001 (GAO, 2017a).

In 2006, the RAND National Defense Research Institute (NDRI) began a collaboration with DoD to develop data-based tools to support analysis of the “organic” defense AW, which includes military and DoD civilians but not contractors. NDRI published reports in 2008 and 2013 (Gates et al. [2008] and Gates et al. [2013]) that documented the construction of the data set and the analytical methods used to examine the data. The reports provided descriptive analyses of the AW based on data through fiscal years (FYs) 2006 and 2011, respectively. They

also included a more extensive discussion of the underlying policy motivation for an analysis of the AW than is included here. The current report updates these earlier reports based on data through the end of FY 2017, documents ongoing improvements to our methodology, and updates the policy context.

Overview of the Acquisition Workforce

In response to the Defense Acquisition Workforce Improvement Act (DAWIA) of 1990 (Public Law 101-510), DoD has been tracking and reporting on the AW since 1992. DoD defines *acquisition* as “the conceptualization, initiation, design, development, test, contracting, production, deployment, integrated product support (IPS), 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.” (Defense Acquisition University, undated) The AW is responsible for executing all of these tasks, as well as conducting oversight of the acquisition process. Military and DoD civilian personnel are flagged as part of the AW based on whether they fulfill one or more of these roles. Members of the AW can be found in many different organizations across DoD, including all branches of the military and a number of other DoD agencies that compose the “Fourth Estate” (i.e., DoD agencies other than the military services).

Members of the AW are grouped into career fields. The number and titles of these career fields have changed over time. In FY 2017, there were 15 main career fields:

- auditing
- business—cost estimating
- business—financial management¹
- contracting
- engineering²
- facilities engineering
- industrial & contract property management
- information technology
- life-cycle logistics
- production, quality, and manufacturing
- program management
- purchasing
- science and technology management

¹ The two business career fields are sometimes combined into one “business—cost estimating and financial management” (BCEFM) career field. In reporting to DoD, RAND provides analyses both separately and combined. Past RAND reports combined the two career fields when providing a descriptive overview of the AW. This report breaks out the two fields to better align with analyses produced by DoD.

² The engineering career field previously was known as systems planning, research, development, and engineering (SPRDE) and split into two separate career fields: SPRDE—systems engineering, and SPRDE—program systems engineer. As of FY 2014, the SPRDE—program systems engineer field was eliminated, and members of both career fields transitioned to a general “engineering” field (see Undersecretary of Defense, Acquisition, Technology and Logistics, 2013).

- small business³
- test and evaluation.

Over the decade that RAND has been collaborating with DoD, there have been conflicting pressures on the AW. With the support of Congress, DoD pursued a growth initiative to increase the size and expand the capabilities of the AW. At the same time, budgetary constraints and hiring freezes served as a countervailing force. The AW growth initiative also coincided with major swings in the economy that likely impacted recruitment, retention, and retirement decisions. DoD's most recent strategic workforce plan for the AW, released in 2016, emphasized the need to "responsibly sustain" gains rather than continuing to add staff (DoD, 2016).

Other recent reports point to the potential for cuts to the AW, including 2015 reports by DoD's Office of the Deputy Chief Management Officer and the Defense Business Board, which found that \$62 billion to \$150 billion in savings could be achieved over five years in part by incentivizing early retirements and through attrition (Defense Business Board, 2015; GAO, 2016a). DoD's current Chief Management Officer has indicated that he is seeking \$46 billion in savings over five years across nine business areas, several of which overlap with acquisition (Mehta, 2018). DoD's most recent *National Defense Strategy* calls for "recruiting, developing, and retaining a high-quality military and civilian workforce" but also "continu[ing] efforts to reduce management overhead and the size of headquarters staff" (DoD, 2018).

The Acquisition Workforce Growth Initiative

In April 2009, DoD launched a major defense AW growth initiative designed to increase the size of the AW by 20,000 between FY 2008 and FY 2015, through a mix of new hiring and insourcing of contractor functions (DoD, 2010b).⁴ The AW growth initiative responded to concerns that the size of the workforce was insufficient to meet DoD procurement demands for major defense acquisition programs (MDAPs), major automated information systems (MAISs), and programs in other acquisition categories (ACATs), as well as that DoD was using contractors to support core functions.⁵ The growth initiative involved a strategic shaping effort that prioritized career fields such as contracting and engineering, which are viewed as critical to improving acquisition outcomes (DoD, 2010b, pp. 1–5). The initiative also was designed to bolster the caliber of the AW in terms of education and credentialing, and to shift

³ The small business career field was established beginning in FY 2015 (see Under Secretary of Defense, Acquisition, Technology and Logistics, 2014a). It has not yet been fully implemented, and timely data on this workforce are not yet available and are not incorporated in this analysis.

⁴ Initially, the additional 20,000 members of the AW were to be split between new hires and insourcing; however, a March 2011 revision to the DoD's insourcing policy "effectively curtailed" insourcing after about 3,400 positions had been insourced (see GAO, 2015, p. 11).

⁵ In addition to the GAO "high-risk" list (GAO, 2017a), several additional reports found fault with DoD acquisitions and the AW in particular. The Section 1423 Report (Acquisition Advisory Panel, 2007) criticized government acquisition efforts for excessive use of noncompetitive approaches, and the Gansler Commission Report (Commission on Army Acquisition and Program Management in Expeditionary Operations, 2007) concluded that major changes were needed in acquisition functions that support expeditionary operations.

the workforce distribution away from workers nearing retirement and toward early- to mid-career workers.

Congress supported the AW growth initiative by establishing several programs and authorities that facilitated the expansion of the AW. Section 852 of the National Defense Authorization Act (NDAA) for FY 2008 (Public Law 110-181) established the Defense Acquisition Workforce Development Fund (DAWDF), which provides funds to support recruitment and hiring of acquisition personnel. Section 833 of the FY 2009 NDAA (Public Law 110-417) created an Expedited Hiring Authority for certain civilian AW positions with a critical hiring need or a severe shortage of candidates. Congress also continued to extend the DoD Civilian Acquisition Workforce Demonstration Project (AcqDemo), initially created in the 1990s “to provide a personnel management system that increases [DoD’s] ability to attract, retain, and motivate” the AW (AcqDemo, undated).

In tandem with supporting DoD’s AW growth initiative, policymakers emphasized the importance of strategic workforce analysis. Section 1108 of the FY 2010 NDAA (Public Law 111-84) required DoD to submit an annual strategic workforce plan (subsequently changed to every two years) “to shape and improve the civilian employee workforce of the Department of Defense.” The legislation required each plan to “include a separate chapter to specifically address the shaping and improvement of the defense acquisition workforce, including both military and civilian personnel.” The AW was the only sub-workforce within DoD required to have its own strategic plan. In addition, Congress required DoD to submit annual reports on the DAWDF’s efforts to recruit and retain members of the AW.

In 2012, GAO urged DoD to align efforts supported by the DAWDF with the overall acquisition workforce plan and to develop outcome-oriented metrics for evaluating the effectiveness of the DAWDF efforts (GAO, 2012). A subsequent GAO report in 2015 recommended that DoD release an updated AW strategic plan in FY 2016 and improve efforts to focus DAWDF-connected hiring on priority career fields (GAO, 2015). DoD concurred with both of these sets of recommendations and has taken steps to address some of the issues GAO raised. A 2017 GAO report described that DoD has developed performance metrics for the AW, which include the size, shape, and educational attainment of the AW, as well as DAWIA certification rates (GAO, 2017b). An updated AW strategic workforce plan was released in 2016. However, GAO expressed concerns in its 2017 report that this plan did not establish numerical targets for staffing for the AW overall or individual career fields, and that the plan remained too disconnected from DAWDF funding decisions (GAO, 2017b).

Budgetary Context

Despite the emphasis on growing the AW, fiscal pressures to cut the DoD budget and federal spending in general this decade often have weighed in the opposite direction. In particular, the Budget Control Act of 2011 (Public Law 112-25) established caps on discretionary spending for both defense and nondefense programs. Because the Joint Select Committee on Deficit Reduction, created by the Budget Control Act, failed to identify additional sources of deficit reduction (for example, by cutting mandatory spending or raising revenue), tighter “sequestration-level” discretionary spending caps were imposed beginning in FY 2013. The Bipartisan Budget Acts of 2013 and 2015 (Public Laws 113-67 and 114-74) provided relief from sequestration-level spending caps for FYs 2014–2015 and 2016–2017, respectively. The Bipartisan

Budget Act of 2018 (Public Law 115-123), enacted in February 2018, raised the discretionary caps for FYs 2018 and 2019.

In addition to imposing caps on spending levels, Congress (via the NDAA) and the comptrollers at OSD and the services also manage personnel levels by establishing ceilings on the number of full-time equivalent (FTE) employees allocated to each service and agency. Since 2010 for Fourth Estate agencies, and since 2011 for the military services, the number of civilian FTEs has been capped at FY 2010 levels, though there are numerous exceptions to the caps (GAO, 2013). As Lewis et al. discuss in a 2016 RAND report that reviewed DoD's experience substituting civilian employees for military personnel, the FTE caps can restrict civilian hiring even when there are available funds (Lewis et al., 2016).

In response to pressures to reduce spending and FTE levels, the Army initiated major cutbacks in its civilian workforce starting in FY 2011 (Nataraj et al., 2014b), which continue to the present (Association of the United States Army, 2017). Other services undertook similar efforts during 2010–2013 (Katz, 2015). The Marine Corps announced a 90-day civilian hiring freeze in December 2010, which was extended until January 2012, when it was replaced by a manage-to-payroll approach. This freeze encompassed the Marine Corps AW (Losey, 2010). The Air Force announced a 90-day civilian hiring freeze effective August 9, 2011, along with plans to use voluntary separation and retirement incentives in a strategic manner. Additionally, Congress froze the level of pay for federal civil servants between 2011 and 2013, and many civil servants experienced unpaid furloughs in 2013 due to sequestration (Asch, Mattock, and Hosek, 2014). Section 955 of the FY 2013 NDAA (Public Law 112-239) required DoD to develop and implement a plan to cut spending on the DoD civilian and service contractor workforces over the FY 2012–FY 2017 period.

To date, the AW has been insulated from the full impact of these budget cuts and personnel policies, because of the growth initiative and because the DAWDF has provided a separate source of funding for hiring and retaining members of the AW. For example, when DoD announced a freeze on the number of civilian workers in March 2011, an exception was made for recruitment and hiring supported by the DAWDF. The same was true for an Army hiring freeze implemented in 2013 (Department of the Army, 2013). In its “Section 955” reports describing efforts to cut spending on the civilian and contractor workforces over the FY 2012–FY 2017 period, DoD excluded members of the civilian AW from the required reductions on the grounds that they were “core or critical to the mission” of DoD (GAO, 2016b; Under Secretary of Defense, Acquisition, Technology and Logistics, 2014b).

However, the DAWDF is not able to pay the base salary of individuals who were employed prior to its establishment in 2008, and the existence of the DAWDF does not mean that the AW is immune from consequences of the uncertain budgetary environment. For example, AW positions were not explicitly exempt from a civilian hiring freeze temporarily in place in early 2017, leading a number of members of Congress to write a letter calling for them to be exempted (Hartzler et al., 2017). DoD's most recent AW strategic plan, from late 2016, warned

DoD's ability to responsibly sustain improvements and continue efforts to strengthen the AWF is challenged by the current fiscal environment. The continuation of fiscal constraints imposed by sequestration, the uncertainty engendered by the annual budget turmoil, and threats of Government shutdown could negatively affect warfighting capability and recent workforce improvements (DoD, 2016).

Regardless of whether future years see less instability in the budget process than has been the case in the recent past, pressures to rein in spending and make operations as efficient as possible are almost certain to persist in light of continued, growing structural budget deficits. Moreover, DoD-wide audits, which are beginning in 2018 (Deputy Secretary of Defense, 2017; Garamone, 2017), may shed light on inefficiencies and lead to further scrutiny with regard to how DoD manages its resources.

Economic Context

Economic conditions can have a significant impact on recruitment, retention, and retirement decisions of workers. Over the decade that RAND has been providing AW analytical support to DoD, the national economy has experienced significant upheaval. The bursting of the housing bubble and the subprime mortgage crisis gave way to a major economic recession that officially lasted from December 2007 to June 2009 but that affected many American families for much longer. Retirement account balances declined sharply, and employment opportunities dried up. The national unemployment rate peaked at 10.0 percent in October 2009.

As noted in Gates et al. (2013), the economic recession likely contributed to lower separation rates in the AW in the 2008–2010 period, as workers nearing retirement but whose savings had taken a hit stayed in the workforce longer, and as younger workers who might have otherwise left saw diminished outside employment prospects. This report provides an opportunity to assess how the economic expansion has impacted AW hiring and retention. As of the end of FY 2017, the national unemployment rate had been at or below 5.0 percent for more than two years. The stock market has long since recovered from recession-era losses and continues to reach new highs, bolstering retirement security for federal workers with Thrift Savings Plan accounts, a growing percentage of the workforce as Civil Service Retirement System (CSRS) workers retire.

Demographic trends can also play a major role in determining how workforces evolve. The leading edge of the baby boom generation turned 65 in 2011, and the ongoing retirement of the baby boomers is among the major challenges facing both public- and private-sector employers in the economy today. With regard to the AW, the distribution of workers had long been tilted toward late-career workers nearing retirement, and one of the goals of the AW growth initiative was to infuse the AW with younger workers to sustain it in the years ahead.

Information Technology and the Acquisition Workforce

As of late, policymakers have paid particular attention to the information technology (IT) acquisition process and cybersecurity. IT was added to the list of “mission-critical” career fields in DoD’s 2010 AW strategic plan. The 2016 AW strategic plan noted that DoD “is further reshaping disciplines related to emergent threats and challenges such as cybersecurity and information technology” (DoD, 2016). Section 804 of the FY 2010 NDAA required the implementation of a new acquisition process for DoD IT systems, based on the recommendations of a March 2009 report by a Task Force of the Defense Science Board that found that “the deliberate process through which weapon systems and information technology are acquired does not match the speed at which new IT capabilities are being introduced in today’s informa-

tion age” (Office of the Under Secretary of Defense for Acquisition, Technology and Logistics, 2009).

Despite ongoing efforts to improve the IT acquisition process and the caliber of the IT AW, concerns endure. GAO added “improving the management of IT acquisitions and operations” to its “high-risk” list in 2015, and GAO’s 2017 report found that “agencies continue to have IT projects that perform poorly” (GAO, 2017a). At a hearing of the House Armed Services Committee Subcommittee on Emerging Threats and Capabilities in April 2017, several witnesses, all former DoD officials, emphasized that the IT acquisition process and the IT workforce need continued improvement (Committee on Armed Services, 2017). Specifically, one witness stated that the “IT/Cyber workforce is not properly shaped with regards to required skills and numbers” (Halvorsen, 2017), while another noted that “the Department needs a strategic workforce plan for its cyber workforce” (Levine, 2017).

Section 842 of the FY 2018 NDAA (Public Law 115-91) explicitly includes personnel who “contribute significantly to the acquisition or development of systems related to cybersecurity” in the AW. It also contains a provision (Section 872) that requires the Defense Innovation Board to study software development and acquisition regulations and to make recommendations, including to “improve the talent management of the software acquisition workforce, including by providing incentives for the recruitment and retention of such workforce within the Department of Defense.” In addition, Section 802 of the FY 2018 NDAA calls for DoD to create a “cadre of intellectual property experts” and to add intellectual property positions to the AW.

The Evolving Department of Defense Policy Environment

Policymakers remain interested in improving acquisition outcomes and reducing cost growth in acquisition programs, and they continue to make a link between the size and quality of the AW and these outcomes. Over the past couple of years, Congress and DoD officials have made permanent some policies and procedures implemented as part of the AW growth initiative while eliminating others and enacting additional changes that could affect the AW.

The FY 2016 NDAA (Public Law 114-92) made permanent the DAWDF and Expedited Hiring Authority. It also mandated an independent study of defense AW improvement efforts.⁶ Section 844 of the FY 2018 NDAA (Public Law 115-91) extends the AcqDemo program through 2023, and Section 843 of the law calls for additional reports on the effectiveness of hiring flexibilities for members of the AW. House Report 115-200 (to accompany its version of the FY 2018 NDAA) included language emphasizing the importance of the civilian AW and urging “that planning for any workforce reduction that would affect the civilian acquisition workforce takes into consideration potential long-term effects of those reductions on cost, technical baseline, and warfighting capability” (U.S. House of Representatives, Committee on Armed Services, 2017).

However, the FY 2017 NDAA (Public Law 114-328) eliminated the biennial DoD civilian workforce strategic plan requirement, which had required a chapter devoted to the AW (though the DAWDF annual report requirement remains). The FY 2017 NDAA also reorganized the Office of the Secretary of Defense, splitting USD(AT&L) into two as of Febru-

⁶ This study was conducted by CNA and published in December 2016 (see Porter et al., 2016).

ary 1, 2018, with implications for strategic workforce management of the AW that remain to be determined. For example, an August 1, 2017, draft reorganization plan noted that “the changes planned will require a significant change in how ‘acquisition’ is taught to the acquisition workforce” (Department of Defense, 2017c). This draft reorganization plan placed “Acquisition Workforce Policy/Training” under the new USD(Acquisition and Sustainment [A&S]), as opposed to the new USD(Research and Engineering[R&E]), and HCI is now part of USD(A&S).

In July 2017, DoD replaced DoDI 5000.55, *Reporting Management Information on DoD Military and Civilian Acquisition Personnel and Positions*, which had been in force since 1991, with DoDI 5000.66, *Defense Acquisition Workforce Education, Training, Experience, and Career Development Program*, which outlines the responsibilities of the director of HCI with regard to DoD-wide AW strategic planning and data collection. DoDI 5000.66 references two guides published by HCI (DoD, 2017a, 2017b) that describe the AW and the quarterly data reporting requirements for the service agencies and the Fourth Estate that allow for RAND’s analyses in this and prior reports.

Purpose

The purpose of this report is twofold. First, we document modifications and new approaches to the analysis that RAND provides to DoD that we have adopted since the publication of Gates et al. (2013). These modifications include analyses of quarterly data for the civilian AW and annual gains and losses to the military AW, as well as a new approach to identifying and analyzing cohorts of workers entering the AW. Second, we present updated descriptive information on the AW, applying these new methods to data through FY 2017. The descriptive information provides an overview of how the factors described in this introduction, including how the AW growth initiative, DoD budgetary pressures, and economic and demographic trends have influenced the AW.

As of this writing, in summer 2018, we continue to work collaboratively with DoD to improve the data and methodologies in order to make them more useful to AW managers, and to update the analyses as new data become available.

Outline of Report

The broader policy motivation for this workforce analysis is addressed in greater detail in our prior reports. In the next chapter, we describe our data and methodology, with a focus on how RAND’s methods and tools have evolved since Gates et al. (2013) was published. Chapter Three provides an overview of the civilian AW as of the end of FY 2017 and discusses how the civilian AW has changed over the decade that RAND has been conducting its analysis. Chapter Four drills down into the background and prior work experience of recent cohorts entering the civilian AW. Chapter Five describes the military AW and (for the first time) discusses flows of gains and losses to the military AW. Chapter Six provides conclusions and recommendations. Appendixes A and B provide details on the model RAND has developed to project the size of the AW in the future and include detailed summary data for the civilian AW.

Overview of Workforce Analysis Data and Methodology

Understanding workforce trends is critical to ensuring that the AW has the people and skills needed to deliver high-quality goods and services to the warfighter at a fair price to the taxpayer. Since 2006, RAND has been collaborating with DoD to analyze data on the AW across DoD agencies and AW career fields—to provide workforce managers with insight into worker retention and other patterns that could inform their hiring and workforce management plans. This supply-side analysis can and should be paired with demand-side analysis of the knowledge and skills needed now and in the future to conduct successful DoD acquisitions (Nataraj et al., 2014a).

As part of our ongoing collaboration, RAND provides a variety of materials to DoD on a quarterly basis. These include detailed data on gains and losses to the AW—by agency, career field, and by career field within agencies—as well as information on the distribution of workers with regard to their proximity to retirement. RAND also provides DoD with a quarterly updated model that extrapolates from recent trends to project the size of the AW over the coming decade, as well as instructions for how DoD can manipulate the model to estimate the impact of potential policy or economic changes. DoD has utilized RAND analysis to develop and implement its congressionally mandated AW strategic workforce plans, administer the DAWDF, and produce a range of materials publicly available on the HCI website (HCI, undated-a, undated-b).

More-extensive descriptions of our data sources and methods are included in Gates et al. (2008) and Gates et al. (2013). Our methods are continuously being refined, improved, and expanded to capture more of the workforce and provide more granular information to DoD managers. In this chapter, we summarize our data and methods, provide some key definitions that are essential to understanding the information presented here, and describe some important changes made in our data definitions, analytical approach, methodological tools, and reporting since the publication of Gates et al. (2013). These changes came about through the process of working with the data and from interacting with DoD on policy-related questions specific to the AW.

Data and Methods

NDRI has assembled a comprehensive data file that can support a DoD-wide analysis of the AW. The RAND data file is made up of information drawn from several files maintained by the Defense Manpower Data Center (DMDC):¹

- **Acquisition workforce person file and the acquisition workforce position file (DAWIA files):** These files provide information on the individuals who are designated as part of the AW for FY 1992 on, as well as the positions that DoD has designated as acquisition positions. The person file contains a record for each individual (both military and civilian) who was included in the service or agency submissions made in accordance with the *Defense Acquisition Workforce Data Reporting Standards Guide* (DoD, 2017a), referenced in DoD Instruction 5000.66 (2017). Each AW person record includes an AW position code and can thus be linked to the position data.² Past RAND reports also referred to these files as the “5000.55 submission data,” after the 1991 DoDI that guided their collection until July 2017.
- **DoD civilian personnel inventory file:** The DoD civilian personnel file provides quarterly snapshots for all Appropriated Fund (APF) Civilians—or all “APF direct hire civilians paid exclusively from DoD APFs” (DoDI 1444.02, 2013)³—including their grade, location, and education level, as well as other demographic variables. The snapshots are taken as of September 30th (the end of DoD’s fiscal year), December 31st, March 31st, and June 30th. The data from this file also include information on each individual’s occupation, the organization they work in, their pay plan, and their years of service.
- **DoD civilian personnel transaction file:** The data from this file complement the inventory data by noting “transactions” that occur to workers between inventory snapshots. The transactions of central interest to us were indicators of and reasons for attrition (e.g., retirement, voluntary separation, or involuntary separation), as well as codes indicating whether an individual transferred to or from another federal government agency. We have obtained civilian inventory and transaction data going back to FY 1980 for this work.
- **Active Duty Master File (ADMF):** DMDC maintains “a centralized database of active duty uniformed personnel” (DoDI 1336.05, 2015). This database includes information on individuals from all of the military services, the Coast Guard,⁴ and the other uniformed services. These active duty personnel files provide quarterly snapshots of the inventory of all of these active duty uniformed personnel as of September 30th, Decem-

¹ For more information on the data files described here, please see the DoDIs that mandate the data reporting. Submission requirements for DoD civilian personnel are described in DoDI 1444.02 (2013). Submission requirements for active duty military personnel are described in DoDI 1336.05 (2015). DoDI 1336.05 defines the Active Component (see paragraph 2b) by referencing DoDI 1120.11 (2015). DoDI 5000.66 (2017) references two DoD guides (DoD, 2017a, 2017b) that include the definitions and reporting requirements for the AW. These guides are published by HCI.

² As described in Gates et al. (2013), these DAWIA workforce data are available from 1992 to the present and are useful for analytical purposes. However, other methods of counting the AW have been used over time. Alignment among these approaches occurred in FY 2005. The DoD Inspector General has concluded that counts from FY 2004 and earlier are not verifiable (see Department of Defense, Office of the Inspector General, 2006). Because of these limitations to the workforce count information, readers are urged to use caution in interpreting trends related to the AW prior to 2005.

³ Including seasonal and part-time employees.

⁴ Coast Guard personnel are included starting in 1989.

ber 31st, March 31st, and June 30th. The data contain a number of variables, including personal demographic and workforce position descriptors.⁵ This study uses subsections of the larger uniformed personnel data files. Specifically, the data files we use consist only of active duty military and Coast Guard personnel who are included in the Active Component End Strength calculations, per DoDI 1120.11.⁶ We were given access to a handful of variables from these files, including personal descriptors, such as education level and gender, and position information, such as occupation codes. Our research uses ADMFs starting in FY 1980.⁷

In the DMDC database, records can be linked across files in useful ways. For example, connections can be made between the military and civilian files or between the civilian inventory file and the acquisition person file. Moreover, searching across time is made possible through a unique identifier (a scrambled social security number) that is used consistently across files and years for a given individual.

Together, the DMDC files contain information on personnel including their position, assignment, rank, pay, occupation, years of service, demographic characteristics, education, acquisition career field, and acquisition certification level. By linking records across time and across files, we are able to examine movement into and out of the AW and movement between the DoD military and civilian workforces, as well as promotion and experience trajectories.

Resolving Discrepancies in Constructing the Acquisition Workforce Analysis File

To construct the AW data file that we use for analytic purposes, we merge data from the DAWIA files with the civilian and military personnel files described above. In the course of this file merging process, we occasionally observe discrepancies between the files. These discrepancies may be due to the different purposes the data files serve. The military and civilian personnel files are extracts from data sources that are used for important administrative purposes, such as benefits determination. By contrast, the DAWIA files fulfill a reporting requirement but are not used directly for operational purposes.

Over the years, we have uncovered and analyzed the source of discrepancies between the DAWIA files and the DoD personnel files. Our analysis of such discrepancies indicates that there can be a lag between the time that personnel transactions occur and when they are reflected in the DAWIA files. For example, our analysis of instances in which individuals appear in the DAWIA file but not in one of the DoD personnel files suggests that this type of discrepancy is due to a lag in updating the DAWIA file to reflect a personnel separation. As a result, our decision rules for dealing with the data discrepancies give priority to the information in the personnel files. Our specific procedures for resolving discrepancies are as follows:

⁵ Enclosure 3 in DoDI 1336.05 (2015). DoDI 1120.11 (2015) lists the information recorded on the active duty military and active duty Coast Guard personnel who are included in the data file.

⁶ However, cadets and midshipmen at the service academies are excluded.

⁷ Past RAND reports used the Work Experience File (WEX) for their active duty information. The WEX was an active duty military personnel transaction file derived from the transaction file equivalent of the ADMF that captured changes in the individuals' records. The WEX was discontinued in 2016. This analysis uses the ADMF, which provides personnel inventory "snapshots" rather than just transaction records, and results in our using data closer to the original source data.

- **Individual appears in the DAWIA files but not in the active duty or the civilian personnel files:** When an individual appears in the DAWIA file but not in a personnel file, we drop them from the acquisition workforce analysis file for that time period. We dropped 485 civilian AW records and 244 military AW records that were in the DAWIA files for this reason in Q4 of FY 2017.
- **Individual appears in the DAWIA files as military but in the personnel files as civilian (or vice versa):** When an individual appears in the DAWIA file as a military employee but matches only to the civilian personnel file, we count them as part of the civilian AW. Conversely, when a person appears in the DAWIA file as a civilian employee but matches only to the military personnel file, we count them as part of the military AW. The first scenario likely reflects individuals who have left the military and joined the civilian workforce. The second scenario likely reflects individuals who have left the civilian workforce and joined the military. We recategorized 22 people from the military to civilian AW and two people from the civilian to the military AW in Q4 FY 2017.
- **Individual appears in the DAWIA files as military or civilian and appears in both military and civilian personnel files:** Each year, we observe individuals in the DAWIA file who match to both the military active duty file and the civilian personnel file. We continue to work with DMDC to understand what is going on in these cases. Our best guess is that these are activated reservists who are also DoD civilian employees. When this happens, we count the individuals as part of either the military or the civilian AW as reflected in the DAWIA file. In Q4 FY 2017, six military AW members and 41 civilian AW members fell into this category.

Because of the adjustments described in this section, the workforce counts in the analysis file that RAND uses differ slightly from the DAWIA files, which cannot support the type of cross-year analysis that RAND conducts. The RAND AW analysis file also differs slightly from the HCI Data Mart, DoD's data repository, which is derived from the DAWIA files. In addition, in some years, there are unexplained discrepancies between the raw DAWIA data that DMDC provides to RAND and HCI Data Mart data. In FY 2017, there were no such discrepancies.

Validation and Quality Assurance

When RAND receives data from DMDC, we first check that the number of records in the new files is consistent with the number of records we have received in the past. We then compute means and frequencies over time for each of the variables and compare those with what we have received in the past. These checks help to confirm that we have an extract of the expected population and reveal when there have been changes in the coding of variables over time. We note the total number of observations in each file, and we track this carefully as we proceed with the next steps. We also compare the counts in the DAWIA files to those reported in Data Mart and address any discrepancies with DMDC and the individuals at DoD who maintain Data Mart.

All subsequent data work is checked carefully to ensure that code is running correctly and generating the intended output. We employ best programming practices, such as process mapping (clearly labeling inputs and outputs), explicit tracking of control totals throughout the entire programming process, maintaining detailed in-line documentation of all code, code-checking, and conducting validity checks of the tables and output we generate.

Key Definitions

Our descriptive analyses and projection modeling rely on variables that we construct or define based on information available in the administrative data files. These variables are designed to capture information that will be useful to workforce managers. In this section, we summarize the definition of several key variables, noting changes from our earlier work.

Types of Gains and Losses to the Acquisition Workforce

Central to RAND's workforce analysis is keeping tabs not only on the number of workers in the AW but the flows of workers into and out of the AW over time. Our approach to identifying different types of workforce gains and losses has not changed and is described in Gates et al. (2013), although we have modified our terminology to make the definitions more accessible to policymakers and workforce managers and to accommodate the fact that we are now producing information on gains and losses to the civilian AW quarterly as well as annually. We provide a brief overview of our approach here, using the new terminology, and describe the potential implications of different categories of gains and losses.

In addition, we now apply this same methodology to study the military AW. It is important to note that, when analyzing gains or losses to the military or civilian AW, the two workforces are considered separately. Any transfers between the military and civilian AW represent gains to one and losses to the other.

To identify workforce gains and losses, we examine the workforce at two points: time t and time $t + 1$. The interval between the two periods could be a year or a quarter. When a worker appears in the workforce at time $t + 1$ but not at time t , the worker is considered to be a workforce gain between time t and $t + 1$. When a worker appears in the workforce at time t but not at time $t + 1$, the worker is considered to be a loss between time t and $t + 1$.

Policymakers are often interested in the source of workforce gains and the destination of workforce losses. When analyzing the AW, we disaggregate gains and losses into six categories, three for gains and three for losses. The categories of gains are as follows:

- **New hire:** Individuals are considered to be new hires at time $t + 1$ if they do not appear in the DoD military or civilian data set at time t but do appear in that workforce at time $t + 1$, even if we observe them in the DoD workforce in a time period prior to time t .⁸ It is worth noting that a person who transfers directly from the military workforce would be counted as a new civilian hire and vice versa.
- **Internal hire:** Individuals are considered to be internal hires into the civilian AW in time period $t + 1$ if they appear in the DoD civilian (non-AW) workforce at time t and appear in the DoD civilian AW at time $t + 1$ and if one or more of the following trigger variables in an individual's personnel record changed in conjunction with the move between the non-AW and the AW:
 - agency (e.g., military service or "other DoD")

⁸ An earlier approach made adjustments to these counts of new hires and separations to exclude re-entrants to the workforce (i.e., people who return to the DoD civilian workforce after some break in service). Under our current approach, re-entrants are treated as separations in the year when they leave and new hires when they re-enter (see Gates et al., 2013, p. 7, for more details).

- agency sub-element (e.g., major command or organization within a military service or other DoD agency)
- occupational series
- pay plan into or out of the Senior Executive Service (SES)
- pay grade within the same pay plan (promotion).⁹

In prior reports, we referred to internal hires as “substantive recategorization into the AW.” When analyzing gains to the military AW, we consider any transfer from the non-AW military workforce to the military AW to be an internal hire.

- **Recode-gain:** Individuals are considered to be recode-gains in period $t + 1$ if they appear in the DoD civilian (non-AW) workforce in period t and appear in the DoD civilian AW in period $t + 1$ and if none of the trigger variables in the personnel record mentioned above changed in conjunction with the move between the non-AW and the AW. In prior reports, we referred to recode-gains as “administrative recategorizations into the AW.” When analyzing gains to the military AW, we do not have a criterion for identifying recode-gains. This is due to differences in the underlying data files (i.e., we use variables in the civilian personnel file to identify recodes into the civilian AW, while we use the ADMF to analyze the military AW), as well as differences in how the military and civilian workforces are managed, with recoding of less concern on the military side.

Each type of gain represents an individual who is in the civilian or military AW in the current period but was not in the prior time period. Internal hires and recode-gains are similar in that they both reflect additions to the civilian AW from individuals who were already part of the DoD civilian workforce, but there are important differences. Internal hires strive to capture those gains that appear to stem from a legitimate change to the nature of work a person is doing—for example, a DoD civilian employ transfers into an open AW position, is promoted into an AW position, or is transferred into a new organization, filling an AW position. By contrast, a recode-gain would reflect a situation where the employer organization or the Director of Acquisition Career Management determines that the work being done by a particular employee in a particular position meets DAWIA criteria and hence that the employee should be categorized as part of the AW. Categorizing gains in this way gives policymakers and managers the flexibility to explore the workforce dynamics of these categories of gains separately or in combination.

We make similar distinctions with regard to separations. The categories are as follows:

- **Separation:** Individuals are considered to be separations if they appear in the DoD military or civilian data set at time t but do not appear at time $t + 1$.
- **Internal loss:** Individuals are considered to be internal losses in time $t + 1$ if they appear in the DoD civilian AW at time t and appear in the DoD civilian non-AW at time $t + 1$ and if one or more of the fields in an individual’s personnel record listed above in the “internal hire” category changed in conjunction with the move between the AW and non-AW. In prior reports, we referred to internal losses as “substantive switches out of the

⁹ If pay grade changes concurrently with pay plan, or if there is a pay plan change that does not involve the Senior Executive Service (SES), we do *not* consider the change to be substantive. This is due do the frequent changes in pay plan structure that are administrative in nature (see Gates et al., 2013, pp. 9–10).

AW.” When analyzing losses to the military AW, we consider any transfer from the military AW to the non-AW military workforce to be an internal loss.

- **Recode-loss:** Individuals are considered to be recode-losses in period $t + 1$ if they appear in the DoD civilian AW at time t and appear in the DoD civilian non-AW in period $t + 1$ and if none of the fields in the personnel record mentioned above changed in conjunction with the move between the AW and non-AW. In prior reports, we refer to recode-losses as “administrative switches out of the AW.” When analyzing losses to the military AW, we do not have a criterion for identifying recode-losses.

Each type of loss represents an individual who is in the civilian or military AW in one time period but not in the next time period. Internal losses and recode-losses are similar in that they both reduce the civilian AW but do not involve people leaving the DoD civilian workforce. Still, there are important differences between these two categories that mirror the differences between internal hires and recode-gains. Internal losses stem from a change to the nature of work a person is doing—for example, a DoD civilian AW employee transfers into an open non-AW position, is promoted into a non-AW position, or is transferred into a new organization, filling a non-AW position. This is a real loss to the AW that may need to be filled by another employee. By contrast, a recode-loss would reflect a situation where the employer organization or the Director of Acquisition Career Management determines that the work being done by a particular AW employee in a particular position no longer meets DAWIA criteria.

Applying Gain and Loss Definitions to Subsets of the Acquisition Workforce

When analyzing subsets of the civilian AW—career fields, services or agencies, or career fields within services or agencies—an internal hire, loss, or recode is anyone who moves into or out of the population of interest but who remains employed as a civilian by DoD. For example, in the context of a career field-specific analysis, a person who switches from the engineering career field to the program management career field is identified as an internal loss for the engineering career field and an internal hire for the program management career field.¹⁰ In an AW-wide analysis, this person would not have been identified as an internal hire or loss at all, because the employee is part of the civilian AW in both years.

We use the same criteria to distinguish between substantive internal hires or losses and recodes in the career field analyses as we do in the overall analysis. If a person switches career fields within the civilian AW but experiences no change in any of the trigger variables, then the change is classified as a recode. Otherwise, the change is classified as an internal hire or loss.

Similarly, in service-level analyses, a civilian moving between the Army AW and the Air Force AW, for example, will be counted as an internal loss to the Army AW and an internal hire into the Air Force AW.¹¹ Because service or agency is a trigger variable, these transfers are never considered to be recodes. As is the case with career field analyses, the total number of internal hires and losses in service-level analyses will exceed the total number of internal hires and losses for the civilian AW as a whole, because the analyses count switches between services or agencies, which are ignored in the AW-wide analysis.

¹⁰ For the purposes of this example, we assume that the person’s occupation code changed when this switch occurred.

¹¹ If the person left the Army AW to work in any part of DoD outside of the AW (Army or another service), they would be counted as a switch out of the Army AW and would not be counted as a switch into any other AW group.

Career field analyses can also be done for the military AW, though in the case of the military AW all movement between career fields is considered to be an internal hire or loss (we never consider these changes to be recodes). As with the civilian AW, the number of internal hires and losses in military AW career field analyses will exceed the number of internal hires and losses in military AW-wide analysis. Because individuals rarely switch between service agencies in the military, it does not make sense to conduct service-level analyses within the military AW.

Years Relative to Retirement Eligibility

The age and proximity to retirement of workers is a key driver of workforce trends. Workers nearing retirement age may be less likely than younger workers to leave for a new job, but once these workers reach the age at which they are eligible to retire, their attrition rates spike. If too high a share of a given workforce is at or near retirement age, there is a risk that skills gaps could arise as older workers retire without younger workers at the ready to replace them. Recognizing that nearly 60 percent of the civilian AW as of the end of FY 2008 was eligible to retire within ten years (HCI, undated-a), one of the major goals of the AW growth initiative launched in 2009 was to reshape the distribution of workers to build up the early- to mid-career workforce.

RAND's analytical support to DoD includes analyzing the distribution of the civilian AW with regard to proximity to retirement. For the purposes of our analysis, we create a variable called *years of retirement eligibility* (YORE) or, more accurately, years relative to retirement eligibility. We do this by calculating the earliest age at which each individual could claim regular, full retirement benefits given the individual's current retirement plan, age, and years of service (YOS) under the assumption that the individual works continuously until that future retirement eligibility date and remains covered under his or her current retirement plan.¹² We then calculate the fiscal year in which the individual will reach this age.¹³ We calculate YORE for individuals who participate in one of two retirement plans: the Civil Service Retirement System (CSRS) and the Federal Employees Retirement System (FERS).¹⁴ The vast majority of civil servants employed by DoD are in one of these two plans. We are not able to calculate YORE for the small number of DoD employees enrolled in "Other" (non-CSRS or -FERS) retirement plans.

¹² Individuals who are covered under the Federal Employees Retirement System (FERS) and achieve 30 years of service must also reach a minimum retirement age (MRA) before they qualify for full retirement benefits. That minimum age depends on birth year. It was 55 for those born before 1948, 56 for those born between 1953 and 1964, and 57 for those born after 1969. Individuals born between 1948 and 1953 or 1965 and 1969 were part of a phase-in process to the higher years. MRA depends on age in months (see U.S. Office of Personnel Management, undated).

¹³ To calculate YORE, we use the full date of birth. When the month or year of birth is missing, we set the birthdate to "missing," and these individuals are not included in any analysis that involves the YORE variable. Missing day of birth is imputed, so we can still compute YORE. In the September 2011 civilian data, we fixed 496 leap-year birth dates: DMDC delivered these cases with day of birth set to 0 instead of 29. In all other years, when day of birth is missing, we impute a legitimate value. There are a total of 2,482 individuals for whom we observe no birth date in any year between 1992 and 2009. Ninety-nine percent of the cases are prior to 2004. There are four individuals for whom we observe no birth date since 2009: two in 2015 and two in 2016.

¹⁴ FERS was created in 1986; anyone hired into the federal civil service after January 1, 1987, is automatically covered under FERS. Employees hired prior to that date were covered by CSRS when they were hired but had the option to switch into FERS. The number of CSRS employees in DoD declines each year. As of Q4 of FY 2017, there were 6,942 people remaining in the AW covered by CSRS, and there were 382 people in "Other" plans.

To calculate YORE for a given individual for a particular fiscal year, we take the fiscal year of interest and subtract it from the fiscal year in which an individual reaches full retirement eligibility and add one. For example, an individual who reached full retirement eligibility in FY 2017 would have a YORE of -1 at the end of FY 2015, 0 at the end of FY 2016, and 1 at the end of FY 2017. Our YORE measure does not account for special retirement incentives that might result in optional retirement prior to reaching full, regular retirement eligibility, or for disability retirement. For this reason, we do observe some people in the data set who retire before having reached regular retirement eligibility.

To summarize, individuals with a YORE of 0 in a given year are those who become retirement-eligible for the first time in the next fiscal year. The people who we see in the data set at the end of FY 2017 with a YORE of 0 were not yet retirement-eligible as of the end of FY 2017, but they will become retirement-eligible in FY 2018. Those with a negative YORE at the end of FY 2017 will not reach retirement eligibility during FY 2018; those with a positive YORE attained retirement eligibility by the end of FY 2017. When we report on turnover by YORE for a given year, we reference YORE as measured at the end of the prior fiscal year and report on the fraction of those people who leave before the end of the fiscal year of interest.

Updates to RAND's Methodology and Reporting

We continue to work with DoD to make our analysis more timely and useful to workforce managers. This section describes three ways that we have improved our analysis since the publication of Gates et al. (2013): providing DoD with quarterly updates to our data and projection model, refining our projection model to account for movement between retirement plans, and developing an approach to analyzing cohorts of entrants to the AW.

Quarterly Updates

When our collaboration with DoD began in 2006, RAND obtained data from DoD on an annual basis—snapshots of the AW as of the end of each fiscal year. We analyzed the data and provided annual updates to our data and model to DoD. This process is described in Gates et al. (2008) and Gates et al. (2013). RAND now obtains AW data on a quarterly basis and provides DoD with quarterly updates to our data and model. Two types of analyses are provided.

The first analysis consists of quarterly updates to the annual reporting described in Gates et al. (2008) and Gates et al. (2013). In this analysis, workforce gains and losses are measured over a one-year time frame based on end-of-quarter workforce snapshots. So, for example, at the end of Q1 FY 2017, we compared the observed workforce with the workforce that was present at the end of Q1 FY 2016 to identify gains and losses and calculate gain and loss rates over that year. We then used those rates in an updated version of the projection model.

The second analysis drills down to look at quarter-over-quarter gains and losses. These are identified by comparing the workforce at the end of one quarter with the workforce at the end of the previous quarter. So, for example, to identify the number of gains during Q1 FY 2017, we look for individuals who were in the workforce at the end of Q1 FY 2017 but who were not in the workforce at the end of Q4 FY 2016. Although the time frame for counting workforce gains and losses is one quarter rather than one year, all other aspects of the approach are the

same as described above. Given the higher volatility in quarterly gains and losses, we do not use quarterly rates in our projection model—just year-over-year rates as of the end of each quarter.

An analysis of quarterly gains and losses provides more up-to-date information on workforce trends and allows policymakers to understand variation in gains and losses over the course of the fiscal year. Looking at quarterly changes may also provide useful information on the immediate impact on the workforce of economic changes, such as a stock market crash or a spike in unemployment, or policy changes, such as a hiring freeze or new retirement incentives.

When comparing data on quarterly and annual gains and losses, it is important to bear in mind that the sum of quarterly gains and losses over the course of a year will not necessarily equal the number of annual gains and losses measured over the same time period. Individuals who enter and leave the workforce in less than one year could be captured in the count of quarterly gains and losses but not appear at all in the analysis of annual gains and losses. For example, suppose a person is hired into the AW on October 10, 2016, and quits on September 25, 2017. That individual would count as a workforce gain for Q1 2016 and a workforce loss for Q4 2016. However, this person would not be counted at all in an annual analysis based on end-of-FY data because he or she does not appear in an end-of-FY data file.

Another reason why the sum of the quarterly counts might differ from the annual counts is because workers may change which workforce they are in during the year. For example, if an individual was hired into the DoD workforce in October 2016 but joined the AW only in September 2017, the individual would be counted as a new hire into the AW for FY 2017 based on an analysis of annual end-of-FY data. However, this person would count as an internal hire into the AW for Q4 FY 2017 because he or she was already part of the DoD civilian workforce in Q3 FY 2017.

Overall, we find that the sum of quarterly separations from the AW over the course of a year tracks closely with annual separations, suggesting that few people leave only to return quickly. We find that the sum of quarterly AW new hires is lower than the number of annual AW new hires but that the sum of quarterly recode-gains is higher than the annual number of recode-gains. These two facts suggest that there may be a lag between when civilians are hired into the DoD civilian workforce and when they are officially counted as part of the AW.

Updates to the Projection Model

In addition to data on gains and losses to the AW, RAND provides DoD with a projection model that can be used to estimate the size of the civilian AW in future years.¹⁵ The model, known as the RAND Inventory Model (RIM), is a stock-and-flow, or inventory, model designed to project the future supply of workers within a given population of interest based on current employee “stock” and projected worker flows, determined either by historical trends or user input. The model starts with the stock of employees in the baseline year. It then changes this stock in each subsequent year based on projected flows of employees into the organization (new hires), out of the organization (separations), and between organizations (switches).

The RIM can be used to analyze the civilian AW on the whole or to analyze individual AW career fields, agencies, or career fields within agencies. For each version of the model (AW overall or by career field or agency), there are two model specifications. Model 1 projects future workforce size by projecting all worker flows (including new hires) based on average flows over

¹⁵ The model does not include the military AW.

the past five years. Model 2 projects the number of new hires or reductions needed to achieve specific workforce size targets specified by the user. We update the RIM quarterly to include the most current data on year-over-year changes to the AW. As a result, it can be used to project from the end of one fiscal year to the end of the next fiscal year, or from the end of a particular quarter to the end of the same quarter in future years (e.g., March 31 to March 31).

The key inputs to the RIM are the baseline populations and information on historical gains and losses: separations, new hires, internal hires, and internal losses.¹⁶ For employees in the CSRS and FERS retirement plans, gains and losses are calculated separately for employees by YORE, to account for the different rates of gains and losses by proximity to retirement. For the small number of individuals in retirement plans other than CSRS and FERS, we calculate the gain and loss rates for the group as a whole. We use historical information about the flows of individual employees to calculate flow rates for cohorts, which are subsequently used in projecting future worker flows.

Each year within most workforce populations, a small but significant percentage of employees moves from one retirement plan to another. In general, employees covered by CSRS and “Other” retirement plans move into FERS; however, a few employees are seen moving out of FERS as well. The inflow of employees into FERS is not large relative to the number of FERS employees; however, the outflows of employees from CSRS and “Other” retirement plans are sometimes large compared with the (relatively small) numbers of employees in those plans. Therefore, failing to account for such transfers would overestimate the number of employees in the CSRS and “Other” retirement plans and underestimate FERS employees. This discrepancy can skew projections over time, because the plans are subject to different gain and loss rates.

The current version of the RIM model, updated since the publication of Gates et al. (2013), accounts for these plan transfers by assuming that historical average rates of transfer will continue into the future. We calculate historical average plan transfer rates based on the most recent five-year period, in a similar manner as we calculate separation rates. To arrive at the historical rate of transfers out of CSRS, we divide the total number of people who transferred out of CSRS plans during the previous five-year period by the total number of employees who were participating in CSRS during each of the past five years. We perform a similar exercise for employees in “Other” retirement plans. In each projected year, we assume that the projected number of plan transfers into FERS is equal to the number of plan transfers out of CSRS and other plans.¹⁷

Workforce managers should use caution when interpreting the output of the RIM—for example, it is highly unlikely that workforce trends in the AW will be the same over the next ten years as they were over the past five years, which included the AW growth initiative. However, because the model can be manipulated by managers to project the effect of possible policy changes, or to determine what hiring rate would be necessary to meet target workforce levels (such as holding the size of the workforce constant), it can be useful in helping managers to answer a range of questions, such as the following:

¹⁶ The projection model does not account for historical patterns in recode-gains and losses, because recodes are not based on changes in the nature of the work being done and past recode rates may not have any predictive power over future recode rates.

¹⁷ Most flows are from CSRS and “Other” retirement plans into FERS, but if the historical data show net flows into CSRS or “Other” retirement plans, the model will accommodate this pattern.

- What will be the size of the civilian AW in two, five, or ten years, assuming that new hires, switches, and separations continue at the same rates as over the past five years?
- What will be the size of the Army's civilian AW belonging to the information technology (IT) career field in two, five, or ten years, assuming that new hires and switches continue at the same rates as in the past but that separation rates double for retirement-eligible employees?
- What will be the size of the Missile Defense Agency's civilian AW in five years if there is a hiring freeze and no new hires are added to the workforce?
- How many employees will the Navy need to hire in each future year in order to maintain status quo workforce levels for its civilian AW for the next five years?
- How many employees will DoD need to hire, or how many employees might it need to involuntarily separate, in each year in order to reduce the size of the civilian AW by 25 percent in ten years relative to status quo workforce levels?

The RIM is contained in a set of Microsoft Excel workbooks that are provided on a quarterly basis to DoD. The model interface is described in detail in Appendix A. In addition, our past reports, Gates et al. (2008) and Gates et al. (2013), include an extensive discussion of the model, how it has evolved, and its uses and limitations.

Analysis of Cohorts of Workforce Entrants

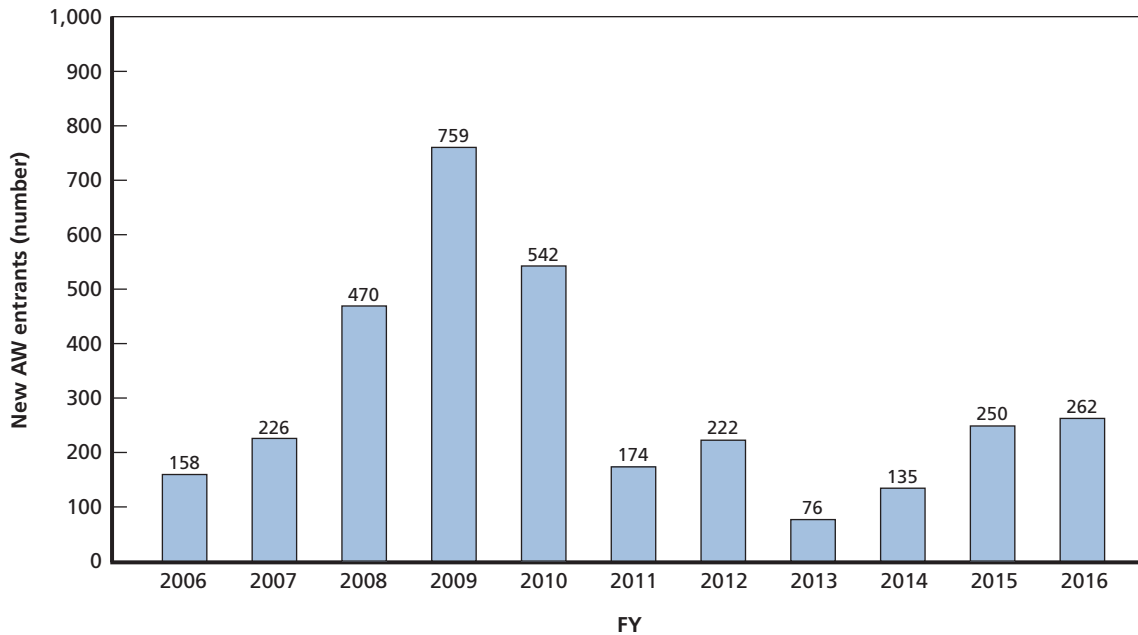
Workforce managers are often interested in examining the outcomes of workers who enter the workforce at a particular point in time. This is referred to as a *cohort analysis*. Cohort analysis can be used to explore characteristics that are related to important workforce outcomes, such as retention, promotion, and performance ratings (see Guo, Partyka, and Gates, 2014; Powell, 2017). Since the publication of Gates et al. (2013), we have begun to analyze cohorts of new entrants to the civilian AW and to provide detailed information on these cohorts to DoD, with a particular focus on the prior work experience of cohort members. This analysis can be useful in helping workforce managers understand how cohorts that entered the AW in a certain year (such as during the years of the growth initiative) differ from other cohorts and track their career progression over time.

Defining a Cohort

In our analysis of entrants to the AW, we define each fiscal year's cohort as including new hires and internal hires during that year.¹⁸ We do not consider recode-gains to be part of an entry cohort, with one key exception: We do include in our analysis those individuals who joined the DoD civilian workforce in one year (year t) and were recoded into the civilian AW in the following year (year $t + 1$). We include these individuals as part of the AW cohort for year t . For these "lag" instances, we use information from their DAWIA record in year $t + 1$ to code AW career field in year t . The number of recodes included in each cohort on this basis is reflected in Figure 2.1. As of summer 2018, data are available through the end of FY 2017, and new hires to the DoD civilian AW in FY 2016 who were recoded into the AW during FY 2017 have been added into the FY 2016 AW cohort. However, because of this adjustment process that incor-

¹⁸ A merged data set consisting of annual (end-of-FY) DoD civilian personnel inventory files and DAWIA files is used to determine who enters the civilian AW and in which fiscal year he or she enters. The DoD civilian inventory files show which individuals are a part of the DoD civilian workforce at the end of each fiscal year, and the DAWIA data indicate which individuals are in AW positions.

Figure 2.1
Number of New Civilian Hires Who Are Acquisition Workforce Recode-Gains in the Year After Hire, FYs 2006–2016



porates recodes in the fiscal year following entry into the civilian DoD workforce, we do not include cohort data for FY 2017 (since we would need to observe changes through the end of FY 2018 for those cohort data to be complete and comparable with our other data).

Characterizing Past Work Experience

When people join the civilian AW, they bring with them a variety of prior work experiences. Those prior experiences may influence the types of positions they enter and possibly their retention and performance while on the job. The DMDC data sets that we utilize in our work allow us to determine whether individuals joining the AW have past DoD experience, either in the civilian DoD workforce or in the active duty military. Of the past work experience that we are able to analyze, two aspects in particular may be of interest to DoD managers. First, managers may want to know how many of the new entrants are transitioning directly from a DoD workforce—either civilian non-AW or military (AW or non-AW). Second, for those who are transitioning from a non-DoD position, managers may want to know whether these individuals have any past experience in a DoD workforce.

To examine the performance implications of prior experience, we must first be able to characterize that prior experience. We have developed an approach for doing so for entrants into the civilian AW. To do this, we take advantage of our ability to merge information from active duty files, DoD civilian personnel inventory files, and DAWIA in order to look back at each civilian AW entrant's past work experience within the DoD.¹⁹ Our civilian personnel and active duty records go back to FY 1980, but coding of the AW did not begin until FY 1992.

¹⁹ As noted above, starting in FY 1989, the active duty data that this study uses also include active component Coast Guard personnel. So, for this study, active duty military experience includes experience in the active component of the Coast Guard starting in FY 1989.

Therefore, DoD work experience prior to 1992 can be categorized into (1) the DoD civilian workforce, and (2) the active duty military. Starting in FY 1992, conditions one and two are broken up into two mutually exclusive subgroups to capture AW experience. An individual who is in the DoD civilian workforce is either in (1a) the civilian AW²⁰ or (1b) another DoD civilian position. An individual in the active duty military is either in (2a) the military AW or (2b) another active duty military position. If an individual is not observed in any of the data files prior to entering the AW, the individual is categorized as having no prior DoD experience.

This categorization scheme provides flexibility to analyze prior workforce experience in different ways. One can combine categories 1a and 1b to analyze individuals with experience in the DoD civilian workforce and categories 2a and 2b to analyze active duty experience. One can also combine categories 1a and 2a to examine all individuals with experience in the AW or combine categories 1a, 1b, 2a, and 2b to analyze all individuals with DoD experience.

It is important to note that this methodology—using end-of-FY files to record DoD experience—does not perfectly illustrate the past work experience of civilian AW entrants: It over counts experience for some individuals and undercounts experience for others. Individuals who are in a particular DoD workforce on September 30th of each fiscal year are counted as having a year of experience in that workforce, regardless of whether they were in the workforce for the full year or just started work in September. At the same time, workers who were not in the workforce on September 30th do not have their experience counted for that year. This limitation is even more salient when accounting for past work experience of individuals with backgrounds as seasonal DoD civilian employees, who likely entered and left the DoD civilian workforce more frequently and may not have been employed on September 30th.²¹ Additionally, our data and methodology do not distinguish between full-time and part-time experience.²²

Finally, our data do not allow us to identify when new entrants to the civilian AW have other relevant, non-DoD experience that allows them to make an immediate contribution to acquisition programs. For example, workers may have experience as DoD contractors, working closely with acquisition programs, or as engineers, cost analysts, or program managers in other industries. We have noted in our past work that insourcing of support contractors was one of the major goals of the AW growth initiative—and it is likely that many of the new entrants to the AW over the growth initiative period had prior experience as DoD contractors—but data limitations impede our ability to track these individuals (Gates et al., 2013, p. 52).

²⁰ This is also adjusted for DAWIA-data lag instances, in parallel with the “lag” adjustment made when defining civilian AW cohorts. Therefore, an individual is marked as in the civilian AW in year t under one of two conditions: (1) if he or she appears in the DoD civilian file and is recorded as in the AW, and (2) if an individual is recorded as joining the DoD civilian workforce in a non-AW position in year t and then being recoded into an AW position the following year (year $t + 1$).

²¹ DMDC data define a seasonal employee as an individual who “works on an annually recurring basis for periods of less than 12 months each year” (DoD, 2010a). For some reason, the end-of-FY-1980 and end-of-FY-1981 files report no seasonal employees. It is not known if the 1980 and 1981 files contain no seasonal employees or if seasonal employees in these files were not properly recorded.

²² The DoD civilian personnel data include all types of workers, including full-time, part-time, and intermittent employees. Intermittent employees are those individuals who do not have a regular set work schedule (DoD, 2010a).

DoD Civilian Acquisition Workforce: Descriptive Overview

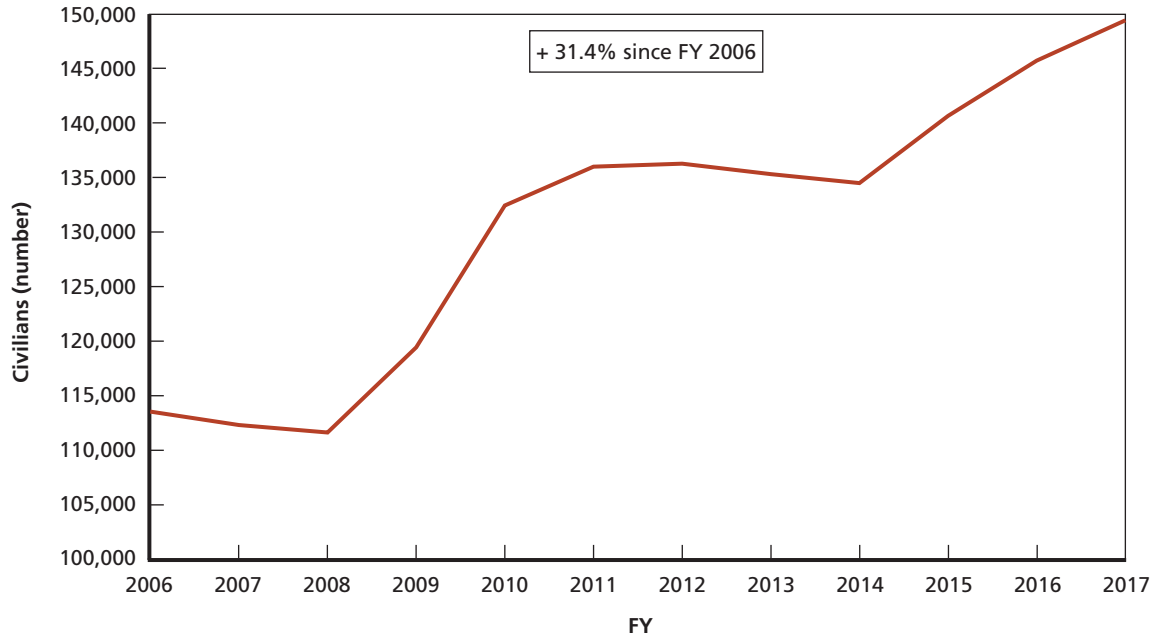
This chapter uses the methods described in the previous chapter to update the descriptive analyses presented in Gates et al. (2008) and Gates et al. (2013). We provide a snapshot of the current state of the civilian AW as of the end of FY 2017 and describe how the AW has evolved since RAND began conducting workforce analysis for DoD in FY 2006. As discussed in Chapter One, over the past decade, DoD has implemented a major AW growth initiative designed to reshape and strengthen the AW and has used the DAWDF to support this initiative. Meanwhile, the larger budgetary, economic, and demographic context has shifted. Workforce managers and policymakers can use the updated information in this chapter to assess the effectiveness of the AW growth initiative and gain insight into the implications of the DAWDF for workforce trends.

In summary, our analysis shows that DoD was successful in increasing the size of the civilian AW since the launch of the AW growth initiative. From FY 2006 through FY 2017, the civilian AW grew by nearly one-third (31.4 percent, or 35,675 people), with this growth concentrated in the years immediately following the announcement of the growth initiative in FYs 2009 and 2010, and again in the most recent years (FYs 2015 to 2017). Most service branches and Fourth Estate agencies added to their AWs over this period; the Army was a notable exception, with Army civilian AW shrinking by more than 15 percent (more than 7,000 people) between FYs 2006 and 2017. The educational attainment of the civilian AW increased on balance, and the share of the workforce with advanced degrees rose especially dramatically. In general, career fields that were identified as priority fields for hiring grew rapidly during the growth initiative period; however, the contracting career field in particular has continued to experience attrition rates that are higher than are typical for the civilian AW as a whole. Our analysis shows that, although there remains a significant share of workers at or near retirement age, the distribution has shifted more toward earlier-career workers since FY 2006.

Civilian AW Growth Was Consistent with Growth Initiative

The primary objective of the AW growth initiative was to increase the size of the organic AW by 20,000 between FYs 2008 and 2015. This goal was met quickly, with the civilian AW expanding rapidly from a recent low of 111,495 at the end of FY 2008 to 132,259 by the end of FY 2010 (see Figure 3.1). Rapid growth continued into FY 2011 before leveling off between FYs 2011 and 2014 (the years most closely associated with fiscal austerity and sequestration). The most recent fiscal years saw the return of significant AW gains, with the AW increasing by nearly 15,000 between FYs 2014 and 2017 to 149,280 at the end of FY 2017. In total, the

Figure 3.1
Number of Civilians in the DoD Acquisition Workforce, FYs 2006–2017



NOTE: The y-axis in the chart does not begin at zero.

AW grew by 31.4 percent (35,675 people) between FYs 2006 and 2017 (a slight dip between FYs 2006 and 2008 before a gain of more than one-third between FYs 2008 and 2017).

The total DoD civilian workforce, including both the AW and non-AW civilian workers, did not grow as rapidly as the AW over the past decade. From FY 2006 to FY 2017, the total DoD civilian workforce grew by 9.6 percent (65,381 people), reflecting the increase of 31.4 percent in the AW and an increase of 5.2 percent in the much larger non-AW civilian workforce. In fact, over the past six years (FYs 2011 to 2017), the total DoD civilian workforce shrank by 5.4 percent, with overall workforce losses concentrated in the FY 2011–FY 2014 period, as the non-AW civilian DoD workforce bore the brunt of fiscal austerity imposed in those years. The total DoD civilian workforce posted modest gains in FYs 2015 and 2016, while this workforce again experienced a net loss of workers in FY 2017, as Figure 3.2 shows.

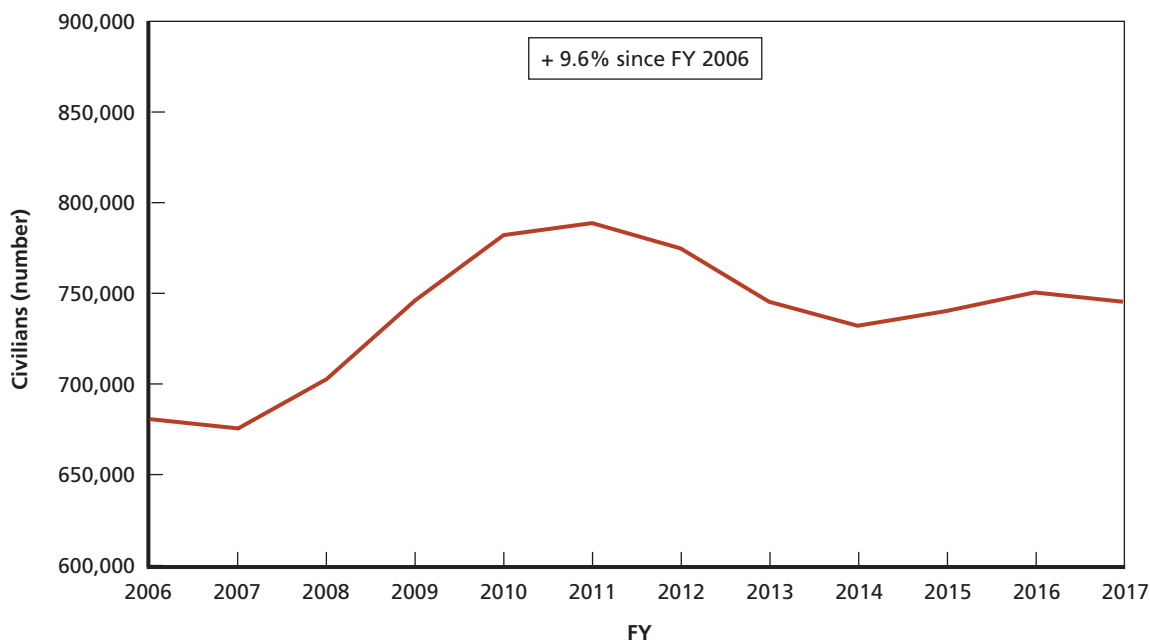
As a result of the comparatively stronger growth in the AW, the AW as a share of the total DoD civilian workforce has increased over the past decade, from 16.7 percent in FY 2006 to 20.0 percent in FY 2017, the highest share on record dating back at least to 1992.

Gains and Losses to the AW

The methodology described in Chapter Two allows us to analyze not just the changes in the overall number of workers in the AW but also the flows of workers into and out of the AW over time. We are also able to disaggregate gains and losses to the AW into those that stemmed from new hires into or losses to the DoD civilian workforce, versus those that were switches into the civilian AW from another DoD civilian position (whether internal hires and losses or recodes).

Total gains to the AW as a share of the prior year's workforce peaked at 20.2 percent in FY 2010 before falling to 7.3 percent in FY 2013 and recovering to about 10 to 12 percent in

Figure 3.2
Number of Civilians in the DoD Workforce, FYs 2006–2017



NOTE: The y-axis in the chart does not begin at zero.

FYs 2015 to 2017. Total losses to the AW as a share of the prior year's workforce have been steadier, hovering between about 8 percent and 10 percent since FY 2010.

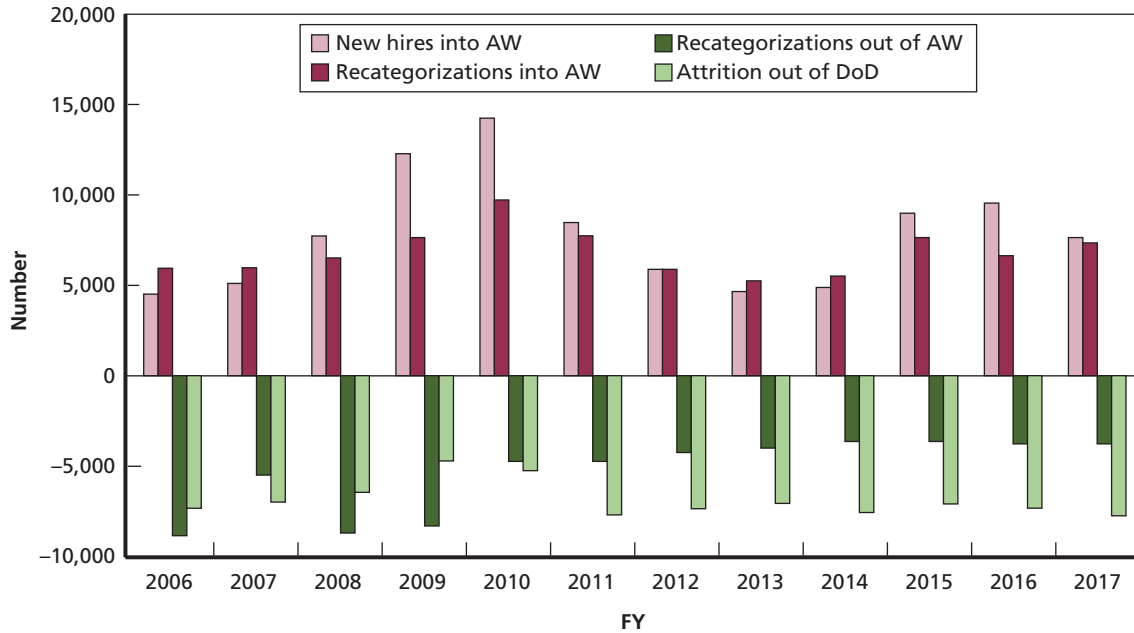
Deconstructing the gains and losses into movement into and out of the DoD civilian workforce overall and movement between AW and non-AW positions within the DoD civilian workforce reveals that new hires exceeded switches into the AW in most years over the past decade (see Figure 3.3), while attrition out of DoD exceeded switches out of the AW in all years beginning with FY 2010. As previously described, switches in or out are those who transitioned into or out of the AW from a non-AW civilian position. This does not include those who transfer from the military or those who switch service or position within the AW.

These findings for the most recent years differ from the findings in our past reports that covered the period going back to 1992. In Gates et al. (2013), we noted that switches into the AW from within DoD (“recategorizations”) exceeded the number of new hires into the AW from outside DoD “often by quite a lot” between FYs 1993 and 2007 (p. 21).

We can further deconstruct gains and losses to the civilian AW resulting from switches in and out into those that were internal hires or losses and those that were recodes. Internal hires represented a majority of switches into the AW in all years since the start of the AW growth initiative, with the exception of FY 2010, when they were 44.2 percent of switches into the AW. In FY 2017, 53.6 percent of switches in were internal hires. Internal losses as a share of switches out have exhibited a similar pattern since FY 2010, dipping below 50 percent for two years (FYs 2012 and 2013) before rising to about 55 percent or more in FYs 2015 through 2017.

These findings are also a reversal from earlier trends. As described in Gates et al. (2013), between FYs 1993 and the mid-2000s, recodes (“administrative recategorizations”) tended to exceed internal hires or losses (“substantive recategorizations”), with recode-gains in particular far surpassing internal hires (pp. 21–23). The decline in the share of switches in that are

Figure 3.3
DoD Civilian Acquisition Workforce, Number and Types of Gains and Losses, FYs 2006–2017



recode-gains, and the decline in the share of gains to the AW that are switches in rather than new hires, are likely due to greater consistency in defining the AW since 2006.

Trends Varied by Service and Agency

While most services and agencies experienced growth in their civilian AWs over the past decade, the rate of growth was not consistent across agencies, and one service branch (the Army) saw its civilian AW decrease in size. Percentage growth over the past decade was most rapid in the Air Force civilian AW, which expanded by 82.3 percent (12,961 people) from FY 2006 to FY 2017. Second in percentage growth was the much smaller Marine Corps civilian AW, which has the smallest AW of the service branches but grew by 80.1 percent (864 people). The Navy civilian AW increased by 51.5 percent (18,480 people) over that same period, while other Fourth Estate DoD agencies (those outside of the service branches) experienced civilian AW growth of 61.1 percent (10,377 people). By contrast, the Army civilian AW shrank by 16.0 percent (7,007 people) from FY 2006 to FY 2017, with most of that decline occurring between FYs 2011 and 2015, followed by a modest rebound over FYs 2016 and 2017 (see Figure 3.4).

These opposing trends led to a change in the shares of the civilian AW that are in each service or agency. The Army civilian AW as a share of the total civilian AW fell from 38.7 percent in FY 2006, the largest share among services or agencies at that time, to 24.7 percent in FY 2017 (see Figure 3.5). The Navy now accounts for the largest share of the civilian AW, with its share increasing from 31.6 percent in FY 2006 to 36.4 percent in FY 2017. The Air Force share grew from 13.9 percent to 19.2 percent over this period, while the share of the civilian AW in agencies other than the service branches rose from 15.0 to 18.3 percent. The share in the Marine Corps civilian AW remained the smallest of the services or agencies, increasing from 0.9 percent of the civilian AW in FY 2006 to 1.3 percent in FY 2017.

Figure 3.4
Number of Civilians in the DoD Acquisition Workforce, by Agency, FYs 2006–2017

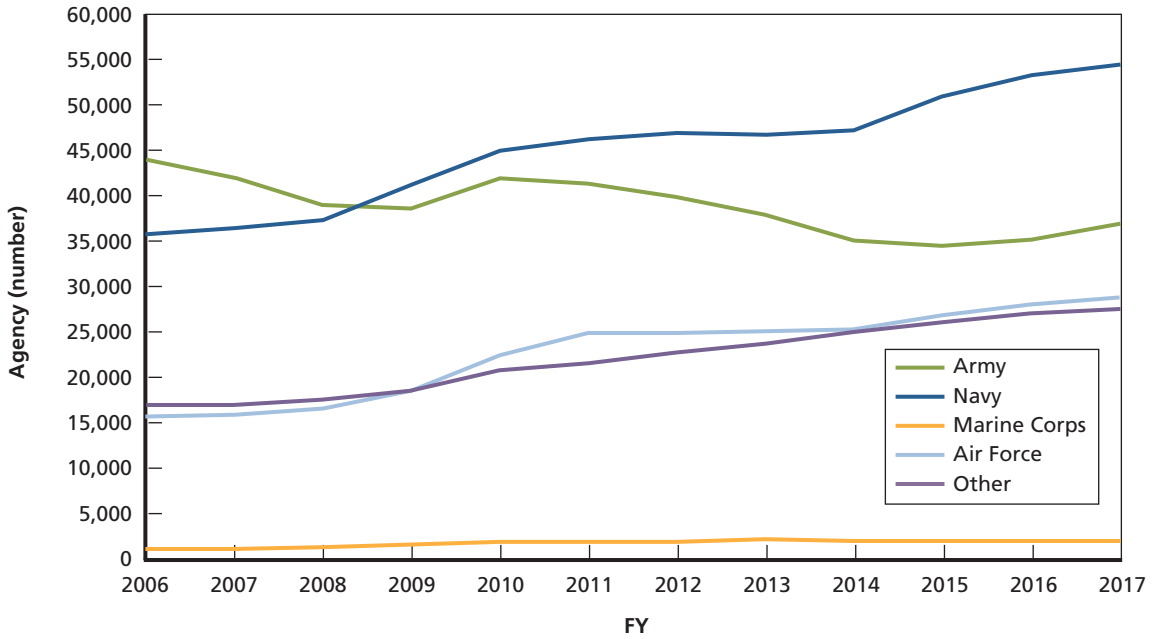
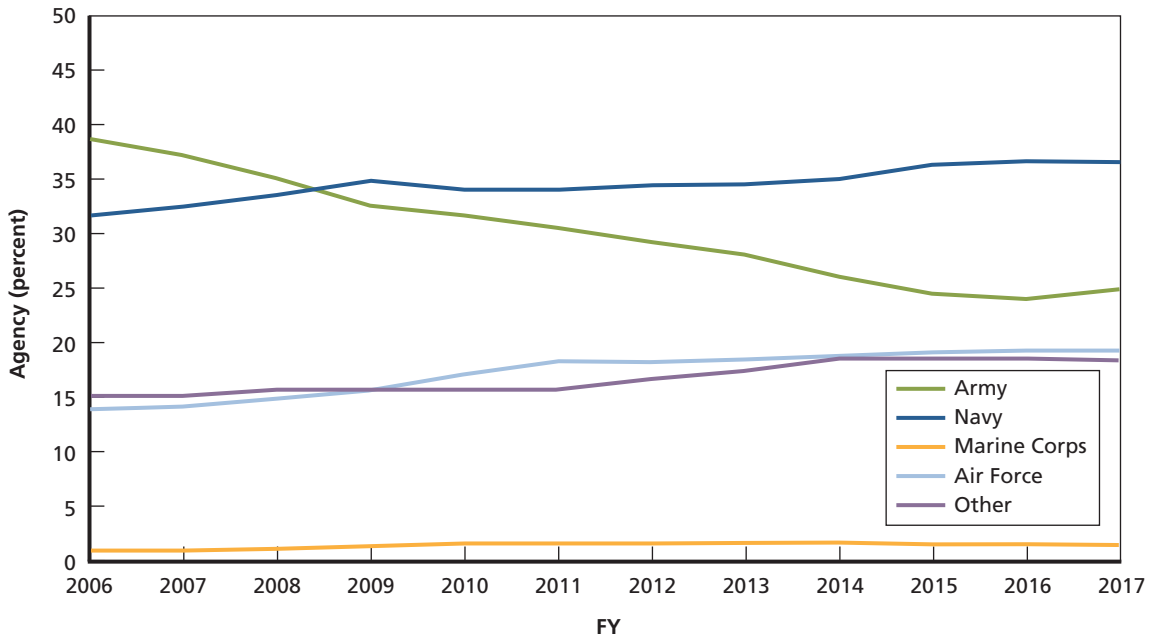


Figure 3.5
Percentage of Civilian DoD Acquisition Workforce, by Agency, FYs 2006–2017

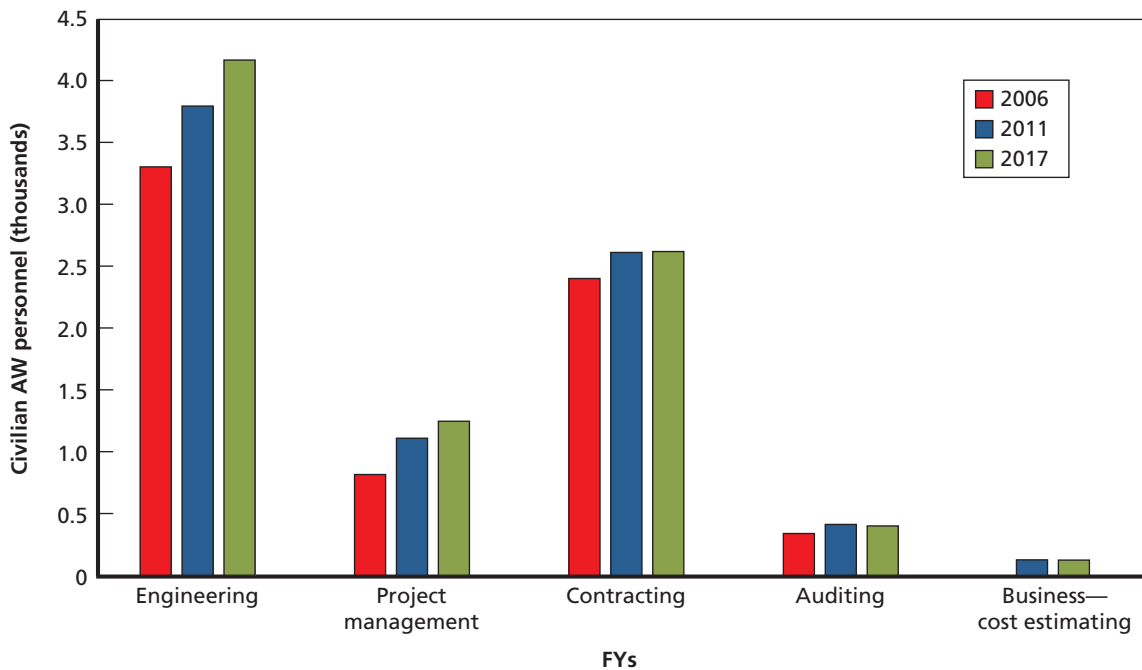


The Distribution of the Acquisition Workforce Across Career Fields

In addition to expanding the size of the civilian AW overall, the AW growth initiative prioritized several career fields for hiring: contracting, business—cost estimating, engineering, program management, and auditing (GAO, 2015; DoD, 2010b). All of these career fields have experienced workforce growth since the launch of the growth initiative, though as a 2015 GAO report noted, as of March 2015 (the middle of FY 2015), growth fell short of the FY 2008–FY 2015 target levels outlined in DoD’s 2010 AW strategic plan in three of the fields: contracting, business (which includes cost estimating), and engineering.¹ Specifically, the strategic plan had called for FY 2008–FY 2015 growth of 23 percent in contracting, 23 percent in business (including cost estimating and financial management), 20 percent in auditing, 19 percent in program management, and 16 percent in engineering.

Two of the priority career fields, engineering and program management, experienced consistent workforce growth both between FYs 2006 and 2011 and between FYs 2011 and 2017 (see Figure 3.6). Overall, the engineering field added 8,699 workers from between FYs 2006 and 2017, an increase of 26.5 percent, while the program management career field added 4,249 workers, an increase of 52.0 percent. By contrast, while the contracting and auditing career fields experienced marked growth from FY 2006 to FY 2011, growth in these career fields stagnated from FY 2011 to FY 2017. Over the full 11-year period, contracting grew by 2,241 people (9.4 percent), while auditing grew by 633 people (14.6 percent). Analyzing growth in the business—cost estimating workforce is complicated by the fact that this workforce was not

Figure 3.6
Number of Civilians in the DoD Acquisition Workforce, by Career Field, FYs 2006, 2011, and 2017



¹ In the analysis in the GAO report, cost estimating and financial management are combined into one “business” career field; these two fields were split in 2010 but were not split when the 2010 AW strategic plan targets were devised.

identified separately from the business—financial management workforce until FY 2010. The cost estimating subset of the business field added 137 workers between FYs 2011 and 2017, an increase of 11.5 percent.

As of the end of FY 2017, engineering and contracting were the two largest career fields, together employing 45.3 percent of the civilian AW (see Figure 3.7). However, despite the increases in the number of workers discussed above, the share of the workforce in these two fields has edged down since 2006. In FY 2006, 28.9 percent of the civilian AW was in the engineering career field and 21.0 percent of the workforce was in the contracting career field; by the end of FY 2017, these shares had dipped to 27.8 percent and 17.5 percent, respectively. The next-largest career fields at the end of FY 2016 were life-cycle logistics and program management, accounting for 12.5 percent and 8.3 percent of the civilian AW, respectively, both shares up from FY 2006, when they represented 10.0 percent and 7.2 percent of the AW. Figure 3.8 plots the share of the civilian AW in each of these four largest career fields over the FY 2006–FY 2017 period, with the remaining ten career fields consolidated into an “other” group to simplify the presentation. There has been little change in the relative size of these major career fields over this time period.

Program Management Career Field

As described above, program management was among the priority career fields for hiring during the AW growth initiative, this workforce grew in both halves of the past decade, and program management workers represented a larger share of the civilian AW in FY 2017 than they did in FY 2006. In additional analysis not shown, we drill down into the source of new entrants to the program management AW career field over the past several years. We find

Figure 3.7
DoD Civilian Acquisition Workforce, by Career Field, FY 2017
(Counts and Percentage of Total)

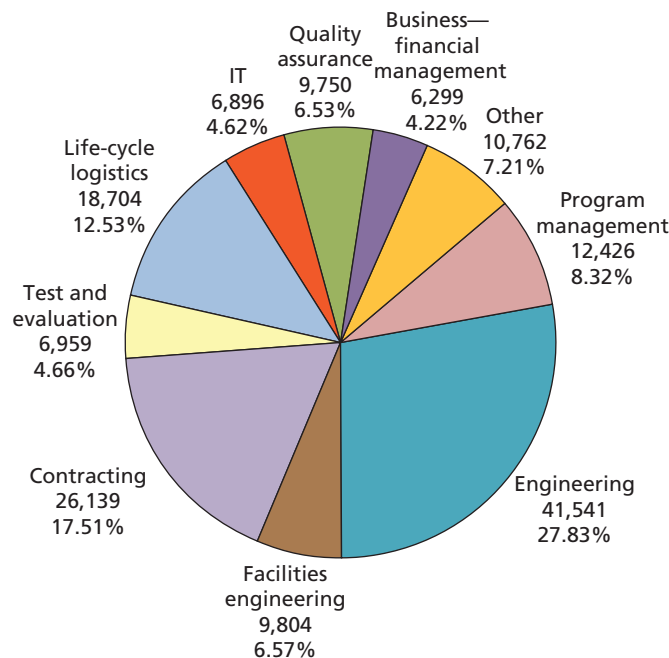
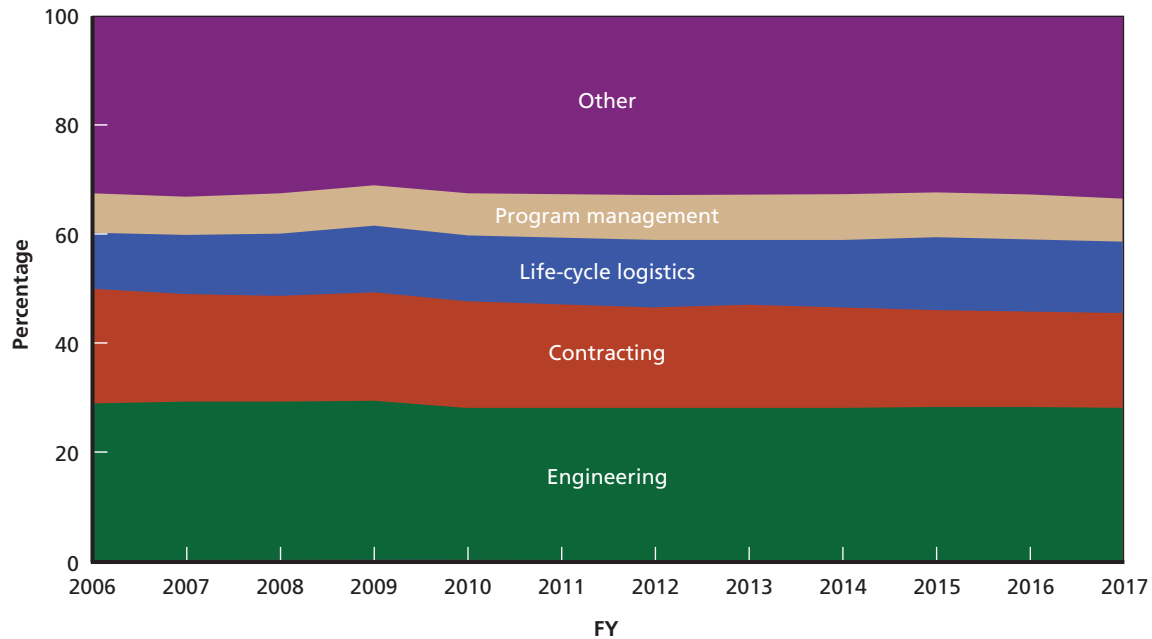


Figure 3.8
Percentage of Civilians in the DoD Acquisition Workforce, by Key Career Field, FYs 2006–2017



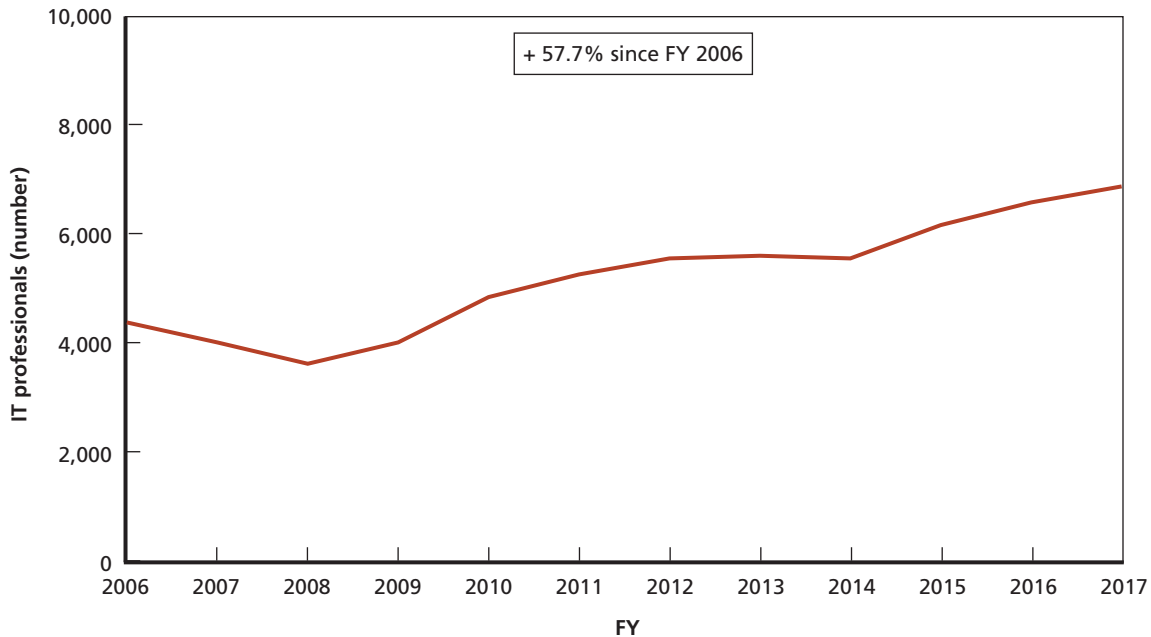
that about two-thirds of entrants to the program management career field were switches in from other DoD civilian positions, either internal hires (substantive switches) or recode-gains (administrative switches), while about one-third were new hires from outside the DoD civilian workforce. This was roughly on par with the share of gains to the life-cycle logistics workforce that were new hires versus switches in, but quite different from the two largest career fields, engineering and contracting, which had a majority of gains coming from new hires from outside the DoD civilian workforce.

For switches in, we further analyze the distribution of prior AW career fields for those individuals for whom that information is available (i.e., who transferred from another AW career field rather than from a non-AW DoD civilian position). The most common prior AW career field for both internal hires and recode-gains was engineering, which is consistent with this career field being the largest of the fields. Business, including both cost estimating and financial management, often was overrepresented among the prior career fields for entering cohorts relative to its share of the overall civilian AW, as was the IT career field.

Information Technology Career Field

In an effort to improve the acquisition of software systems, communications systems, and other IT, policymakers have devoted attention to the modest-sized IT career field in recent years. Figure 3.9 shows how this workforce has evolved over the past decade. Figure 3.9 shows that the IT workforce increased by nearly 60 percent from FY 2006 to FY 2017, from 4,374 to 6,896 workers. This resulted in the IT career field going from 3.9 percent of the civilian AW in FY 2006 to 4.6 percent of the workforce in FY 2017. Nonetheless, as discussed in Chapter One, witnesses at recent congressional hearings have continued to criticize DoD's IT

Figure 3.9
Number of Information Technology Professionals in the Civilian DoD Acquisition Workforce, FYs 2006–2017



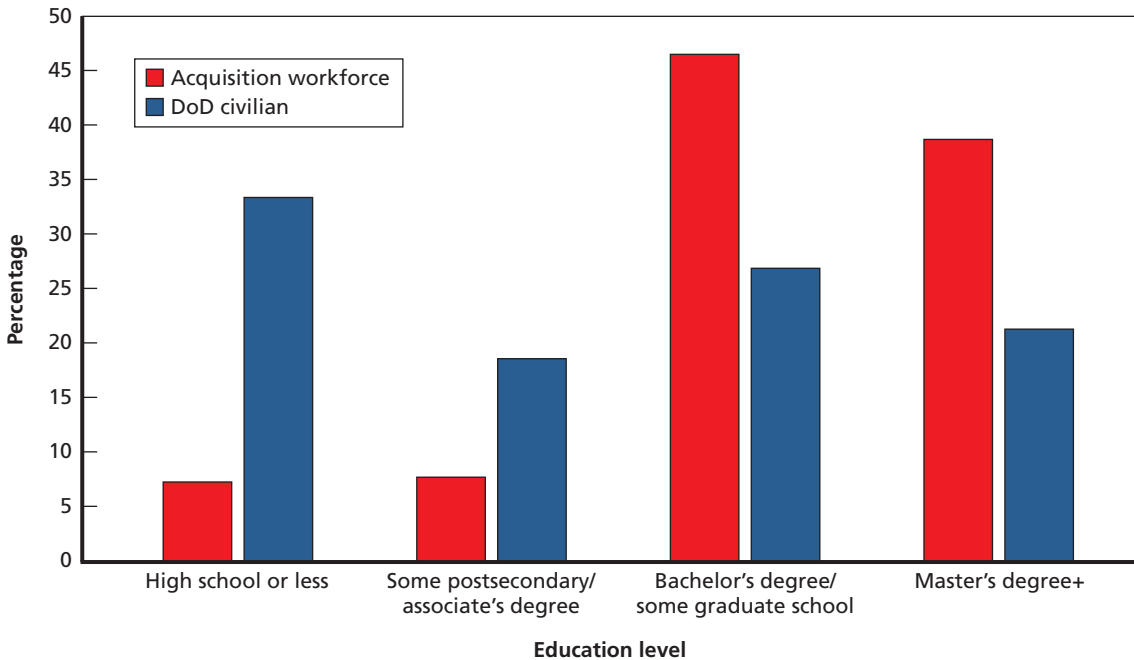
acquisition process and called for a renewed focus on the size and capabilities of the IT AW within the larger DoD civilian AW.

We also analyze the source of new entrants to the IT career field over the past several years, using the same categorization scheme as for the program management career field. As with program management, we find that about one-third of gains to the IT career field, on average, over the past several years have been new hires from outside of DoD, while about two-thirds were switches in, either internal hires or recode-gains. In the case of the IT workforce, the engineering career field again accounts for the highest share of switches in for whom we can identify a prior career field, and the program management career field is disproportionately represented among prior career fields. The flow of workers between the program management and IT career fields—in both directions—suggests that DoD may be seeking to pull more IT expertise into the program management field and vice versa.

Educational Attainment of the Acquisition Workforce

Among the workforce metrics that DoD tracks as a proxy for the quality of the AW is educational attainment. Relative to the DoD civilian workforce overall, the civilian AW has a much larger share of workers with higher levels of education. In FY 2017, 85 percent of the civilian AW had at least a bachelor's degree, compared with less than half (48 percent) of the DoD-wide civilian workforce (see Figure 3.10). The difference in the share of workers with advanced degrees was just as sharp. In FY 2017, 39 percent of the civilian AW held a master's degree or higher, compared with 21 percent of the DoD civilian workforce overall.

Figure 3.10
DoD Civilian Workforce and DoD Civilian Acquisition Workforce, by Educational Attainment, FY 2017



As illustrated in Figure 3.11, over the past decade, the share of the civilian AW with higher levels of educational attainment has increased. In FY 2017, 85 percent of the civilian AW had at least a bachelor's degree, compared with 74 percent in FY 2006. The increase in the share of the civilian AW with an advanced degree has been especially pronounced—up from 23 percent in FY 2006 to 39 percent in FY 2017. Most of these workers with advanced degrees (both now and a decade ago) have terminal master's degrees; the share with education beyond a master's degree has held fairly steady at about 3.0 to 3.5 percent over the past decade. As a result of the increase in the share with advanced degrees, the share of the civilian AW with just a bachelor's degree (or some graduate work short of a degree) dipped between FYs 2006 and 2017.

The Distribution of Workers by Years of Service and Proximity to Retirement

The ongoing retirement of the baby boom generation is one of the major trends in the economy overall. Recognizing the potentially significant impact of retirements on the AW, the AW growth initiative was designed in part to adjust the distribution of the AW to incorporate more early- and mid-career workers.

Years of Service

As Figure 3.12 shows, the YOS distribution of the civilian AW has changed significantly over the past decade. On balance, the distribution has shifted toward earlier-career workers, with the magnitude of the spike on the right-hand side of the chart (indicating the share of workers later in their careers) diminishing between FYs 2006 and 2011 and again between FYs 2011 and 2017. Perhaps the clearest sign of the impact of the AW growth initiative is the spike in the

Figure 3.11
DoD Civilian Workforce, by Educational Attainment, FYs 2006, 2011, and 2017

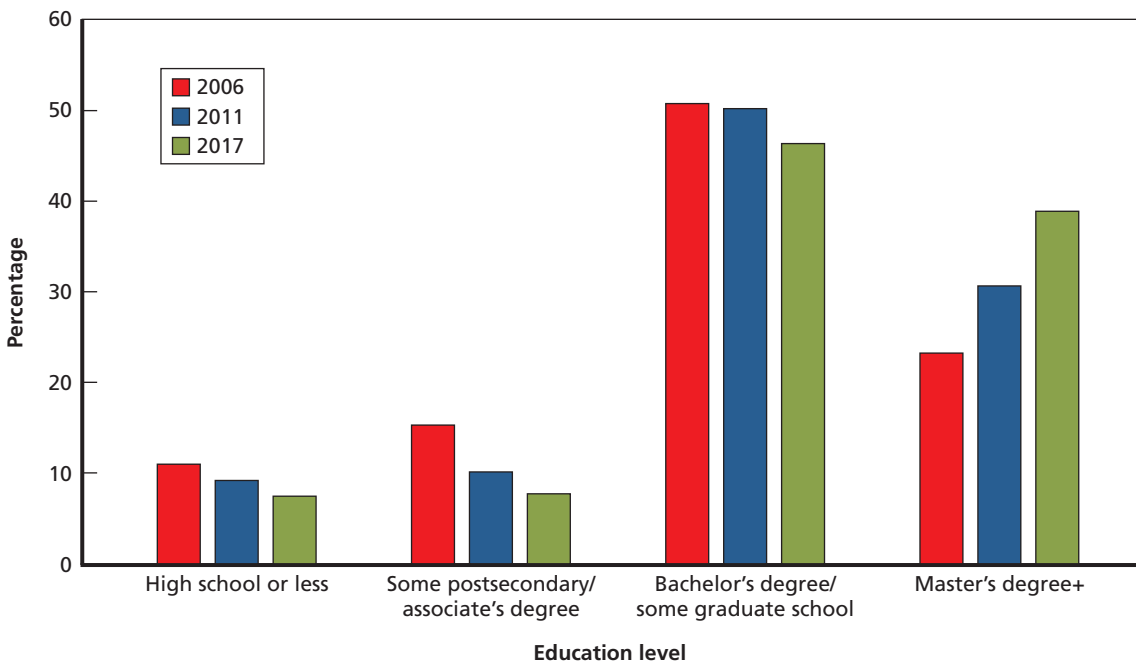
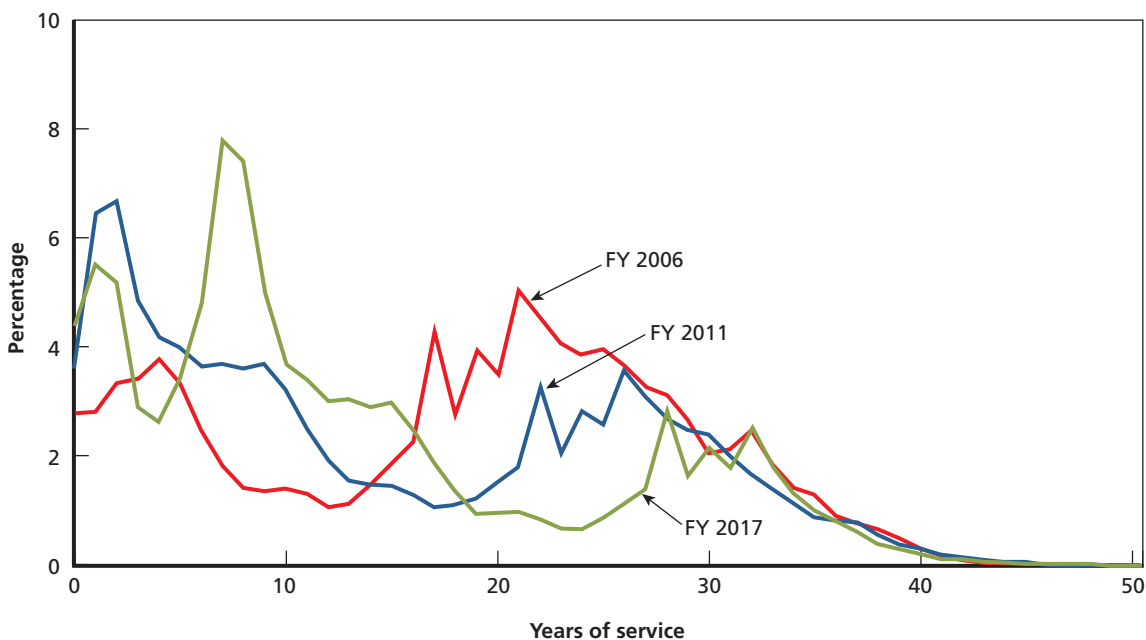


Figure 3.12
DoD Civilian Acquisition Workforce, by Years of Service, FYs 2006, 2011, and 2017



share of workers with between zero and four YOS in FY 2011 and, consequently, the share of workers with between five and nine YOS in FY 2017.

It is worth emphasizing that individuals with fewer than ten years of federal service as civilian workers are not necessarily “inexperienced.” New civilian hires may enter the workforce with experience (sometimes substantial) in the private sector or in the military.

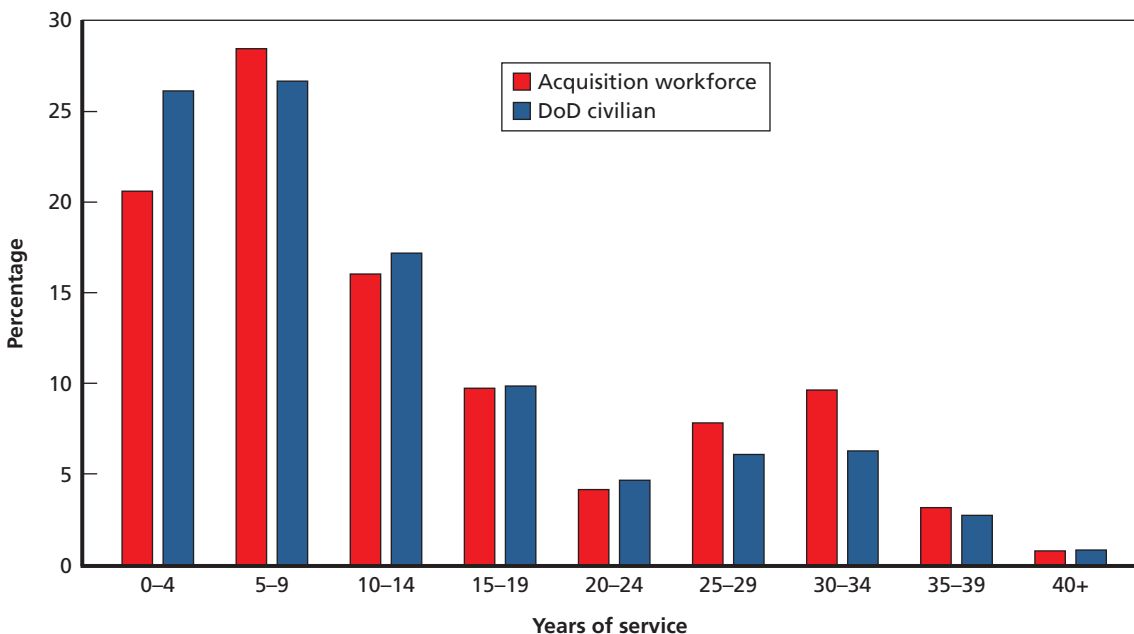
Despite this shift toward earlier-career workers within the AW, compared with the DoD civilian workforce overall, members of the AW tend to have more years of federal service (see Figure 3.13). At the end of FY 2017, 21.2 percent of the AW had at least 25 YOS, compared with 15.7 percent of the DoD-wide civilian workforce. This disparity has narrowed a bit over the past decade, while both shares have fallen. In FY 2006, 31.3 percent of the civilian AW had at least 25 YOS, compared with 24.4 percent of the DoD-wide civilian workforce.

In contrast to the remainder of the five-year brackets below 25 YOS, the share of the AW with five to nine YOS exceeds the share of the DoD-wide civilian workforce in this group, likely the result of the AW growth initiative that launched in earnest between five and nine years ago and that brought many workers without prior federal civilian work experience into the DoD. In both the AW and the DoD-wide civilian workforce, there is a trough in the share of workers with between 20 and 24 YOS, reflecting the drawdown in hiring in the post-Cold War era. In our past reports, we noted this trough; for example, in our report that looked at the AW as of the end of FY 2006, it was among workers with between five and 14 YOS (Gates et al., 2008, p. 11).

Years Relative to Retirement Eligibility

Perhaps more important to workforce managers than YOS is YORE (years relative to retirement eligibility), which indicates the number of years until full retirement eligibility given a worker’s age, YOS, and retirement plan. About 14 percent (13.7 percent) of the civilian AW as

Figure 3.13
DoD Civilian Workforce and DoD Civilian Acquisition Workforce, by Years of Service, FY 2017



of the end of FY 2017 was already eligible to retire (YORE of one or above). Another roughly one-in-three members of the current civilian AW (31.7 percent) will become eligible to retire by the end of FY 2027 (YORE of -9 to 0).

In our 2008 report on the AW (Gates et al., 2008), with data through FY 2006, we highlighted a pending wave of workers reaching retirement eligibility starting in FY 2007 that would last for about a decade, during which about 4 percent of the workforce would reach eligibility each year (pp. 14–15). The YORE distribution of the AW at the end of FY 2006, which shows this expected retirement wave, is depicted in Figure 3.14 (the red line). As the figure shows, by the end of FY 2017 this wave had abated somewhat. The share of the current AW set to reach full retirement age in a given year does not exceed 4 percent in any year over the next decade and falls below 3 percent toward the end of the coming decade (YORE of -7 to -9).

As the retirement wave has ebbed, the share of the AW with a decade or more until reaching full retirement eligibility (YORE of -10 or below) has increased. At the end of FY 2017, 54.5 percent of the AW had at least a decade to go until becoming eligible for retirement, up from 46.0 percent at the end of FY 2006.

There are differences in terms of proximity to retirement of the current AW depending on whether workers have a bachelor's degree or above. As Figure 3.15 shows, a higher share of workers without a bachelor's degree are at or near retirement age than workers with a bachelor's degree. Specifically, 18 percent of workers without a bachelor's degree are already eligible to retire, while another 42 percent will become eligible within the next ten years. This compares with 13 percent and 30 percent of workers with a bachelor's degree. As a result of this disparity, the typical educational attainment level of the AW can be expected to continue to increase in the coming years as workers with less than a bachelor's degree retire from the workforce.

Figure 3.14
DoD Civilian Acquisition Workforce, by Years Relative to Retirement Eligibility, FYs 2006 and 2017

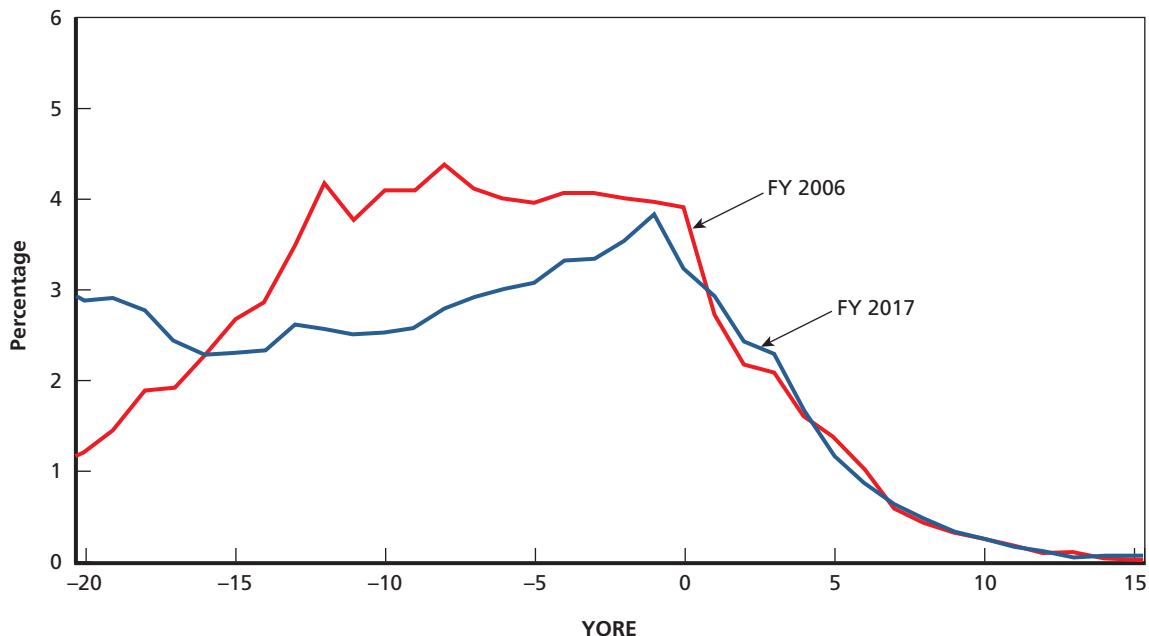
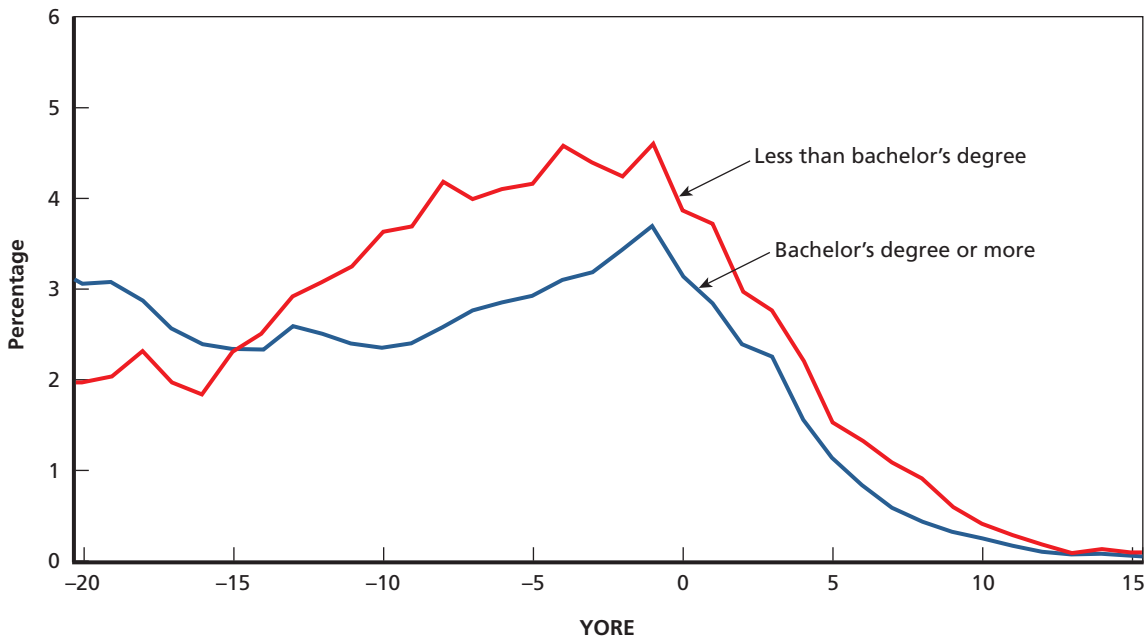


Figure 3.15
DoD Civilian Acquisition Workforce, by Years Relative to Retirement Eligibility and Education Level, FY 2017



Attrition Rates

The YOS and YORE metrics described above are useful in assessing the state of the AW, but it is important to pair them with an analysis of attrition rates, whether due to retirement or as a result of a voluntary or involuntary separation. For example, an increase in the share of early- to mid-career workers may be less meaningful if it was paired with a spike in attrition rates.

In our past reports, we noted that members of the AW tend to have lower attrition than other members of the DoD civilian workforce. This trend continued in the most recent years, with attrition rates for the civilian AW of between 5.1 and 5.6 percent since FY 2012 (see Figure 3.16), compared with attrition rates for the DoD-wide civilian workforce of between 7.8 and 8.6 percent over the past six years (see Figure 3.17). As in the past, this difference was driven by lower rates of voluntary and involuntary separation; attrition due to retirement was similar (about 3 percent) in both the AW and the DoD-wide civilian workforce.

In Gates et al. (2013), we highlighted the decline in attrition in 2009 and 2010, hypothesizing that it was due in part to the economic recession, which simultaneously negatively affected retirement account balances for workers who otherwise might have retired during those years and outside employment opportunities for workers who might have moved on to other jobs. In that report, we noted the bounce-back in the attrition rate in FY 2011, which came as equity values approached prerecession levels. The jump in the attrition rate in FY 2011 was also due in part to a temporary spike in involuntary separations, in particular in the Army. Our analysis for this report finds that the attrition rate for civilian AW workers held fairly steady over the six years since FY 2011, not returning to the 4.3 to 4.4 percent rate of FYs 2009 and 2010.

Figure 3.16
DoD Civilian Acquisition Workforce Attrition, by Type, FYs 2006–2017

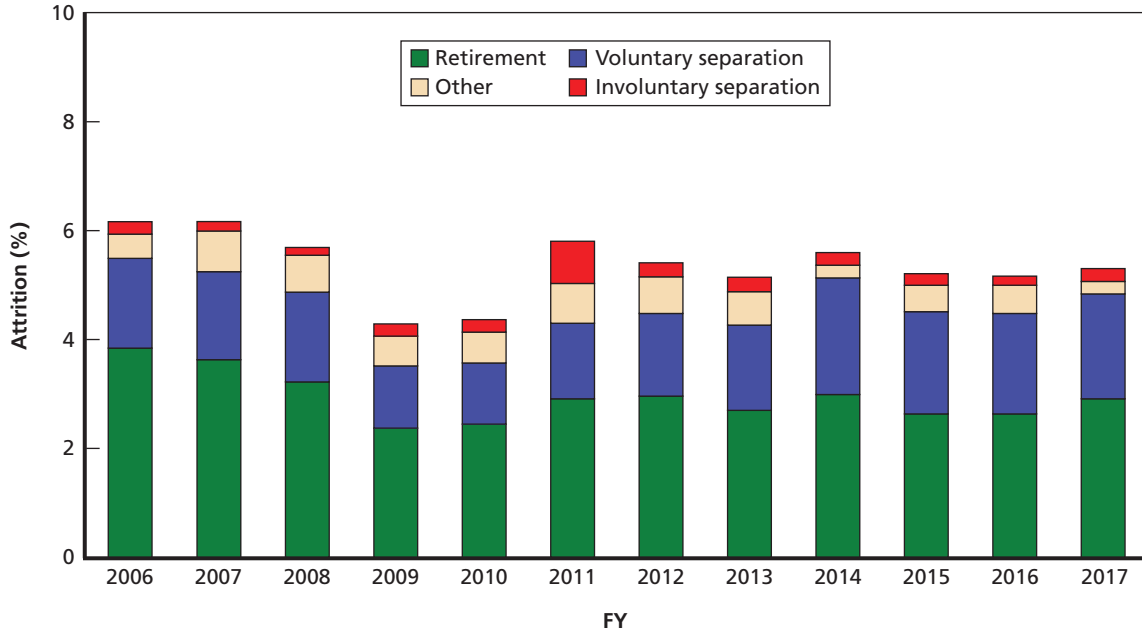
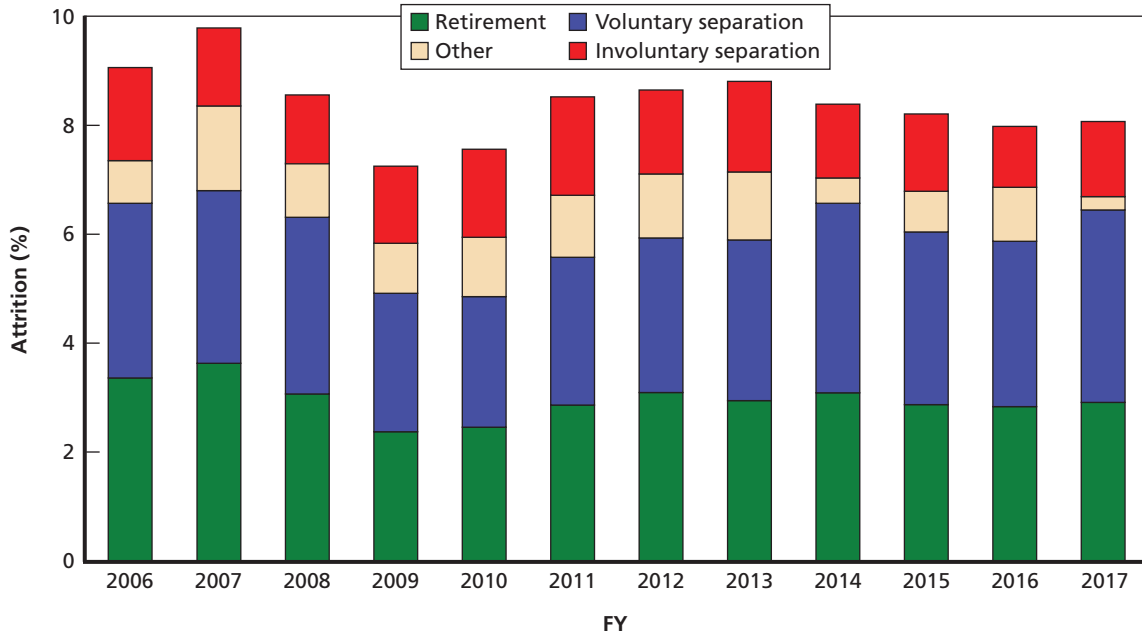


Figure 3.17
DoD Civilian Workforce Attrition, by Type, FYs 2006–2017



Despite the generally low attrition rate for the civilian AW, there continue to be differences in attrition across career fields. For example, attrition in the contracting career field has been around 6.3 percent per year or higher (see Figure 3.18), while attrition in the engineering career field has been at or below 4.6 percent of the prior year’s workforce over the past several years (see Figure 3.19). DoD managers have noted the higher attrition rate in the contracting field as a contributor to challenges in meeting strategic workforce plan goals (GAO, 2015, p. 15). Data on separations from the AW suggest that the higher attrition rate for the contracting career field may be due in part to members’ being in higher demand elsewhere in the federal government. Over the past several years, about half of workers exiting the AW and moving directly to a position in another federal agency (Nature of Action, or NAC 352) were in contracting, while this career field accounts for less than 20 percent of the overall civilian AW.

As can be expected, attrition varies considerably based on proximity to retirement, with workers at or past retirement age leaving the workforce at much higher rates than workers further from retirement eligibility. Figure 3.20 shows the rate of attrition (as a percentage of the prior year baseline) by years relative to retirement eligibility. Workers with zero years relative to retirement eligibility are those who will become retirement-eligible for the first time in FY 2018 (but who were not yet retirement eligible at the end of FY 2017). The far-left side of the graph reflects those with a decade or more until retirement eligibility, while the far right reflects those who have been retirement-eligible for a decade or more but remain employed.

Along with the jump in attrition propensity upon becoming fully retirement-eligible, we also see that the AW has lower attrition in both the years preceding and immediately following retirement eligibility, compared with the DoD civilian workforce as a whole. The post-retirement eligibility attrition behavior differs somewhat from the findings in our past reports, which found that the attrition rate differential between the AW and non-AW DoD civilians

Figure 3.18
DoD Civilian Acquisition Workforce Attrition, Contracting Career Field,
by Type, FYs 2006–2017

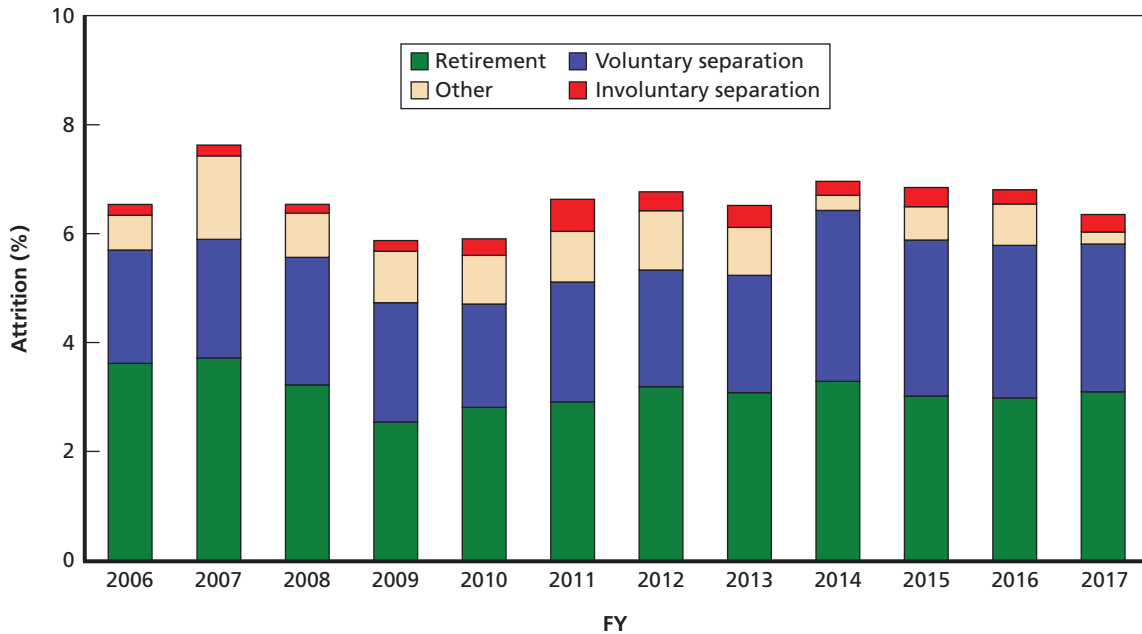


Figure 3.19
DoD Civilian Acquisition Workforce Attrition, Engineering Career Field, by Type, FYs 2006–2017

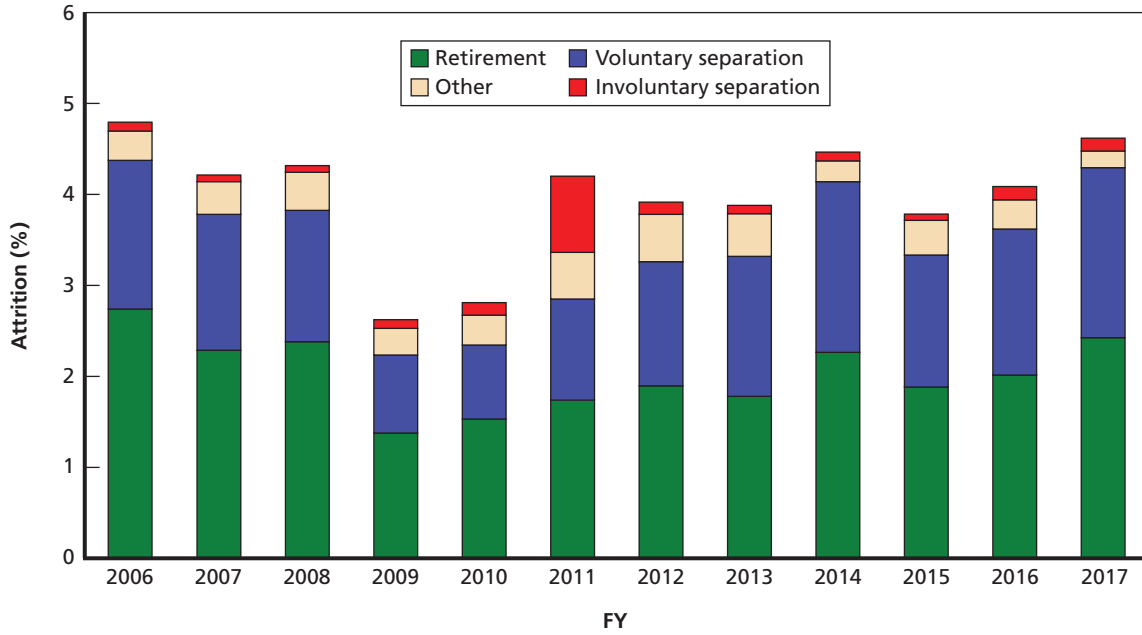
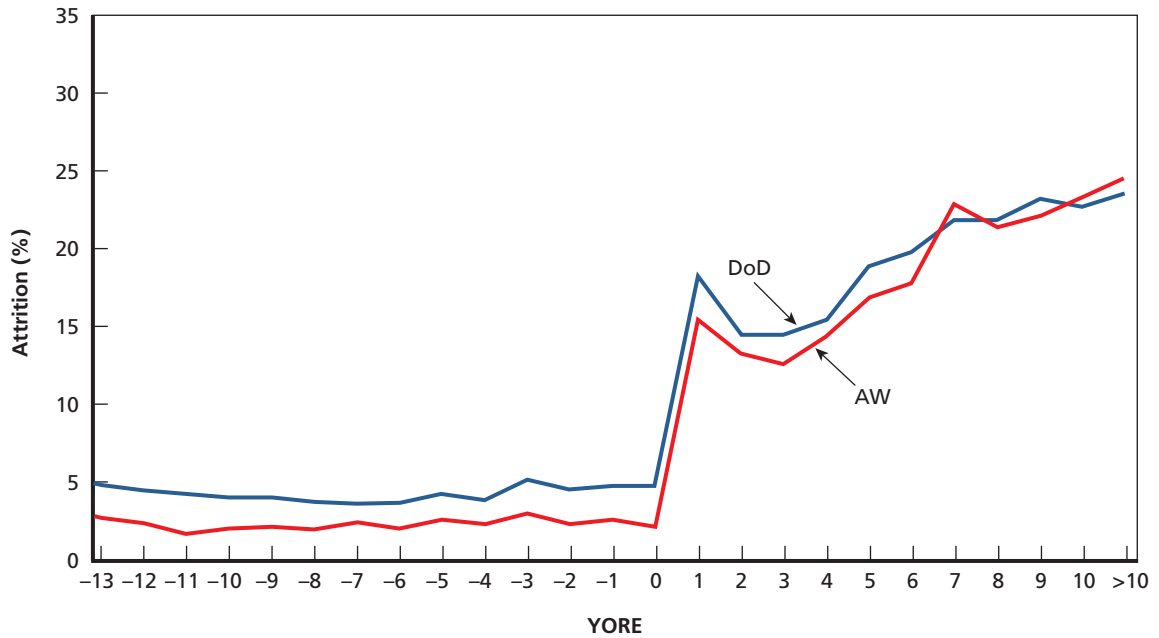


Figure 3.20
DoD Civilian and DoD Civilian Acquisition Workforce Attrition, by Years Relative to Retirement Eligibility, FY 2017

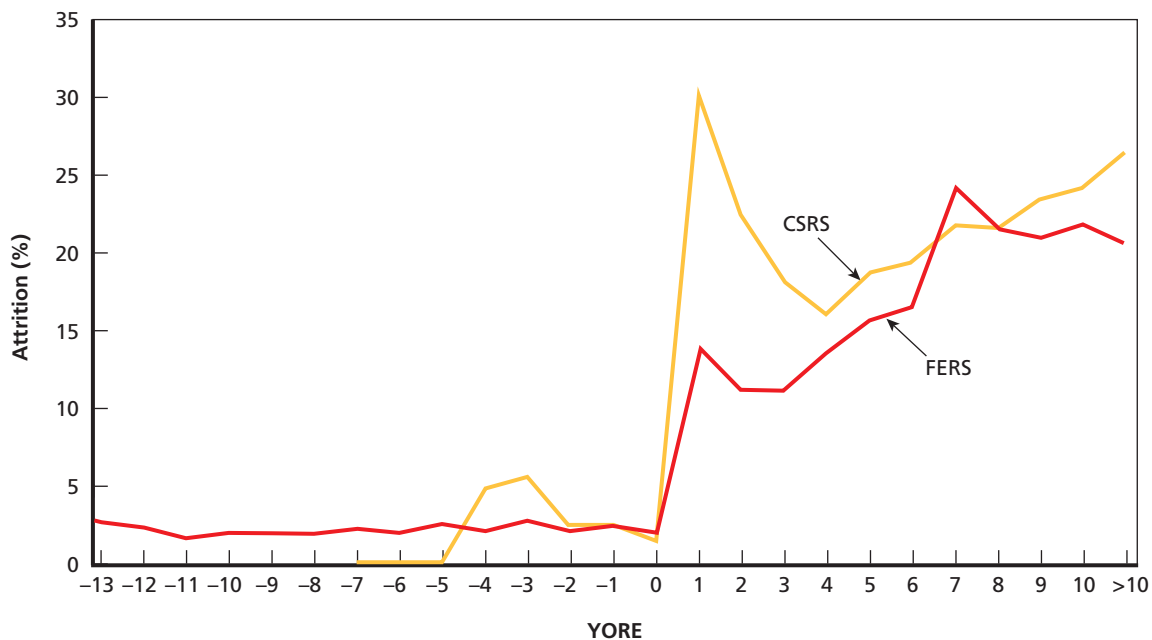


largely disappeared once workers became eligible for retirement (Gates et al., 2008; Gates et al., 2013). This could be due in part to the declining share of retirement-eligible workers in CSRS retirement plans. Attrition rates increase less dramatically immediately upon reaching retirement age for workers in FERS, as discussed below.

Given the differences between the two major retirement plans—the older, more traditional CSRS or newer FERS—it is important to consider whether the retirement behavior described in this section differs for individuals depending on their retirement plan. The plans differ notably in terms of benefits. Those covered by CSRS are not eligible for Social Security benefits based on their federal employment. FERS has a defined benefit and a defined contribution component. In addition, individuals covered under FERS also receive Social Security credits. Under CSRS, employees who leave federal employment before they reach retirement age receive no retirement benefits. Thus, the plan creates very strong incentives for employees to remain in the civil service. These incentives do not exist with FERS to the same extent, since all employees receive a government contribution to their Thrift Savings Account (similar to a 401K account), and employees with as few as five years of service are eligible for a basic benefit annuity payment when they reach retirement age (U.S. Office of Personnel Management, 1997).

Figure 3.21 shows the attrition rate by years relative to retirement eligibility for CSRS and FERS employees in the AW in FY 2017 relative to the FY 2016 baseline. As in our past reports, we see a much larger jump in attrition upon reaching retirement eligibility for CSRS employees. More than twice the share of CSRS employees (30 percent) who became eligible to retire in FY 2017 did so than FERS employees (14 percent). As the number of individuals covered by CSRS declines over time, an increasingly small proportion of the civilian employees reaching eligibility are part of CSRS. In FY 2017, only about 540 CSRS employees reached retirement

Figure 3.21
DoD Civilian Acquisition Workforce Attrition, by Years Relative to Retirement Eligibility and Retirement Plan, FY 2017



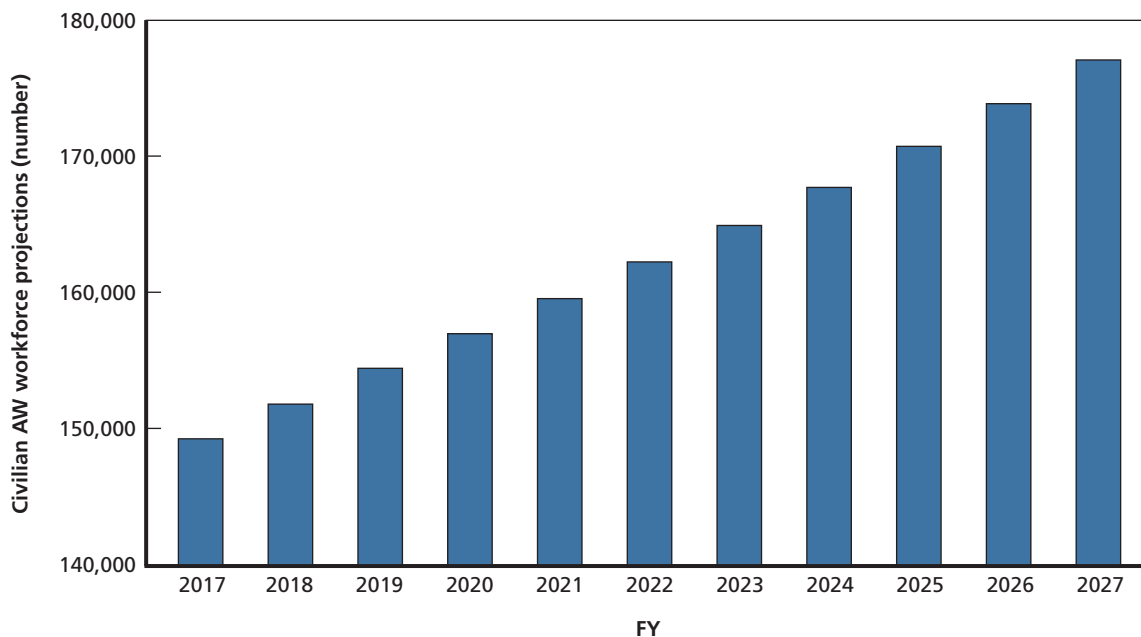
eligibility (compared with about 4,650 FERS employees), and the number of CSRS employees reaching eligibility will continue to drop about 50 percent each year until reaching zero.² At this point, the dynamics of the FERS workforce are driving workforce separation dynamics.

Projections for the Future

As described in Chapter Two, the workforce analysis that RAND conducts for DoD includes generating and updating on a quarterly basis a workforce inventory model that extrapolates from recent trends in hiring, attrition, and switches in and out to make projections about the size and characteristics of the civilian AW over the coming decade. This model can be useful for workforce managers seeking to understand future needs—but it is critical to keep in mind the limitations of using trends over the past five years to make projections for the next ten years. In particular, assuming that hiring rates experienced during the years of the AW growth initiative will continue could significantly overstate the expected size of the AW in the future. The features, function, and limitations of our model are described in detail in Appendix A.

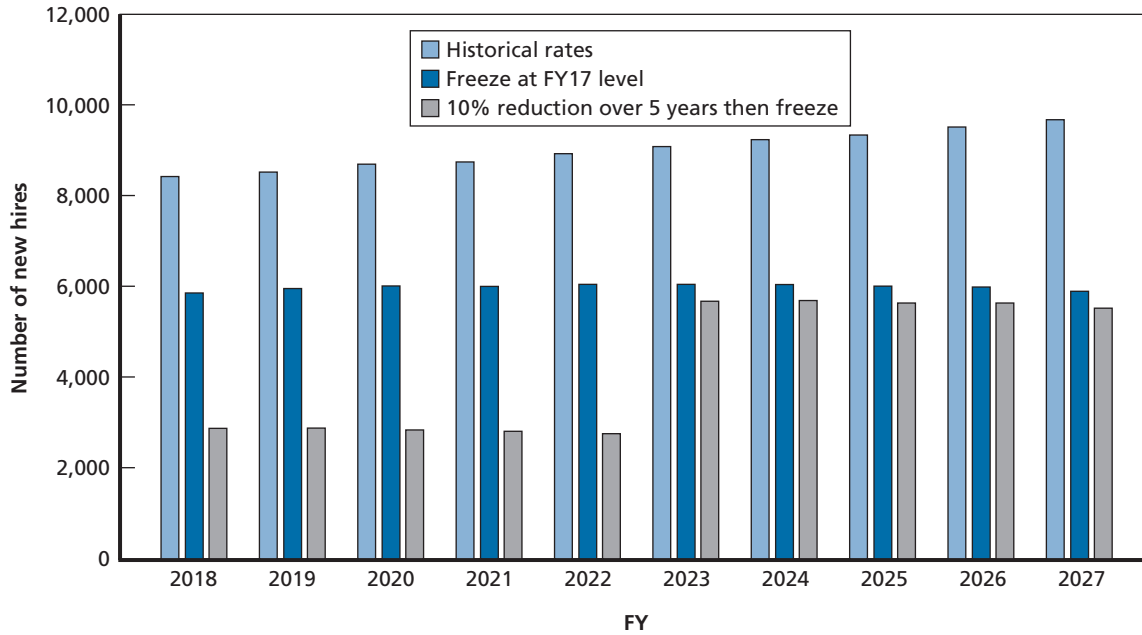
The baseline specification of our model, which assumes that past trends in hiring will hold, suggests that the civilian AW will increase from 149,280 at the end of FY 2017 to 176,925 (see Figure 3.22), with the number of new hires each year ranging between about 8,000 and 9,500 (see Figure 3.23). Simply put, this estimate strains credulity, given that the AW growth initiative has ended and considering likely budgetary constraints moving forward.

Figure 3.22
DoD Civilian Acquisition Workforce Count Projections (Historical Hiring Rates), FYs 2017–2027



² Because of the phasing out of CSRS, there are fewer than 125 individuals in each YORE category beyond -2. This leads to greater variation in attrition rates for these groups.

Figure 3.23
DoD Civilian Acquisition Workforce Hiring Needs Under Select Scenarios, FYs 2018–2027



An alternative specification of our model allows users to input target end strengths for the civilian AW and uses recent trends in separations and switches in and out to project the level of new hiring that would be needed to hit the targets. For example, if the goal were to hold the size of the AW constant over the next decade (a more reasonable target than continued rapid growth, given the language in the most recent AW strategic plan to “responsibly sustain” the AW in the years ahead), the required number of new hires each year would be about 6,000 over the FY 2018–FY 2027 period. If the goal were to shrink the civilian AW by 10 percent and then freeze it at that level, the required number of new hires would be under 3,000 for the next five years and then around 5,500 over the remainder of the coming decade. In making these projections, our model adjusts for differences in attrition rates and switches in and out of the civilian AW by YORE and retirement plan.

Analysis of Recent Cohorts Joining the Civilian Acquisition Workforce

The previous chapter provided an overview of the civilian AW as of the end of FY 2017 and analyzed trends in this workforce over the past decade. This chapter looks more closely at the characteristics of recent cohorts joining the civilian AW.¹ This cohort analysis allows us to understand how recent entrants to the civilian AW, whether new hires from outside the DoD civilian workforce or internal hires from within that workforce, have shaped the civilian AW. It also lays the groundwork for future analyses of how these characteristics affect performance on the job, career progression, and retention over time.

We have devoted particular attention to analyzing the past work experiences of members of recent cohorts, and our findings are discussed below. We also consider how recent cohorts break down by service or agency, career field, education level, and proximity to retirement.

Our data sources and methodology for defining a cohort and characterizing past work experience are described in Chapter Two. To reiterate, we include in each fiscal year's cohort individuals who were newly hired into the DoD civilian workforce in an AW position, internal hires into an AW position from a non-AW position in the DoD civilian workforce, and people who entered the DoD civilian workforce in the fiscal year in question and who were recoded into the AW in the following fiscal year. We do not include other recode-gains in the cohorts.

Because we incorporate workers recoded into the AW in the year after they entered the DoD civilian workforce in a non-AW position in our AW cohorts, our cohort analysis ends with the FY 2016 cohort. To produce comparable figures for the FY 2017 cohort, we would need to observe and incorporate recode-gains through the end of FY 2018.

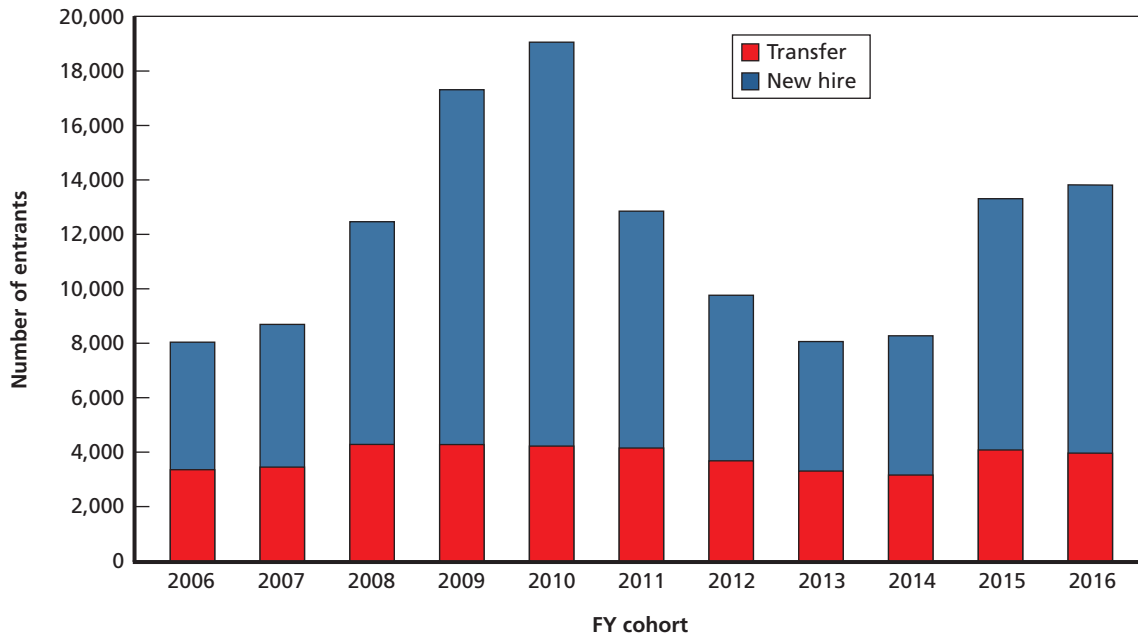
Size of Recent Acquisition Workforce Cohorts

Over the past decade, AW cohorts have varied in size, rising to 17,308 and 19,073 in FYs 2009 and 2010, respectively—the years immediately following the launch of the AW growth initiative—before returning to around 8,000 in FYs 2013 and 2014, as sequestration hit (see Figure 4.1). The most recent fiscal years (FYs 2015 and 2016) have seen the size of entering cohorts bounce back to around 13,000 to 14,000 per year.

AW growth over the past decade was fueled mainly by increases in new hires rather than transfers into the AW from non-AW civilian DoD positions (see Figure 4.1). The number of

¹ This chapter is an updated version of Chapter 7 of Powell (2017), which presented information on cohorts through FY 2014.

Figure 4.1
DoD Civilian Acquisition Workforce Entrants, by Type, FYs 2006–2016



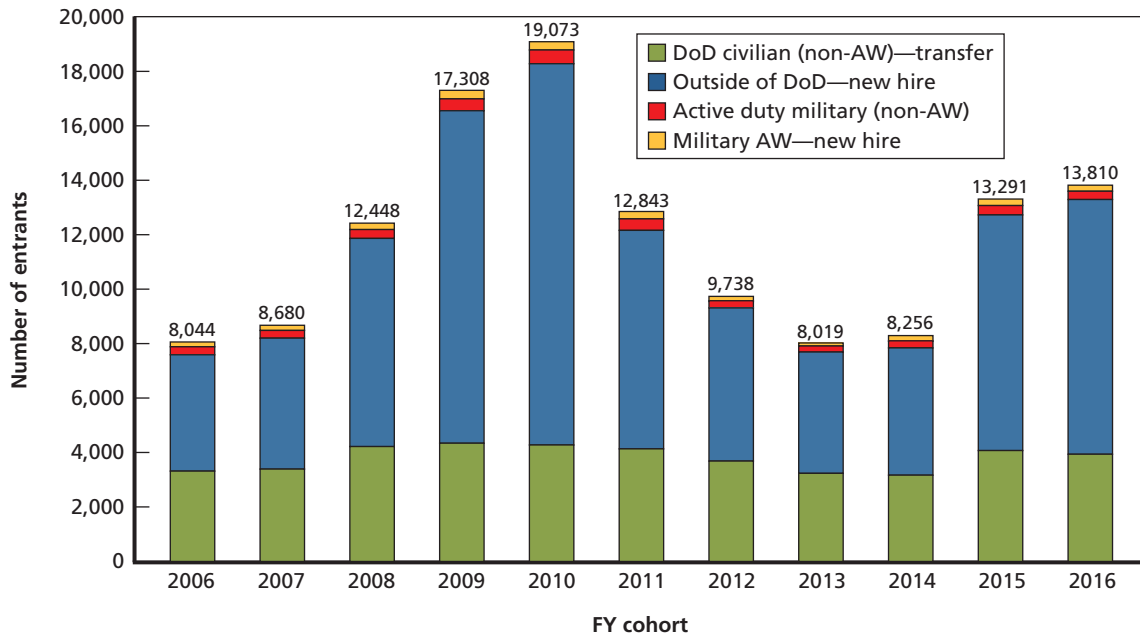
internal hires remained relatively constant from FY 2006 to FY 2016, including during the years with notably larger entering cohorts (FYs 2008 to 2011 and FYs 2015 and 2016). All cohorts between FYs 2006 and 2016 had roughly between 3,200 and 4,300 internal hires. By contrast, the cohorts immediately following the launch of the AW growth initiative, as well as the FY 2015 and 2016 cohorts, had considerably more new hires than cohorts from the other years. Specifically, these larger cohorts had about 8,000 or more new hires each (and nearly 15,000 in FY 2010), whereas smaller entering cohorts over the past decade had as few as 4,750 members.

Past Work Experience of Civilian Acquisition Workforce Entrants

The past work experience of individuals entering the civilian AW may influence their performance on the job, career progression, and attrition rates. In this section, we analyze the past work experience for members of cohorts from FYs 2006 to 2016, using the methodology for characterizing past work experience described in Chapter Two. It is important to note at the outset that our data allow us to capture only whether individuals have prior DoD experience and what type of experience they have (civilian or military). Individuals may have other relevant prior work experience that allows them to make an immediate contribution to acquisition programs—for example, as support contractors to DoD.

We determine that the new hires that fueled the AW growth initiative (and that contributed to the larger cohorts in the most recent two fiscal years) came from increases in hires from outside DoD. Figure 4.2 shows at a more precise level where civilian AW entrants worked immediately before joining the civilian AW for the cohorts from FY 2006 to FY 2016. The categories are internal transfer from a non-AW civilian DoD position, new hire who had been

Figure 4.2
DoD Civilian Acquisition Workforce Entrants, by Work Experience Immediately Prior to Joining the Acquisition Workforce, FYs 2006–2016



in the military AW, new hire who had been in a non-AW military position, and new hire who was not in a DoD position at all. The greatest variation is in the number of new entrants coming from outside DoD, peaking at more than 14,000 in FY 2010. The number of people in each cohort who came from military positions (either AW or non-AW) or who transferred from civilian non-AW DoD positions held fairly steady.

While individuals who join the civilian AW from a position that is outside DoD could still have some DoD experience in previous years (in either the DoD civilian workforce or the active duty military), our analysis finds that the majority of hires from outside DoD in recent cohorts do not have such experience (see Figure 4.3). This finding holds for every cohort from FYs 2006 to 2016, including both larger and smaller cohorts. In fact, the percentage of outside-DoD hires without prior DoD experience remains relatively stable for every cohort, hovering between 53 and 64 percent in each fiscal year.

Despite a majority of outside-DoD new hires into the civilian AW not having prior DoD experience, there remains a significant share that do have prior DoD experience, nearly half in some recent cohorts. Figure 4.4 examines these outside-DoD hires who have some prior DoD experience to understand what type of DoD experience they tend to have. (Note that, because individuals can have both civilian and active duty prior DoD work experiences, the percentages in Figure 4.4 add up to more than 100 percent for each cohort.) Figure 4.4 illustrates that nearly two-thirds of outside hires in the FY 2006 to 2016 cohorts with DoD experience had prior active duty experience (but never served in the military AW). By contrast, less than half of outside-DoD hires with prior DoD experience had experience in the civilian DoD workforce, with about the same share having some prior civilian AW experience as had DoD civilian experience but never in the AW. The percentage of outside hires with active duty experience that spent time in the military AW has hovered consistently around 10 percent.

Figure 4.3
DoD Civilian Acquisition Workforce New Hires, by Prior DoD Work Experience, FYs 2000–2016

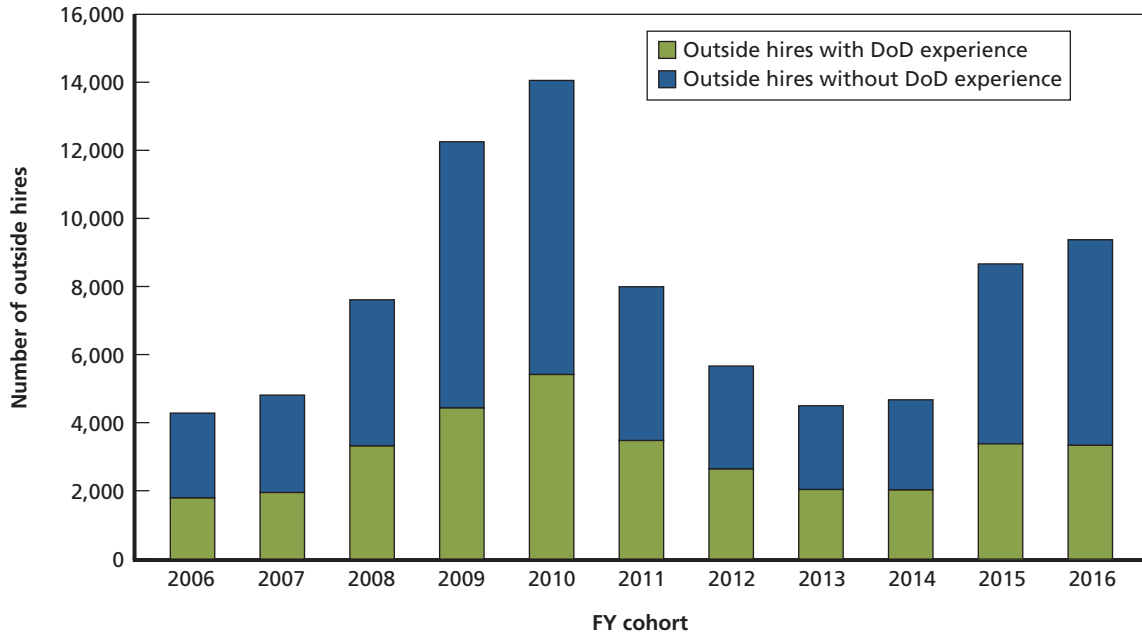
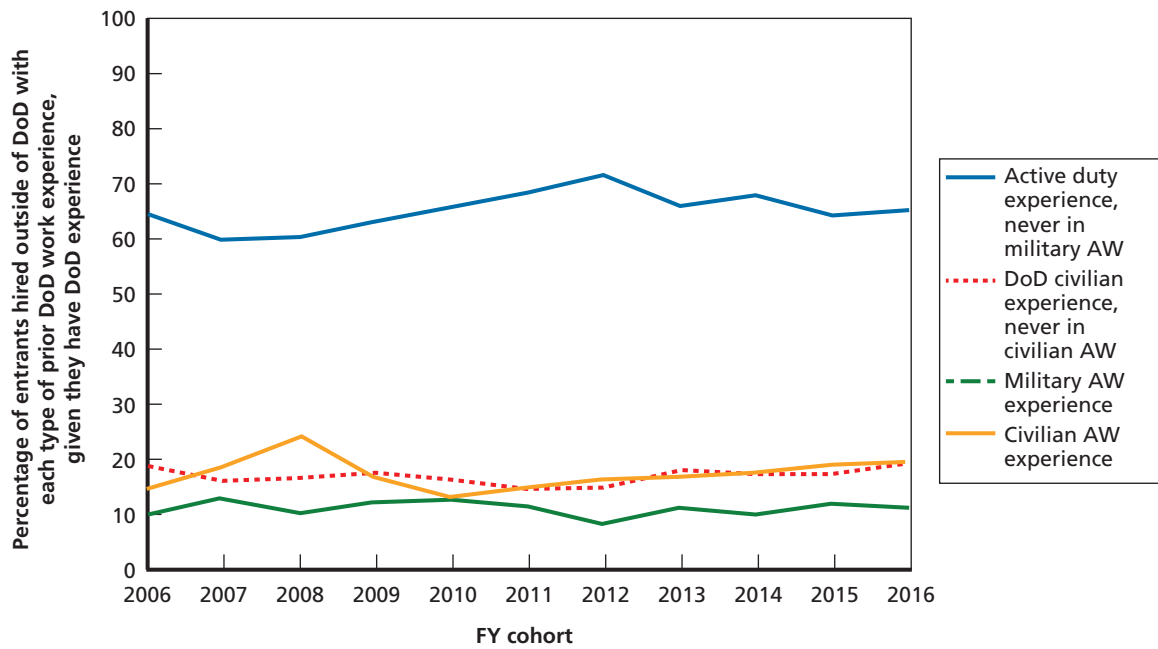


Figure 4.4
DoD Civilian Acquisition Workforce Entrants Hired from Outside DoD with Prior DoD Work Experience, by Type of Prior DoD Work Experience, FYs 2006–2016



Prior Career Profile Analysis

This section expands on the analysis of prior work experience discussed above by dividing each recent cohort into mutually exclusive prior-work-experience combination groups, or “prior career profiles.” These profiles are listed and described in Table 4.1. The first five profiles are the top five most common prior DoD experience combinations. Entrants with other past DoD experience combinations fall into the “Other DoD experience” profile, and entrants with no prior DoD experience fall into the “No DoD experience” profile. Each entrant for all cohorts examined is categorized into only one of these profiles.

This more granular analysis underscores that individuals with no prior DoD experience were the driving force behind the larger civilian AW cohorts over the past decade, in particular in the years immediately following the commencement of the AW growth initiative.

Figure 4.5 shows how the number of entrants with each of these prior career profiles changed from FY 2006 until FY 2016. Each line represents the number of entrants in each cohort with that particular profile. The sum of all lines for a given cohort year is the total number of entrants in each fiscal year cohort. The chart illustrates that the larger civilian AW cohorts were mainly fueled by outside hires with no prior DoD experience. There is also an increase—although not as drastic—in the number of entrants with active duty (non–defense AW) experience in the larger cohort years. As described above, hires with DoD experience tend to have active duty experience.

Figure 4.6 shows the same data but in percentage terms, so that the distribution of prior career profiles can be compared more easily across cohorts. This chart demonstrates that the share of new entrants with no prior DoD experience was significantly higher in the years with larger cohorts than in years with smaller cohorts. By contrast, the share of new entrants with prior DoD civilian experience (but not in the AW) was significantly lower in the years with larger cohorts than in the years with smaller cohorts. Moving forward, it will be informative to track whether new entrants without prior DoD experience have different levels of attachment to the AW compared with entrants who have prior DoD experience.

Table 4.1
Prior Career Profiles

Prior Career Profile	An Entrant Is Categorized into This Profile When . . .
DoD civilian	The only DoD experience an individual has is in the DoD civilian workforce (in a non–defense AW position)
DoD civilian + civilian defense AW	An individual has had experience in both the DoD civilian workforce and in the civilian defense AW but has no other type of DoD experience
Active duty	The only DoD experience an individual has is in the active duty military (in a non–defense AW position)
Active duty + DoD civilian	An individual has had experience in both the active duty military (in a non–defense AW position) and in the DoD civilian workforce (in a non–defense AW position) but has no other type of DoD experience
Active duty + military defense AW	An individual has been in the active duty military in both an acquisition position and a non-acquisition position but has no other type of DoD experience
Other DoD experience	An individual has any other prior DoD experience combination
No DoD experience	An individual has no prior DoD work experience

Figure 4.5
DoD Civilian Acquisition Workforce Entrants, by Prior Work Experience Profile, FYs 2006–2016

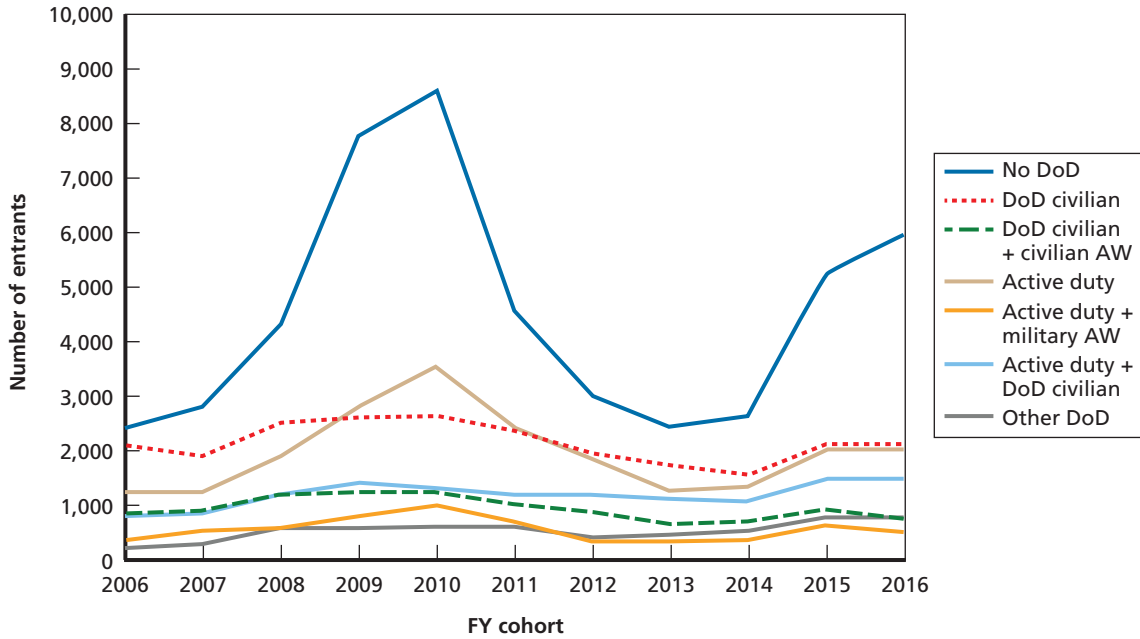
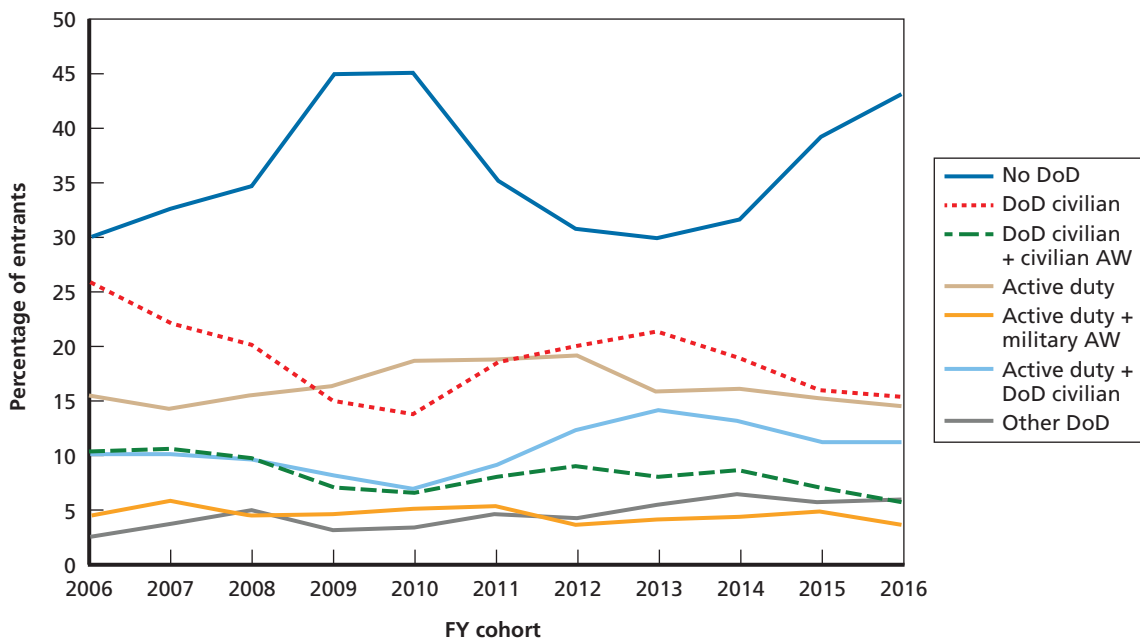


Figure 4.6
DoD Civilian Acquisition Workforce Entrants, by Prior Work Experience Profile (Percentage of Total Entrants), FYs 2006–2016



Other Characteristics of Recent Acquisition Workforce Cohorts

In addition to their prior career history, we analyzed several other characteristics of recent civilian AW cohorts that may be relevant for workforce managers: their agency, career field, education level, and proximity to retirement. This section provides an overview of our findings.

Agency

In Chapter Three, we discussed changes in the civilian AW by service and agency over the past decade. This analysis showed that the Army AW decreased in size and was replaced as the largest employer of members of the civilian AW by the Navy. Our analysis of the distribution of entering cohorts confirms these trends (see Figure 4.7). We find that, while there were more new members who joined the Army civilian AW than joined any of the other service or agency workforces in several years prior to FY 2012, more people entered the Navy civilian AW in every year starting in FY 2012. In FY 2015, the Navy share approached half of all entering workers. The shares of each incoming cohort that joined the Air Force or Marine Corps AWs have been relatively stable, at about 20 percent and about 2 percent, respectively. The share of each year's cohort joining agencies other than the service branches peaked during the years of smaller overall civilian AW cohorts (FYs 2012 to 2014), at around 25 percent.

Career Field

Analyzing the career fields of members of recent cohorts can shed light on DoD's efforts to bolster the size and capabilities of certain priority career fields (see Figure 4.8). Comparing the shares of incoming cohorts in different career fields with the share of the overall AW in those fields can also serve to highlight career fields that may experience higher or lower attrition rates. We find that the share of recent cohorts joining the engineering career field (22 percent

Figure 4.7
DoD Civilian Acquisition Workforce Entrants, by Agency, FYs 2006–2016

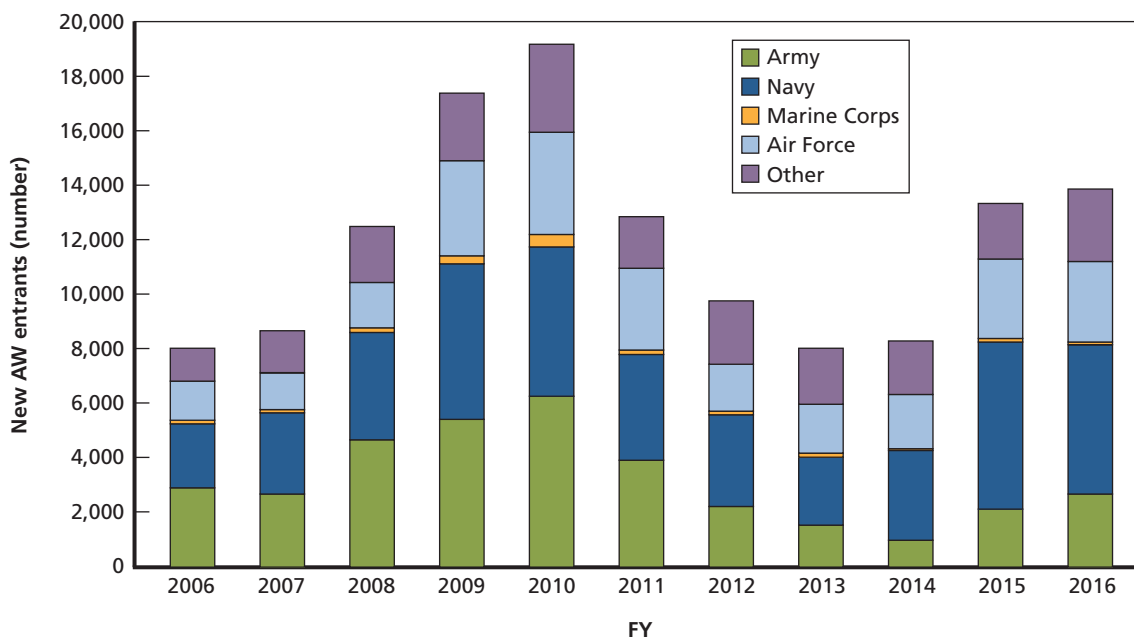
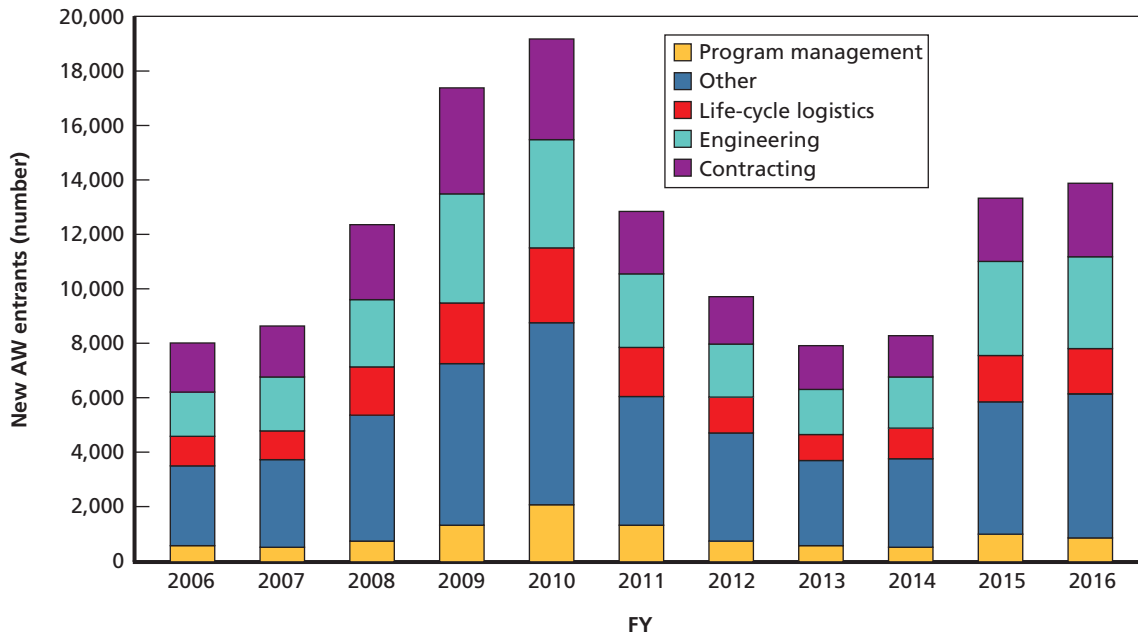


Figure 4.8
DoD Civilian Acquisition Workforce Entrants, by Key Career Field, FYs 2006–2016

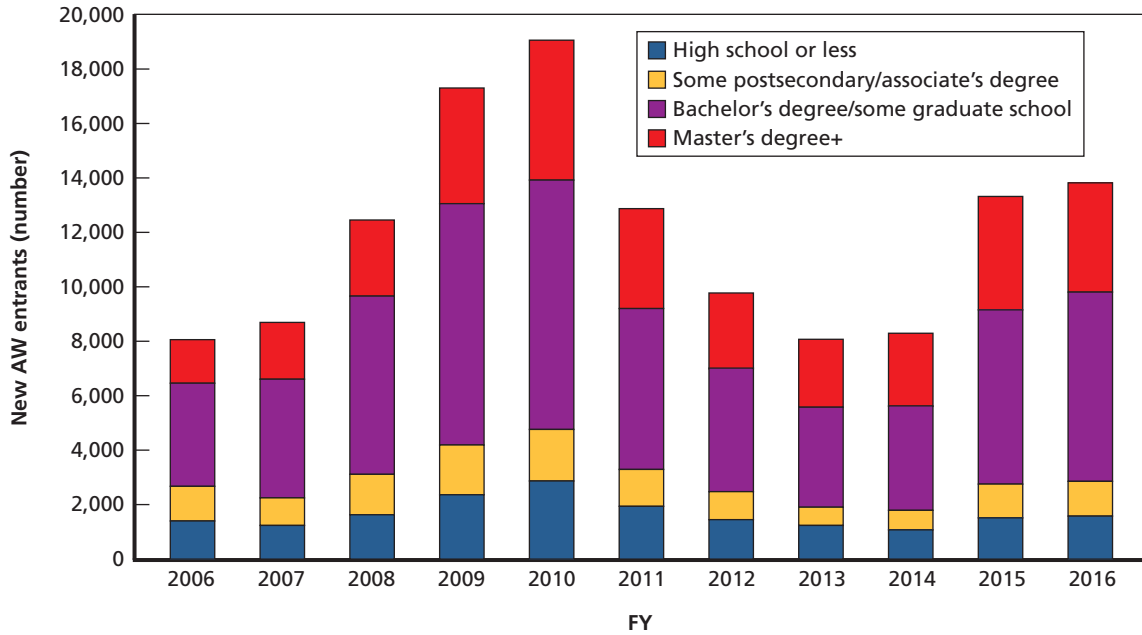


on average) was consistently lower than the share of the overall civilian AW in this career field. Nonetheless, the share of the overall AW in engineering declined only slightly over the past decade, from 29 to 28 percent, due in part to the lower attrition rates in engineering. By contrast, in every fiscal year from 2006 to 2012, the share of the entering cohort in life-cycle logistics surpassed the share of the overall civilian AW in this field, contributing to the increase in the share of the overall AW in life-cycle logistics, from 10 to nearly 13 percent over the decade. Both contracting and program management had about as many years with shares of incoming cohorts higher than their overall shares as they did years with shares of incoming cohorts lower than their overall shares. However, these overall shares moved in opposite directions, with program management increasing and contracting decreasing as a share of the civilian AW.

Educational Attainment

Attracting workers with higher levels of educational attainment was one of the goals of the AW growth initiative. Indeed, as discussed in Chapter Three, there was a significant increase in the share of the AW with at least a bachelor's degree over the past decade, with a particular spike in the share of the AW with a master's degree or more education. Our analysis of recent cohorts entering the AW reveals that these new entrants contributed to the observed increase. The share of entering cohorts with at least a bachelor's degree increased from about two-thirds in FY 2006 to nearly 80 percent in FY 2016, while the share with a master's degree or more education increased from less than 20 percent to nearly 30 percent over this period (see Figure 4.9). These shares fall short of the shares of the overall civilian AW with such levels of education, in part because entering workers are disproportionately younger and may continue to pursue further education while on the job.

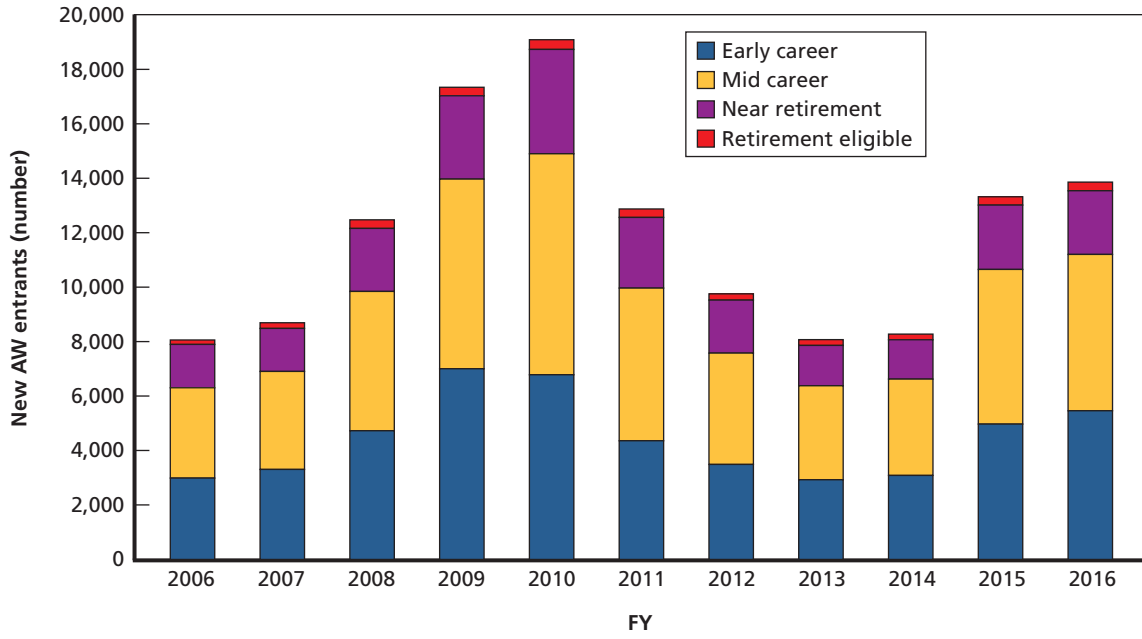
Figure 4.9
DoD Civilian Acquisition Workforce Entrants, by Educational Attainment, FYs 2006–2016



Proximity to Retirement

As discussed in Chapter Three, the YORE distribution of the AW shifted over the past decade, with the share of the AW with more than a decade to go until reaching full retirement age increasing. This trend likely was driven both by the characteristics of individuals exiting the workforce (for example, baby boomers reaching retirement age) and the YORE distribution of entering workers. As Figure 4.10 shows, more than three-quarters of members of recent cohorts, on average, had a decade or more to go before reaching retirement age (YORE of -10 or below), with about one-third having more than 25 years to go. By contrast, less than one-quarter of members of recent cohorts were set to reach full retirement age within ten years, including just 2 percent who were already at or beyond retirement age upon joining the AW.

Figure 4.10
DoD Civilian Acquisition Workforce Entrants, by Years Relative to Retirement Eligibility, FYs 2006–2016



The Military Acquisition Workforce and Its Implications for the Civilian Acquisition Workforce

To this point, the analysis in this report has focused on the civilian AW. In this chapter, we turn to the military AW—the members of the active duty military who serve in acquisition-related positions in their service branch. The military AW is an order of magnitude smaller than the civilian AW, though the proportion of the AW that is active duty military varies across the services. The military AW also breaks down differently across AW career fields, with a much higher share of the military AW serving in program management roles. As they leave active duty and enter civilian life, individuals with experience in the military AW become an important source of new recruits to the civilian AW.

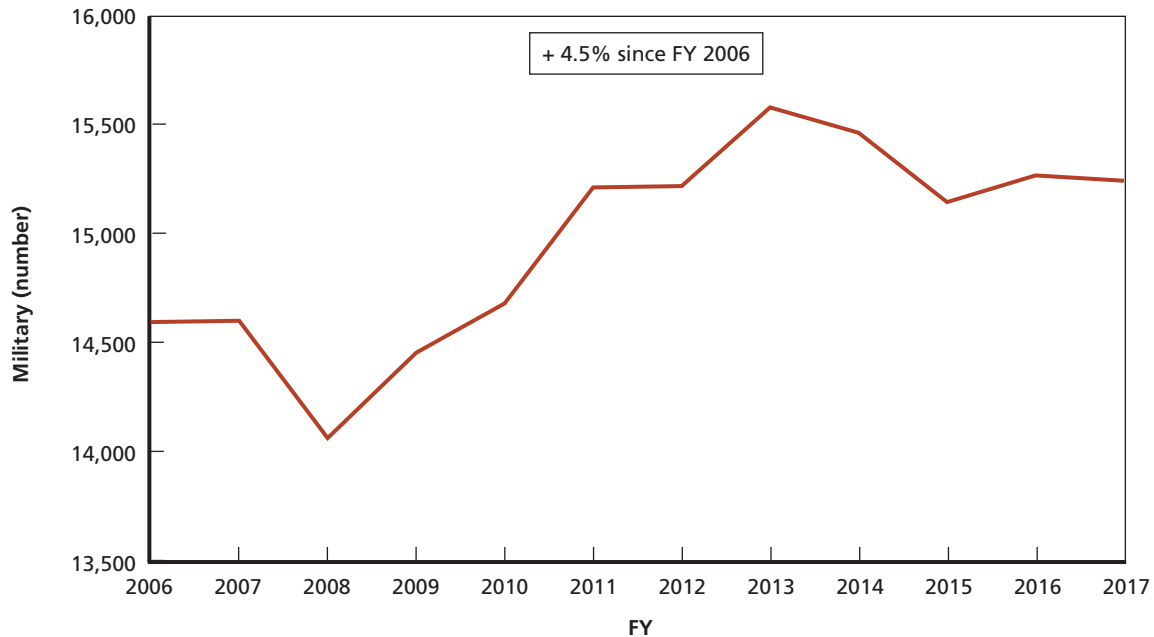
This chapter begins by providing a descriptive overview of the military AW and how it differs from the civilian AW. As part of this descriptive overview, we are now able to report flows of gains and losses to the military AW, which we had not yet developed the capability to do in past reports. We then extend the cohort analysis detailed in the previous chapter to show the role the military AW plays as a source of new hires into the civilian AW.

The analyses reported here differ from our prior analyses of the military AW because we draw on the ADMF rather than the WEX, which was discontinued in 2016, to generate workforce counts. The ADMF is the primary personnel data file for individuals who are part of the active duty military, whereas the WEX was a transaction file derived from the transaction file equivalent of the ADMF, the Active Duty Transaction File (ADTF), to address a specific analytic need that has since been resolved. In years in which the WEX was being produced, the number of military AW members we identified using the ADMF was systematically lower than the number of military AW members we identified using the WEX, by between 0.2 and 3.6 percent, depending on the year, as a result of methodological differences between the two data sources (e.g., the ADMF does not capture individuals who enter and exit the AW within the same quarter) and unexplained variation. In this report and going forward, we present data drawn from the ADMF.

Overview of the Military Acquisition Workforce

The military AW included 15,241 people at the end of FY 2017, less than one-tenth the number of people in the civilian AW. The size of the military AW has remained relatively stable in recent years, increasing by just 28 people (0.2 percent) since FY 2011 and 659 people (4.5 percent) since FY 2006 (see Figure 5.1). This corresponds to the steadiness in overall active duty

Figure 5.1
Number of Military in the DoD Acquisition Workforce, FYs 2006–2017



NOTE: The y-axis in the chart does not begin at zero.

end strength over that time period. By contrast, the civilian AW grew by nearly one-third between FYs 2006 and 2017, as discussed in Chapter Three.

Gains and Losses to the Military Acquisition Workforce

We are now able to use the workforce analysis methodology described in Chapter Two to describe the flows of individuals into and out of the military AW. However, unlike in our analysis of the civilian AW, we do not distinguish between internal hires and recode-gains or between internal losses and recode-losses; all transfers into the military AW from a non-AW active duty military position are considered to be internal hires, and all transfers out of the military AW to a non-AW active duty military position are considered to be internal losses.

This analysis reveals several noteworthy insights. First, the magnitude of the workforce flows is much greater for the military AW than for the civilian AW, a result of typical military career progression that involves rotating positions every few years. Over the past several fiscal years, total workforce gains and losses as a share of the prior year baseline were about 20 to 25 percent for the military AW, compared with about 7 to 12 percent for the civilian AW. Drilling down into the source of the gains (new hires to DoD or transfers from a non-AW position), about 90 percent of gains to the military AW in each of the past five years were transfers, compared with roughly half of the gains to the civilian AW (including both internal hires and recode-gains). This indicates that it is unlikely that individuals will enter military service and immediately assume a military AW position—they are much more likely to serve in another capacity in the military before transferring to the military AW.

The high rate of transfers in the military services can also be seen when analyzing losses to the AW. More than half of the losses to the military AW over the past several years were transfers from a military AW position to a non-AW position in the military. By contrast, only about one-third of losses to the civilian AW were transfers to a non-AW DoD civilian position

(either internal losses or recode-losses), while about two-thirds of losses to the civilian AW were people who exited DoD entirely. Figure 5.2 plots these workforce flows for the military AW.

The high share of officers relative to enlisted personnel among members of the military AW provides further evidence that serving in the military AW is unlikely to be an individual’s first role—and that they are likely to transfer into the AW from a non-AW military position. In FY 2017, nearly 80 percent of the military AW was officers, and just over 20 percent was enlisted. Military-wide, these percentages are roughly reversed—less than one-in-five members of the military services are officers, and more than four-in-five are enlisted (see Figure 5.3).

Military Acquisition Workforce by Service

As we have noted in our past reports, members of the military AW are not evenly distributed across the services. Rather, a majority of the military AW is in the Air Force (58 percent as of FY 2017), with the remainder distributed between the Navy (24 percent), Army (12 percent), and Marine Corps (6 percent) (see Figure 5.4).

As a share of the AW in each service, active duty military make up nearly one-quarter of the Air Force AW (24 percent) versus 6 percent of the Navy AW and 5 percent of the Army AW (see Figure 5.5). Active duty military are nearly one-third of the Marine Corps AW (32 percent); however, as noted above, this workforce is the smallest of the services, with just over 900 military AW members versus nearly 9,000 in the Air Force as of FY 2017.

Military Acquisition Workforce Career Field Distribution

Two acquisition career fields—program management and contracting—employ about 60 percent of the military AW (31 percent in program management and 29 percent in contracting) (see Figure 5.6). By contrast, there are several career fields with few or no military personnel (fewer than ten people in FY 2017): auditing, facilities engineering, industrial and contract

Figure 5.2
DoD Military Acquisition Workforce, Number and Types of Gains and Losses, FYs 2007–2017

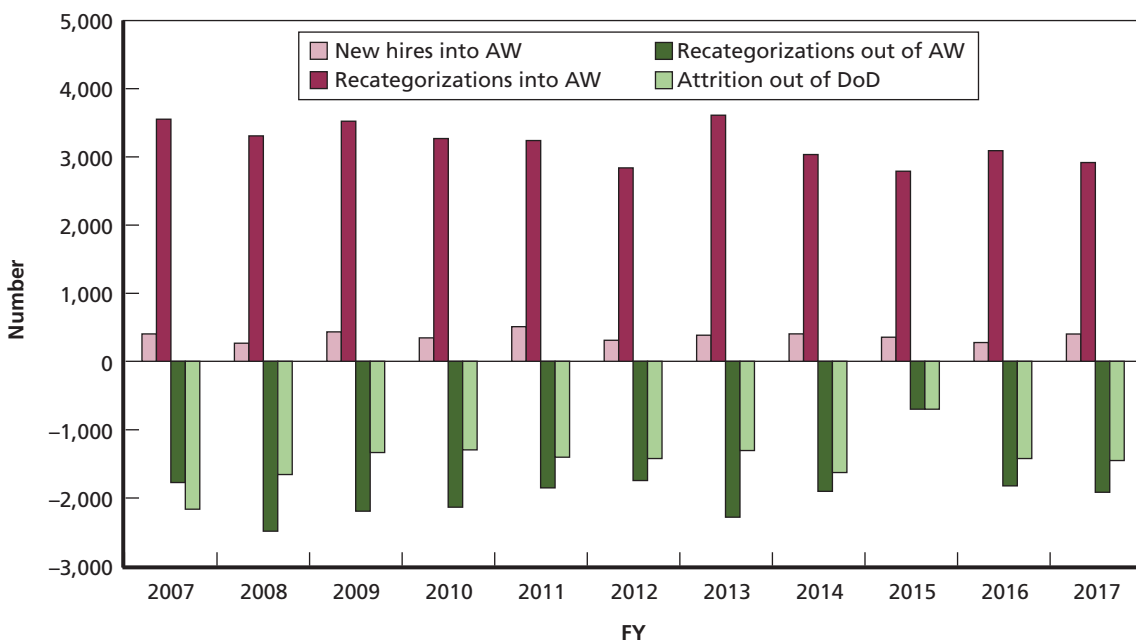


Figure 5.3
DoD Military and Military Acquisition Workforce, by Enlistment Status, FY 2017

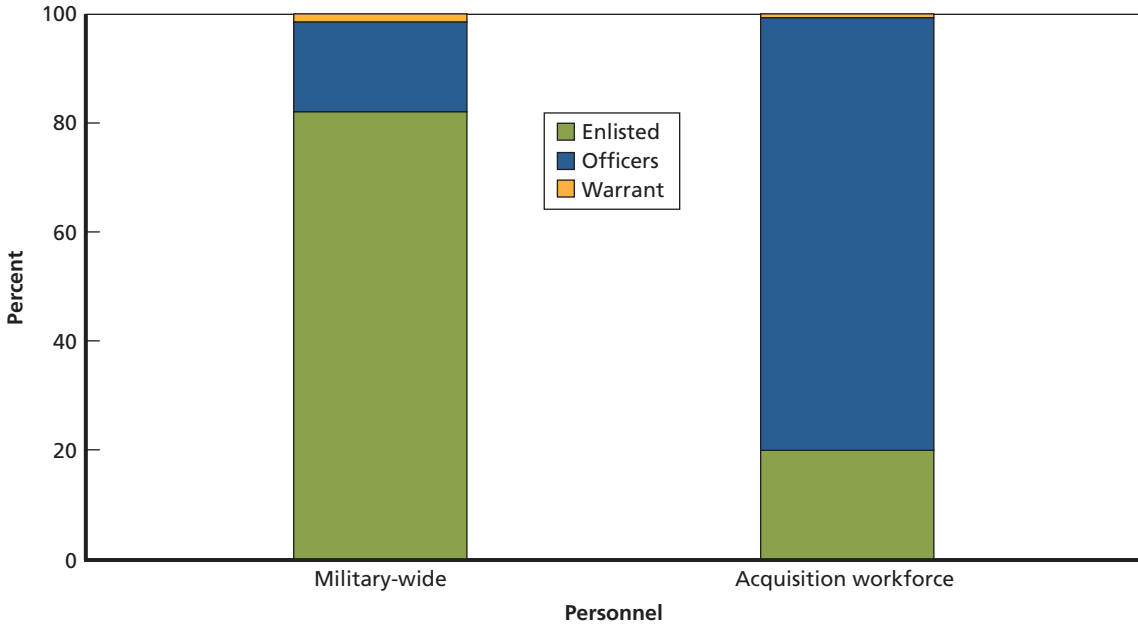


Figure 5.4
DoD Military Acquisition Workforce, by Service, FY 2017

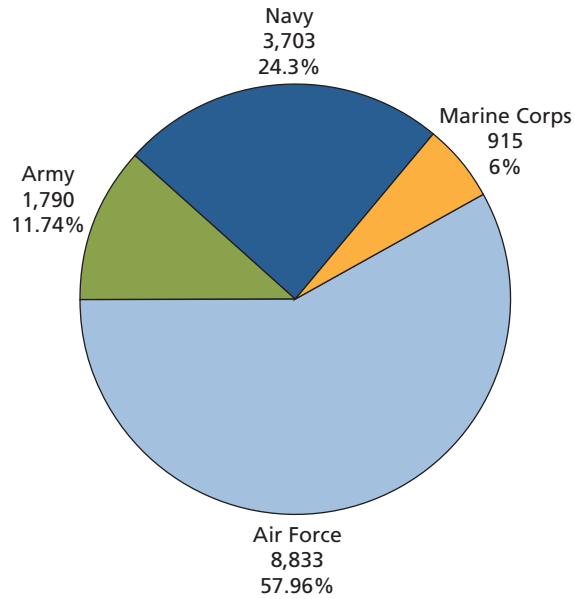


Figure 5.5
DoD Civilian and Military Acquisition Workforce, by Service, FY 2017

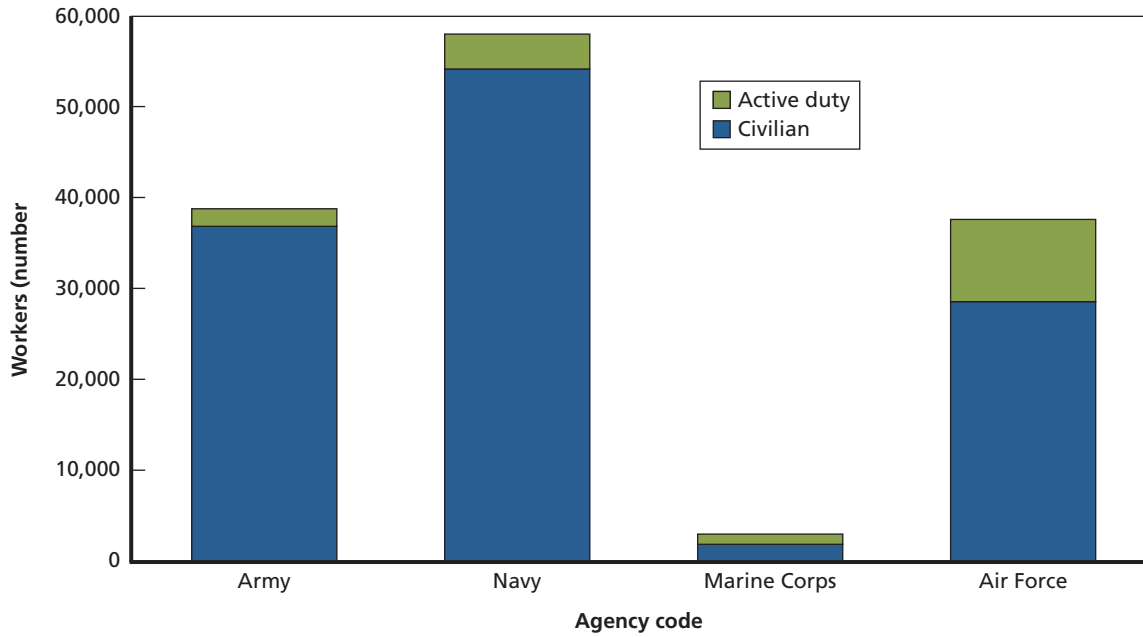
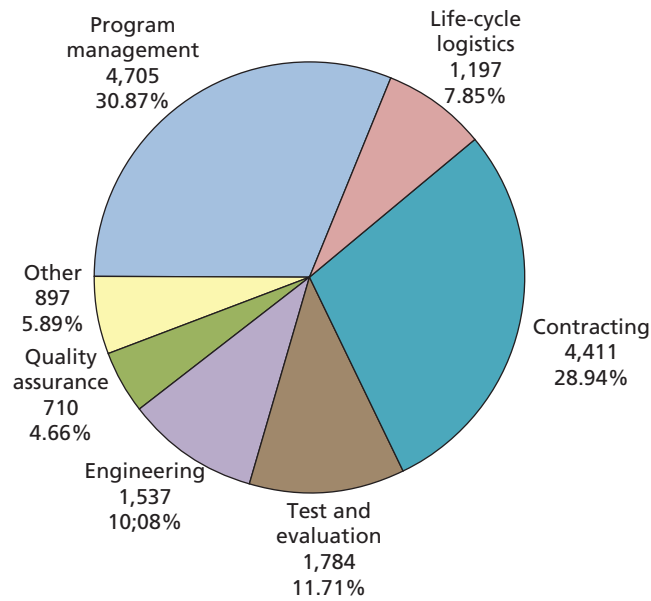


Figure 5.6
DoD Military Acquisition Workforce, by Career Field, FY 2017



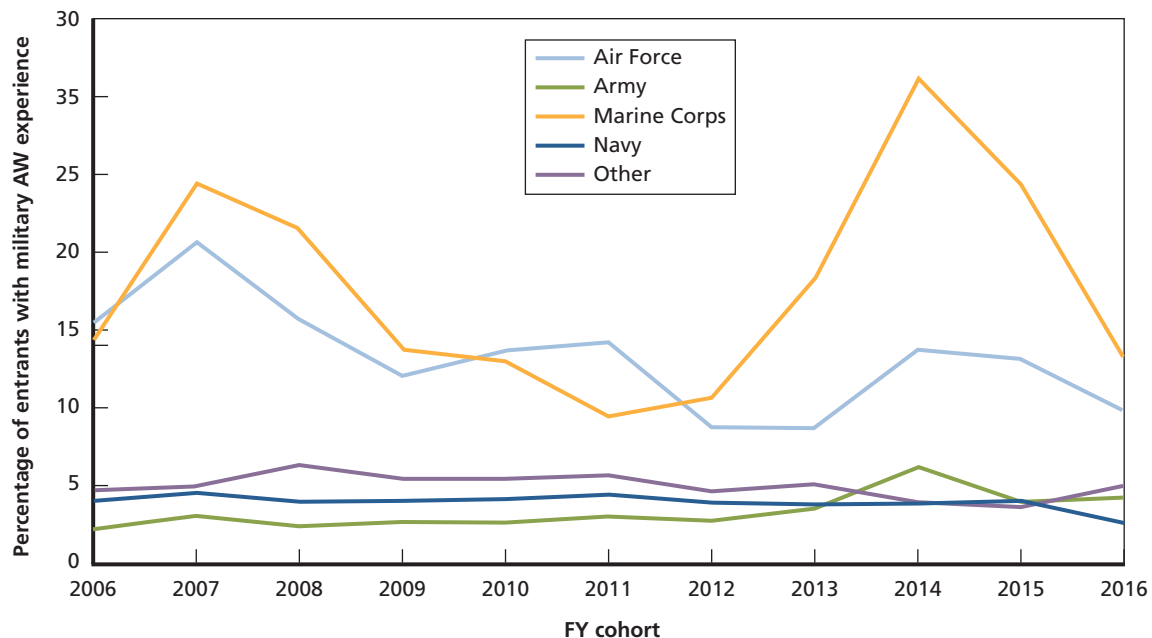
property management, and purchasing. Notable differences between the distribution of the military AW and the distribution of the civilian AW, discussed in Chapter Three, include the greater share of the workforce in program management (just 8 percent of the civilian AW is in program management), the smaller share of the workforce in engineering (10 percent of the military AW versus 28 percent of the civilian AW), and the very low representation of active duty AW members in business (less than 2 percent versus 5 percent of the civilian AW).

The Military Acquisition Workforce as a Source of New Entrants to the Civilian Acquisition Workforce

The cohort analysis we described in Chapter Four reveals that individuals with military AW experience are an important source of recruits for the civilian AW, although the share of new entrants to the civilian AW with prior military AW experience varies by service and agency (see Figure 5.7). Recent Marine Corps and Air Force civilian AW cohorts have the largest fractions of entrants with military AW experience (13 percent and 10 percent, respectively, of new entrants in FY 2016). This finding is not surprising given the much larger presence of active duty military in the Marine Corps and Air Force AWs, as described above, and the analysis in our 2013 report that showed that military members who eventually transition to the civilian AW tend to remain in the same service (see Gates et al., 2013, pp. 46, 50). The shares of civilian workers with prior military AW experience among recent Army and Navy cohorts are below 5 percent, on average.

The likelihood that members of recent civilian AW cohorts have prior military AW experience generally increases with the level at which they are hired. For example, whereas less than

Figure 5.7
DoD Civilian Acquisition Workforce Entrants with Prior Experience in Military Acquisition Workforce, by Agency, FYs 2006–2016



1 percent of entry-level and about 6 percent of mid-level entrants to the civilian AW in FY 2016 were previously active duty military AW members, nearly 20 percent of senior-level entrants to the civilian AW in FY 2016 had experience in the military AW (see Figure 5.8). The share of executive-level entrants with prior military AW experience has been somewhat lower in the most recent cohorts but is typically at or above the share for senior-level entrants.

The share of recent civilian cohort members with prior military AW experience varies by career field. Program management career field cohorts have the highest percentage of entrants with military AW experience—17 percent in FY 2016 (see Figure 5.9). Approximately 9 percent of entrants into the contracting career field, around 4 percent of entrants into the life-cycle logistics career field, and about 3 percent of engineering entrants joined the civilian AW with military AW experience in FY 2016.

Figure 5.8
DoD Civilian Acquisition Workforce Entrants with Prior Experience in Military Acquisition Workforce, by Career Level at Entry, FYs 2006–2016

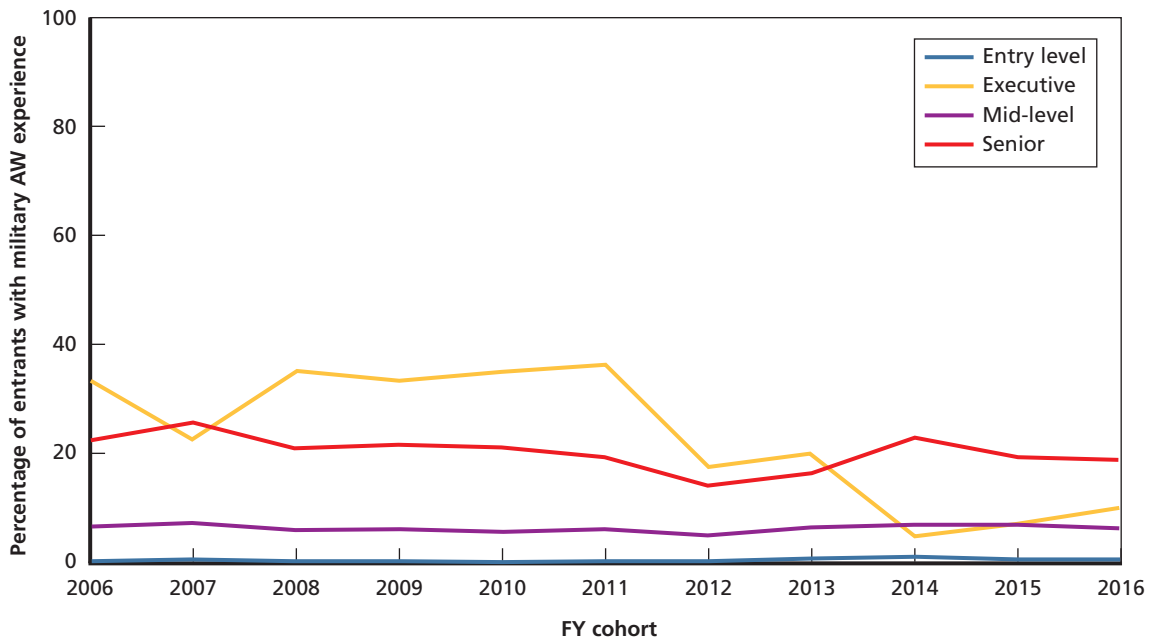
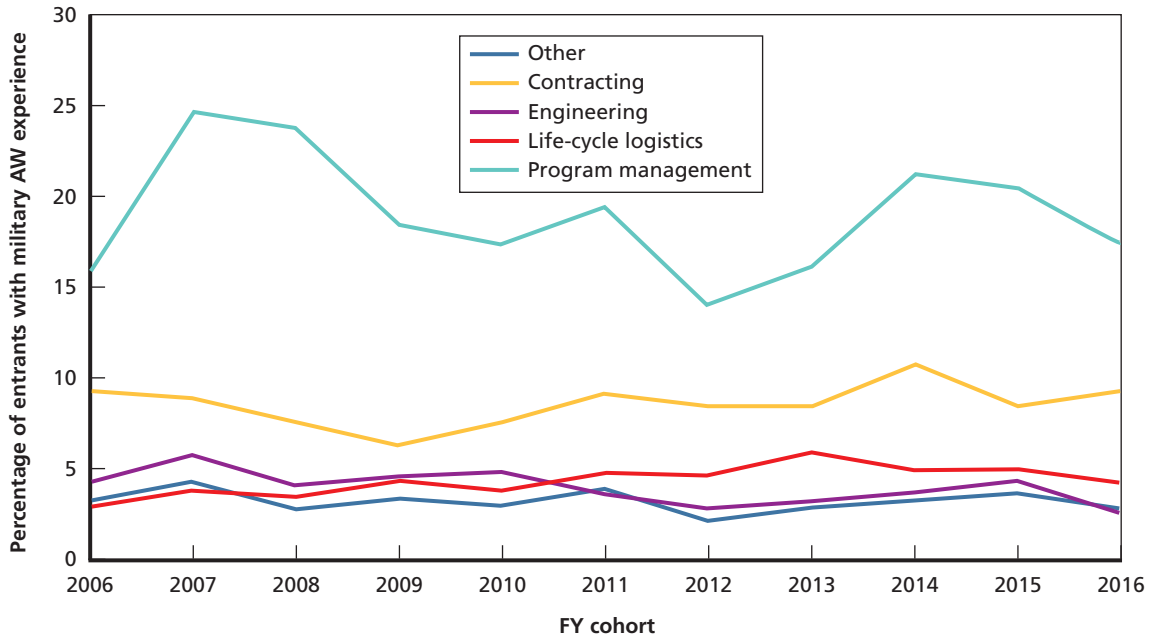


Figure 5.9
DoD Civilian Acquisition Workforce Entrants with Prior Experience in Military Acquisition Workforce, by Career Field, FYs 2006–2016



Conclusions and Recommendations

The AW is an important workforce for DoD. Composed of military personnel, civilians, and contractors, the AW fulfills a core mission of DoD. Over the past decade, RAND has developed data resources and methodological approaches to help DoD analyze the organic defense AW (that is, military and civilian employees of the DoD). These resources help managers track workforce gains, losses, and trends over time. They can serve as validation that intended changes are being executed as planned or a warning signal about unintended or unexpected changes.

Findings

This report has described refinements we have made to our methodologies and analytical tools over the past several years, and it updates our analyses of the AW through FY 2017.

Our analysis reveals that DoD grew the civilian AW during and after the AW growth initiative. From the end of FY 2008 to the end of FY 2017, the civilian AW expanded by more than one-third, to nearly 150,000 workers. The AW now makes up 20 percent of the total DoD civilian workforce, the result of this strong growth in the AW coupled with slower growth in the broader DoD civilian workforce, which has experienced job losses on net since 2011.

DoD grew the civilian workforce through a combination of internal and external hires. We find that new hires from outside the DoD civilian workforce exceeded internal hires from other DoD civilian positions in most years over the past decade. In particular, our analysis of cohorts of entrants to the civilian AW shows that DoD expanded the share of outside hires in years of higher civilian AW growth, such as FYs 2009 to 2011 and FYs 2015 and 2016.

Our analysis of prior work experience profiles for members of recent cohorts joining the civilian AW further reveals that a majority of new hires from outside DoD do not have any prior (observable) DoD experience, either in a civilian or military position. This finding held for both larger and smaller entering cohorts. For new hires with prior DoD experience, by far the most common experience was in a non-AW active duty military position.

We find that the civilian AW as of the end of FY 2017 is, on average, better educated and further from retirement than it was more than a decade ago, at the end of FY 2006. The share of the civilian AW with at least a bachelor's degree has reached 85 percent, up from 74 percent in FY 2006, and this share remains considerably higher than the share of the overall DoD civilian workforce with at least a bachelor's degree (48 percent). While about 45 percent of the current AW is at retirement age or will reach it over the next ten years, indicating that retire-

ments will continue to pose a challenge for AW managers, this share was 54 percent at the end of FY 2006.

Consistent with our past reports, we continue to find that attrition rates are lower for the civilian AW than for the DoD civilian workforce overall. Specifically, over the past five years, AW attrition has been about 5 to 5.5 percent each year, compared with about 8 percent for the broader DoD civilian workforce. AW attrition was even lower in FYs 2009 and 2010, due to the economic recession, which negatively affected retirement account values and outside employment opportunities, but it returned to historically typical levels as the recovery advanced. Despite lower-than-average attrition for the AW compared with the DoD workforce overall, there remain differences across career fields, with the contracting career field continuing to experience higher attrition than the AW as a whole.

Military AW dynamics differ from those of the civilian AW. This group is much smaller, only about one-tenth the size of the civilian AW, though military AW members are more likely than their civilian counterparts to serve in program management roles. More than 30 percent of the military AW is in the program management career field, compared with less than 10 percent of the civilian AW. Workforce flows are much greater for the military AW than for the civilian AW. Over the past several fiscal years, total workforce gains and losses as a share of the prior year baseline were about 20 to 25 percent for the military AW, compared with about 7 to 12 percent for the civilian AW. About 90 percent of gains to the military AW in each of the past five years were transfers, compared with roughly half of the gains to the civilian AW. This indicates that very few individuals will enter military service and immediately assume a military AW position—they are much more likely to serve in another capacity in the military first.

Limitations

An ongoing limitation of our analysis remains a lack of information about the contractor workforce. Because of this, we are unable to determine what share of the growth in the AW over the past decade came from insourcing of contractor personnel. This limitation also has implications for our cohort analysis. As we track career progression and retention patterns for members of recent cohorts to determine whether individuals with different prior career experience profiles follow different trajectories, it would be beneficial to be able to determine when an individual who appears to have no prior DoD experience in fact has significant experience working directly alongside the organic AW in a support contractor capacity.

Recommendations

This report describes how DoD data can be used to analyze workforce trends in the DoD-wide AW, as well as within individual agencies and career fields. As DoD proceeds with the reorganization of AT&L into A&S and R&E and considers changes to how acquisitions are conducted across DoD and how the AW is structured, DoD-wide analyses of the AW can inform the decisionmaking process. For example, DoD-wide analyses can help officials to understand how the size and composition of the AW is changing across services and agencies, and where DoD-wide human capital shortages or surpluses may be developing. These analyses can help

the services and agencies learn from one another and identify leading practices. A DoD-wide look at the AW can also highlight trends in AW career fields that cross agency lines.

While a high-level view of how the AW breaks down across the DoD on the whole is important for workforce planning, so too is making sure that managers across DoD have the tools they need to understand the dynamics of the AW in their service or agency. To that end, DoD should consider mechanisms to make data on AW gains and losses available to managers in the military services and Fourth Estate agencies.

As we have noted in our past reports, these workforce supply analyses—whether at the individual agency or DoD-wide level—are only part of strategic human capital planning. Ultimately, they must be combined with demand analyses of AW workload drivers, as well as considered in the context of any budgetary or FTE-level constraints.

Finally, DoD should continue efforts to better understand the role of the contractor workforce and the prior career experiences of new AW hires who come from outside DoD. While insourcing of service contractors contributed to the significant growth in the organic AW over the past decade, we are unable to assess to what degree because of a lack of data. More careful tracking of the contractor workforce and whether members of the AW have past experience as contractors would help managers to develop a fuller picture of their workforce. Nataraj et al. (2014a) identify key limitations of DoD-wide data and offer recommendations for addressing those, including limitations related to the contractor workforce.

YORE Projection Model: Technical Details

Over the decade RAND has been supporting DoD by analyzing the AW, we have developed and regularly updated a model, known as the RAND Inventory Model (RIM), for projecting the size and composition of the AW. The RIM uses historical data on external and internal hiring and losses to the civilian AW to project how the AW will evolve over the next ten years. Two versions of the model exist: a baseline model that is based strictly on hiring and separation rates over the past five years, and a “target” model that allows managers to adjust hiring rates to align with expected policy goals or to target force levels. Both models allow for analysis of the civilian AW as a whole, of individual service branches and agencies, of AW career fields, and of members of career fields within service branches and agencies.

Since the publication of Gates et al. (2013), we have made several adjustments to our model and data reporting. We now include individuals in retirement plans other than FERS and CSRS in the model, and we account for transfers of individuals between retirement plans using historical rates of transfer between plans. We do this because separation rates by YORE vary based on retirement plan—and failing to account for transfers between plans could bias our projections. In addition, we now provide DoD with quarterly updates of our model based on data through the end of the prior quarter. The model, therefore, can be used to project year-over-year changes through the end of any given quarter. We do not make quarter-over-quarter projections.

This appendix provides an overview of the model and discusses how the model calculates projections. It also includes a detailed description of the Excel workbooks that contain the model and guidance for users on how to manipulate the model. The underlying methods used to generate the projection model are described in greater detail in Gates et al. (2013).

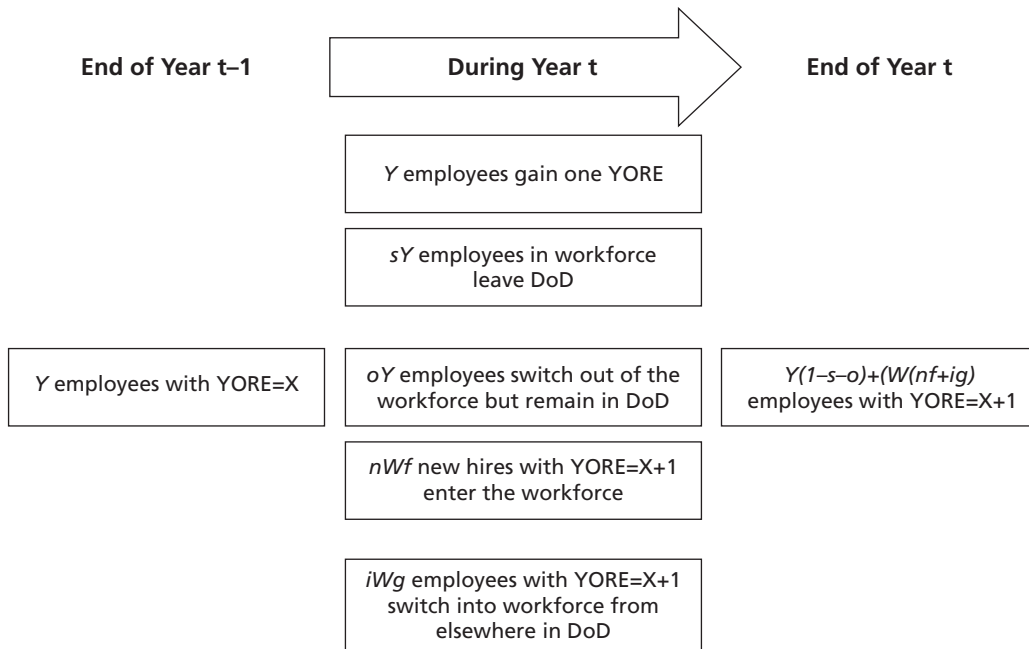
Model Overview

This section describes the basic logic motivating RIM inventory projections for Model 1, in which historical gain and loss rates (over the past five years) are used as the basis for projections of future workforce levels. RIM projections are based on calculations applied at the unit of a *YORE cohort*, defined as a group of employees with the same YORE (i.e., who will reach or have reached full retirement eligibility during the same fiscal year). The starting point for the projection is the distribution of the workforce of interest, by YORE, at the end of year $t - 1$ (in this example, the end of FY 2016). This section assumes that Q4 (end-of-FY) snapshots are used; the same logic would apply if snapshots from other quarters were used instead.

Figure A.1 demonstrates the basic procedure used to project the one-year change in workforce size for a given YORE. In Figure A.1, there are W employees in the workforce of interest and Y employees with a given YORE (YOPE = x) at the end of year $t - 1$. During year t , the following changes are made:

- The cohort of employees with YORE = x is “aged” by one year, to YORE = $x + 1$.
- The separation rate s for employees with YORE = x is multiplied by the number Y of employees in cohort YORE = x to project the number sY of employees with YORE = x who leave the DoD civilian workforce altogether.
- The switch-out rate o for employees in YORE = x is multiplied by the number Y of employees in cohort YORE = x to project the number oY of employees with YORE = x who move out of the workforce of interest but remain within DoD. For the purposes of the RIM, internal losses (“substantive switches out” in our past reports) are considered to be switches out but recode-losses (“administrative switches out” in our past reports) are not, since recoding trends in the past may have little connection with future trends.
- The overall new-hire rate (n) across the entire workforce of interest is multiplied by the size of the workforce of interest (W) to estimate the total number of new hires in the workforce of interest (nW). Then, the total number of new hires in the workforce of interest (nW) is multiplied by f , where f is the fraction of new hires who enter with YORE = $x + 1$, to project the number of employees with YORE = $x + 1$ who enter the workforce of interest (nWf).
- The overall switch-in rate (i) across the entire workforce of interest is multiplied by the size of the workforce of interest (W) to estimate the total number of switches into the workforce of interest (iW). Then, the total number of switches into the workforce of interest (iW) is multiplied by g , where g is the fraction of switches in who enter with YORE

Figure A.1
Overview of the Workforce Supply Projection Model



$= x + I$, to project the number of employees with YORE = $x + I$ who switch into the workforce of interest (iWg). As is the case with switches out, for the purposes of the RIM, internal hires (“substantive switches in” in our past reports) are considered to be switches in but recode-gains (“administrative switches in” in our past reports) are not.

- At the end of year t , the size of the workforce in the population of interest in YORE = $x + I$ is thus given by the size Y of the population in YORE = x in year $t - 1$, minus separations sY , minus switches out oY , plus new hires nWf , plus switches in iWg .

Since separation rates tend to differ across retirement plans (Gates et al., 2008), the model follows the method above separately for employees in the CSRS and FERS plans. A similar method is used for employees in retirement plans other than CSRS and FERS, except that this procedure applies to this group of employees as a whole rather than by YORE (since there is such a small number of individuals in Other retirement plans). The projections for employees in the CSRS, FERS, and other retirement plans are then added up to generate an overall projection. The model also accounts for transfers between retirement plans.

Calculating Rates for Small Populations

Stock-and-flow models (such as the RIM) are typically thought to be appropriate for relatively large workforces; some sources (e.g., Edwards, 1983) cite 100 employees as a lower bound. These models rely on projecting future employee movements based on past patterns; with very few employees, historical gain or loss rates may be highly variable or nonexistent in some years, particularly when the analysis is conducted separately by YORE. One outlier in the historical data for such small populations can lead to improbably high or low rates, thus creating implausible projections.

In creating previous versions of some career field and several career-field-by-agency models, we have typically found that small populations lead to implausible projections in a few career-field-by-agency models and occasionally in a career field model. To address this challenge, the model uses rates from a larger, aggregated population if the baseline population was ever less than 500 in any of the previous five years. For example, if the Air Force auditing workforce was less than 500 in any given year between FYs 2013 and 2017, the model will calculate separation, new-hire, switch-in, and switch-out rates based on the auditing workforce as a whole and apply those rates to the smaller subpopulation. If a career field as a whole has a small population, the model uses rates from a larger “bin” of functionally similar career fields.

Detailed Procedure for Generating the Projections

In this section, we describe the procedure outlined above in more detail and distinguish between the construction of the baseline model (strictly using historical rates) and the target model, which allows for adjustments. We discuss how the year $t - 1$ starting inventory is used to arrive at the year t projected inventory. The model carries out similar procedures for projecting the workforce up to ten years out. As discussed above, this section assumes that Q4 (end-of-FY) snapshots are used, but the model can be easily applied to snapshots from another quarter.

As discussed above, we apply the following procedure to employees with FERS, CSRS, and other retirement plans separately and then roll up the results for the total workforce of interest. For FERS and CSRS employees, projections are done by YORE. The procedures are identical for these two plans, with the exception that we assume all new hires are covered by

FERS. The procedure for projecting the number of employees in retirement plans other than FERS or CSRS is similar, but projections are created for the group of employees as a whole rather than by YORE.

The procedures for generating projections are also similar for the baseline model (Model 1) and the target model (Model 2). The key difference is that in Model 1 new-hire rates are assumed to be equal to historical new-hire rates, and end strengths are projected, whereas in Model 2 the user specifies required end strengths, and the numbers of required new hires or mandatory additional reductions are projected.

Step 1: “Age” the Existing Population

The model starts with the beginning inventory of a workforce in a particular year. In year $t-1$, this inventory comes from actual workforce size; in subsequent years, the inventory comes from the model projection. If the user has specified a target or on-board strength for a future year, the user-specified strength will be used (and will match the model projection for that year).

For employees covered by CSRS or FERS, beginning inventory is distributed by YORE. The beginning inventory for employees covered by Other retirement plans is not distributed by YORE and is entered as a single data point for a given year. In the CSRS and FERS plans, we begin by letting employees in each YORE cell “age” by one year. For example, individuals with YORE -10 in year $t-1$ are moved into YORE -9 for year t .

Step 2: Generate Projected Losses

We then project how many workers are expected to remain in the workforce using *continuation rates*, mathematically equivalent to one minus the corresponding loss rate. Individuals leave the workforce of interest for two reasons: They separate from DoD employment, or they switch out of the particular workforce of interest. Therefore, the continuation rates take into account losses from separations due to attrition and, in the case of subpopulation analyses, workers who switch out of the subpopulation but remain in the AW.

Continuation rates by YORE are determined either by historical averages over a five-year period (Model 1 and the default in Model 2) or by user input (available in Model 2). We selected a five-year horizon because it strikes a balance between long-run and short-run trends. On one hand, if a shorter horizon—say, one year of historical data—were used and the data for that year were unusual, the abnormality would percolate through the model’s projections. Using a five-year horizon smooths such abnormal effects. On the other hand, if a longer horizon—say, 10 or 20 years—were used, the data would include a time when the workforce looked significantly different than it does today. Using a five-year horizon balances these two concerns and is likely to seem reasonable from a manager’s point of view. Nonetheless, it is important to keep in mind that trends over the next decade could look quite different from trends over the past five years.

For FERS and CSRS employees, historical separation and switch-out rates are calculated for each YORE based on the most recent five-year period for which we have data (year $t-5$ through year $t-1$). To arrive at the separation rate for YORE = x , we divide the total number of people who separated from YORE = x during the past five years by the total number of employees who started in YORE = x at the beginning of each of the past five years. For example, suppose there were 150 separations in year $t-5$, 100 in year $t-4$, 200 in year $t-3$, 150 in year $t-2$, and 300 in year $t-1$. Also suppose that the beginning workforce sizes in each of the five preceding years were 1,000 employees at the beginning of year $t-5$, 850 in year $t-4$,

900 in year $t - 3$, 950 in year $t - 2$, and 800 in year $t - 1$. Then the historical separation rate would be $(150 + 100 + 200 + 150 + 300)/(1000 + 850 + 900 + 950 + 800) = 0.2$.

A similar procedure generates the switch-out rate for $\text{YORE} = x$. The expected continuation rate for $\text{YORE} = x$ is then one minus the separation rate minus the switch-out rate. In terms of Figure A.1, the continuation rate is $(1 - s - o)$. For example, suppose the separation rate for FERS employees in $\text{YORE} = 0$ is 0.2, the switch-out rate is 0.1, and there were 1,000 FERS employees in $\text{YORE} = 0$ at the end of year $t - 1$. The model will project that $1,000 \times (1 - 0.2 - 0.1) = 700$ employees will continue to $\text{YORE} = x + 1$ in the workforce of interest at the end of year t .

We perform a similar procedure to calculate the continuation rate for employees in retirement plans other than FERS or CSRS, except that separation and switch-out rates are calculated for the employees in this population as a whole, rather than by YORE, because this population is so small.

Step 3: Account for Transfers Between Retirement Plans

Each year within most workforce populations, a small but significant percentage of employees moves from one retirement plan to another. In general, employees covered by CSRS and “Other” retirement plans move into FERS; however, a few employees are seen moving out of FERS as well. The inflow of employees into FERS is not large relative to the number of FERS employees; however, the outflows of employees from CSRS and “Other” retirement plans are sometimes large compared with the (relatively small) numbers of employees in those plans. Therefore, failing to account for such transfers would overestimate the number of employees in the CSRS and “Other” retirement plans and underestimate FERS employees. This discrepancy can skew projections over time, because the plans are subject to different gain and loss rates.

The RIM accounts for these *plan transfers* by assuming that historical average rates of transfer will continue into the future. We calculate historical average plan transfer rates based on the most recent five-year period, in a similar manner as we calculate separation rates. To arrive at the historical rate of transfers out of retirement plans other than FERS or CSRS, we divide the total number of people who transferred out of “Other” retirement plans during the previous five-year period by the total number of employees who started in “Other” retirement plans during each of the past five years. We perform a similar exercise for CSRS employees. In each projected year, we assume that the projected number of plan transfers into FERS is equal to the number of plan transfers out of CSRS and “Other” retirement plans.¹

Step 4: Generate Projected Gains

Once separations, switches out, and plan transfers out have been removed, the RIM calculates the number and distribution of workers who are expected to enter the workforce (gains) using *overall gain rates*; the previous year’s end strength; and, for FERS and CSRS employees, *gain distributions* by YORE. Gains may arise for two reasons: because individuals are newly hired into DoD employment or because they switch into the particular subpopulation of interest. Therefore, these gain rates and gain distributions are separated into gains due to new hires and gains due to switches into the workforce of interest.

¹ Most flows are from CSRS and “Other” retirement plans into FERS, but if the historical data show net flows into CSRS or “Other” retirement plans, the model will accommodate this pattern.

The overall new-hire (switch-in) rate indicates the expected number of new hires (switches in) as a percentage of the previous year's end strength. The new-hire (switch-in) gain distribution by YORE, used to project FERS and CSRS gains, indicates the average proportion of annual new hires (switches in) assumed to be in the specified YORE.

In Model 1 (Baseline), new-hire and switch-in rates and distributions are determined based on historical averages, using the most recent five-year period for which we have data (year $t - 6$ through year $t - 1$). Historical switch-in rates for each retirement plan are calculated by dividing the total number of switches in during the previous five years by the total number of employees who were in the population of interest at the start of each of the previous five years. Historical new-hire rates are similarly determined, with one exception. Because the CSRS was replaced by FERS in 1987, the model makes the simplifying assumption that no new hires will be covered by CSRS.² Therefore, historical new-hire rates for FERS are calculated by dividing the total number of new hires over the previous five-year period by the total number of employees in both the FERS and CSRS plans at the start of each of the previous five years.

For Model 2 (Targets), the switch-in rate is determined in the same way as discussed above, but the number of new hires is set equal to the difference between the user-inputted end strength and the initial projection of workforce size (including separations and switches).³ The ratio of new hires covered by "Other" retirement plans relative to those covered by FERS is assumed to be equal to the ratio of other retirement plan employees to FERS employees in the previous year.

In both Model 1 and Model 2, the expected distributions of switches in for FERS and CSRS by YORE and the expected distributions of new FERS hires by YORE are calculated using five-year historical average distributions. In terms of Figure A.1, the number of new hires for YORE = x is equal to the new-hire rate (n) expressed as a fraction of the baseline population, times the number of employees in the workforce (W), times f , the fraction of new hires that enter YORE = x . For example, suppose that the new-hire rate (n) is 0.1 and that there were 1,000 employees in the workforce (W) in year $t - 1$, such that the aggregate number of new hires into W is $1000 \times 0.1 = 100$ new hires. Now, suppose that one out of every 20 new hires (5 percent, or 0.05) are hired into YORE = x . The model will project that $100 \times 0.05 = 5$ employees will enter at YORE = x during year t .

For employees covered by retirement plans other than CSRS and FERS, the model simply calculates the number of new hires by multiplying the new-hire rate for the other plans by the baseline population covered by other plans in the preceding year, without considering distribution by YORE.

Step 5: Calculate Mandatory Additional Reductions (Model 2 Only)

In Model 2 (Targets), if the user enters a target or on-board end strength that is lower than the projected end strength for year t under the assumption of no new hires, the model will generate the number of mandatory additional reductions needed to achieve the required end strength in

² After 1987, only re-entrants to the federal workforce who had previously been covered by CSRS could select CSRS retirement coverage. Any new hires with no federal service prior to 1987 are not eligible for CSRS. In FY 2017, just 18 new hires were in CSRS.

³ Because the model rounds to the nearest whole number of employees, the new hires generated by this formula may be slightly more or less than the required end strength less the initial projection.

year t . The mandatory reductions are split across the FERS, CSRS, and other retirement plan populations in proportion to their relative sizes. For the CSRS and FERS populations, these reductions are also spread proportionally across YORE according to the projected distribution of employees across YORE for year t , after accounting for separations due to attrition, switches, and plan transfers. For example, consider a projected workforce for year t in which 70 percent of the workforce is covered by FERS, and after adjusting for separations due to attrition, switches, and plan transfers, 10 percent of the FERS workforce has a YORE of -10 . If the user enters a target population that requires a reduction of 1,000 employees, $1,000 \times 0.7 \times 0.1 = 70$ forced reductions will be taken out of the population of FERS employees with a YORE of -10 . Subsequently, Model 2 will generate projections for year $t + 1$ end strength, separations due to attrition, switches, and new hires using the required end strength specified in year t (assumed to be achieved through the mandatory additional reductions).

Guide for Manipulating the RAND Inventory Model Excel Workbook

On a quarterly basis, RAND provides a set of Excel workbooks containing an inventory projection model for the AW on the whole and by agency and career field to DoD. These workbooks are available from the authors upon request. In this section, we provide detailed information on the “Overview Page” tab of the RIM. All of the model capabilities can be accessed from this tab, and most users will likely prefer to focus on this tab only. The screen shots shown here are based on the RIM projection for the entire civilian AW using data through Q4 2017.

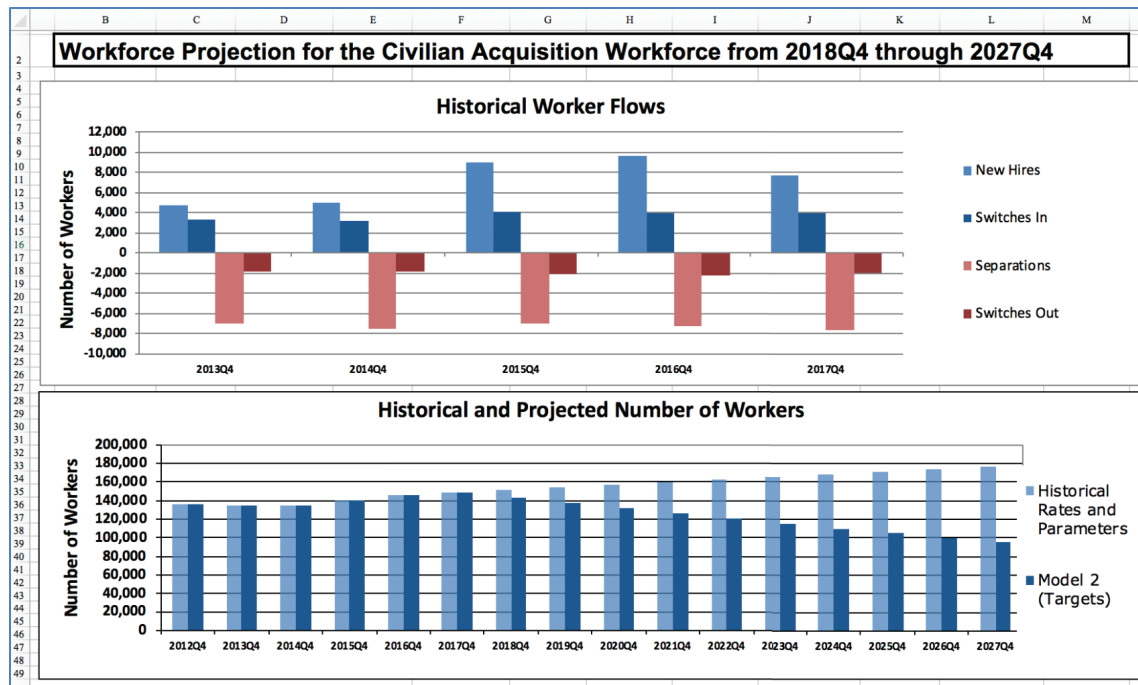
The “Overview Page” serves three basic functions. First, it provides summary graphs and statistics in rows 1–89. Second, it provides the user the opportunity to specify end strengths for Model 2 (Targets) in rows 68–69 of columns H–Q. Third, it displays key assumptions about new hire, separation, and switching rates underlying both models and gives the user the opportunity to make changes to those rates (rows 91–234). Opportunities for the user to input information that will influence the model projections are identified by cells highlighted with a yellow background.

Summary Statistics: Model 1 and Model 2

The “Overview Page” displays summary statistics for both Model 1 (Baseline) and Model 2 (Targets). As noted in the top line of the “Overview Page” (see Figure A.2), the example provided in this appendix is based on Q4 (end-of-FY) data snapshots. The graphs at the top of the page display “Historical Worker Flows” and “Historical and Projected Number of Workers,” respectively. The top graph, “Historical Worker Flows,” displays (1) the number of new hires into the workforce of interest (here, the overall civilian AW) (light blue), (2) switches into the workforce (here, switches in from non-AW DoD civilian positions) (dark blue), (3) separations from the workforce (light red), and (4) switches out of the workforce (here, switches from the AW to a non-AW DoD civilian position) (dark red). As noted above, switches in and out do not include recode-gains and recode-losses. The bottom graph, “Historical and Projected Number of Workers,” depicts the historical (actual) workforce size for Q4 FY 2012 through Q4 FY 2017, as well as the projected workforce size for Q4 FY 2018 through Q4 FY 2027 for both Model 1 (Baseline, with no user-inputted changes to historical rates) and Model 2 (Targets).

The summary statistics used to generate these graphs are displayed in rows 53–89 (Figure A.3). Columns B through G display historical (actual) workforce figures from FYs

Figure A.2
Graphs of Historical Worker Flows and Historical and Projected Workforce Size



2012 through 2017. These figures are identical for both models. Columns H through Q display projected figures for Model 1 (Baseline) in rows 53–57 and for Model 2 (Targets) in rows 65–89. As discussed above, in Model 1, the projected workforce (row 53) is based on historical new-hire rates. In Model 2, the projected workforce (row 65) is based on user-provided targets and/or on-board end strengths provided in rows 69 and 68, respectively.⁴ If the user does not enter end strength values in either of these rows, new hires for Model 2 are set equal to zero, but additional mandatory reductions are not forced. The procedures and projections associated with these user-provided end strengths (rows 65–89) are described in detail in the following section.

In both models, gain and loss rates and distributions (except for new hires in Model 2) are, by default, assumed to be equal to historical rates. If the user overrides historical rates, both models are updated to reflect these changes, with one exception: row 57, which is used to generate Model 1 values for the “Historical and Projected Number of Workers” graph. Row 57 always assumes historical gain and loss rate parameters and does not change if the user inputs rates or distributions. The reason for this exception is to provide a benchmark against which user-inputted values can be compared.

The fraction of the workforce eligible for retirement can have a major impact on future workforce size—and therefore on workforce planning. For instance, a large number of people becoming eligible for retirement in upcoming years can become a major planning consideration, as approximately 20 percent of employees who have just reached retirement eligibility (i.e., have YORE = 1) retire immediately (Gates et al., 2008). Therefore, managers may also

⁴ If the user inputs values for both on-board strength and target end strength and the values differ, the model overrides target strength and uses the value provided for on-board strength.

Figure A.3
Summary Statistics for Model 1 and Model 2

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
50	MODEL 1: KEY PROJECTION RESULTS: HISTORICAL HIRING RATES, USER-PROVIDED OR HISTORICAL PARAMETERS																
51		ACTUAL HISTORICAL WORKFORCE						PROJECTED WORKFORCE BASED ON HISTORICAL RATES									
52	Year	2012Q4	2013Q4	2014Q4	2015Q4	2016Q4	2017Q4	2018Q4	2019Q4	2020Q4	2021Q4	2022Q4	2023Q4	2024Q4	2025Q4	2026Q4	2027Q4
53	Total Workforce based on Historical New Hire Rates and User Provided or Historical Parameters	136,249	135,293	134,558	140,460	145,683	149,280	151,851	154,373	156,923	159,515	162,166	164,893	167,711	170,639	173,698	176,925
54	FERS Workforce, Model 1	119,275	120,909	122,519	129,947	136,822	141,956	145,917	149,615	151,119	156,318	159,806	163,037	166,253	169,491	172,791	176,204
55	CSRS Workforce, Model 1	16,429	14,030	11,721	10,133	8,442	6,942	5,581	4,433	3,484	2,720	2,106	1,620	947	201	185	551
56	Other Workforce, Model 1	545	354	318	380	419	382	352	325	300	277	255	236	217	201	185	171
57	Projected Workforce based on Historical New Hire Rates and Historical Parameters ONLY	136,249	135,293	134,558	140,460	145,683	149,280	151,851	154,373	156,923	159,515	162,166	164,893	167,711	170,639	173,698	176,925
58	MODEL 2: KEY PROJECTION RESULTS: USER-PROVIDED END STRENGTHS, USER-PROVIDED OR HISTORICAL PARAMETERS																
59	User Input																
60	Values Generated Based on User Input End Strengths																
61	NOTE: USERS MAY ENTER TARGET STRENGTHS, ACTUAL ON-BOARD STRENGTHS, OR BOTH. TARGET STRENGTHS REPRESENT GOALS FOR FUTURE YEARS. ON-BOARD STRENGTHS CAN BE USED IF THERE ARE ANY DEVIATIONS BETWEEN THE GOALS AND ANTICIPATED, ACTUAL STRENGTHS. IF ON-BOARD STRENGTHS ARE ENTERED, THEY OVERRIDE TARGET STRENGTHS. IF NEITHER TARGET NOR ON-BOARD STRENGTHS ARE ENTERED, MODEL ASSUMES NO NEW HIRES OR ADDITIONAL REDUCTIONS.																
62		ACTUAL HISTORICAL WORKFORCE						PROJECTED WORKFORCE BASED ON USER-INPUT ON-BOARD OR TARGET STRENGTHS									
63	Year	2012Q4	2013Q4	2014Q4	2015Q4	2016Q4	2017Q4	2018Q4	2019Q4	2020Q4	2021Q4	2022Q4	2023Q4	2024Q4	2025Q4	2026Q4	2027Q4
64	Total Workforce (Actual or Projected), Based on User-Provided End Strengths	136,249	135,293	134,558	140,460	145,683	149,280	143,419	137,601	131,892	126,296	120,815	115,473	110,274	105,235	100,373	95,719
65	Workforce Prior to New Hires and/or Additional Reductions							143,419	137,601	131,892	126,296	120,815	115,473	110,274	105,235	100,373	95,719
66	On-Board Strength (User Input)																
67	Target Strength (User Input)																
68	User-Provided End Strength Used in Model																
69	Separations Due to Attrition		6,993	7,540	7,003	7,271	7,684	7,728	7,632	7,469	7,305	7,134	6,941	6,741	6,528	6,294	6,032
70	Switches Out		1,796	1,893	2,154	2,288	2,030	2,228	2,144	2,056	1,966	1,879	1,790	1,704	1,619	1,538	1,458
71	New Hires to Meet Target or On-Board Strengths		4,674	4,917	8,921	9,569	7,643	0	0	0	0	0	0	0	0	0	0
72	Switches In		3,269	3,204	4,120	3,979	3,910	4,095	3,958	3,817	3,675	3,531	3,388	3,247	3,107	2,970	2,836
73	Additional Reductions to Meet Target or On-Board Strengths							0	0	0	0	0	0	0	0	0	0
74	Total FERS Workforce	119,275	120,909	122,519	129,947	136,822	141,956	137,540	132,966	128,261	123,469	118,632	113,796	108,993	104,258	99,629	95,152
75	Total CSRS Workforce	16,429	14,030	11,721	10,133	8,442	6,942	5,581	4,433	3,484	2,720	2,106	1,620	1,240	947	722	551
76	Total "Other" Workforce	545	354	318	380	419	382	278	202	147	107	78	56	41	30	22	16
77	Percent of workforce with:																
78	YORE -21 and less	26.3%	25.9%	25.3%	25.5%	25.6%	26.4%	24.0%	21.6%	19.6%	17.6%	15.8%	14.1%	12.7%	11.5%	10.4%	9.7%
79	YORE -11 to -20	22.9%	22.9%	23.0%	23.6%	24.6%	25.7%	26.8%	28.0%	28.7%	29.7%	30.7%	31.5%	31.9%	31.7%	31.3%	30.3%
80	YORE -6 to -10	17.3%	16.3%	15.9%	15.2%	14.5%	13.9%	13.8%	13.9%	14.2%	14.5%	14.7%	14.9%	15.2%	15.8%	16.8%	17.8%
81	YORE -1 to -5	18.4%	19.1%	19.1%	18.5%	17.8%	17.1%	16.7%	16.5%	16.4%	16.2%	16.2%	16.2%	16.4%	16.8%	17.1%	17.4%
82	YORE 0 to 4	10.7%	11.2%	12.0%	12.4%	12.8%	12.6%	13.7%	14.2%	14.7%	15.0%	15.1%	14.9%	14.9%	14.9%	14.7%	14.8%
83	YORE 5 and more	4.5%	4.6%	4.6%	4.8%	4.9%	4.4%	5.0%	5.7%	6.3%	7.0%	7.5%	8.4%	8.9%	9.3%	9.7%	10.0%
84	% Eligible for Retirement	15.2%	15.8%	16.7%	17.2%	17.6%	17.0%	18.7%	20.0%	21.0%	22.0%	22.7%	23.3%	23.8%	24.2%	24.5%	24.7%

want to keep track of the proportion of the workforce reaching retirement eligibility in future years in considering how to focus future recruitment (both internal and external). Targeted recruitment in response to changing retirement patterns would allow the organization to maintain a workforce with a more consistent distribution of YORE, helping to ensure that there will not be a large simultaneous mass of retirements. To assist managers in keeping track of the workforce distribution by YORE, rows 82–87 show the projected percentage of the workforce in each of several YORE categories (–21 or fewer, –11 to –20, –6 to –10, –1 to –5, 0 to 4, and 5 or more) based on user-provided end strengths in Model 2.⁵ Row 89 shows the projected percentage of the workforce that is eligible for retirement (YOER 0 or above).

Model 2: User-Provided End Strengths

In Model 1 (Baseline), workforce end-strength projections are *variable*, whereas new-hire rates are *fixed* based on observed, historical averages from FY 2013 through FY 2017 (or user-specified rates, as discussed at the end of this chapter). In Model 2 (Targets), end strengths are *fixed*—set by user-provided *target* or *on-board* end strengths—and new-hire rates are *variable*—determined by the number of new hires required to achieve or at least approach the user-provided end strengths. This section explores the user interface for generating projections associated with Model 2.

Figure A.4 provides a close-up view of the section of the model interface in which the user enters target or on-board end strengths, columns H through Q of rows 63–80. The user can either enter target end strengths in row 69 or on-board end strengths in row 68. If neither value is entered for a given year, the model assumes there are no new hires in that year. If different values are entered for both target and on-board end-strengths in the same year, the model will use the value provided for on-board strength and disregard the target strength. The end strength in use by the model (either target or on-board) is displayed in row 70.

The model calculates the number of separations due to attrition from the workforce (row 72) and the number of employees who switch out (row 73) and switch in (row 75) based on the actual or projected workforce in the preceding year and historical or user-specified separation and switching rates. Note that for a given year t these figures depend on projections for the preceding year $t - 1$, specified in the column to the left. Therefore, altering the target or on-board end-strength in year t will not change the projected numbers of separations and switches in year t (i.e., in the same column) but will rather change projected separations and switches in subsequent years.

New hires (row 74) represent either the historical new hires (columns C through G) or the number of new employees who would need to be hired in order to meet the user-provided target or on-board end strengths (columns H through Q). In columns H through Q of row 74 (identified with an orange background), the model generates a positive value for new hires if the user enters an end strength that is greater than the number of employees in the preceding year plus projected switches in minus projected separations and switches out. In this event, new hires are equal to the difference between user-provided end strength and the projected value of the workforce prior to new hires. For example, if there are 50,000 employees at the end of year $t - 1$ and the model predicts 5,000 voluntary separations, 1,000 switches out, and 500 switches in during year t , the model will project a workforce of 44,500 in year t before the user enters an

⁵ The “Overview Page” currently includes this information only for Model 2, because the results of Model 2 are more heavily used by some model users. However, this information could easily be provided for Model 1 as well.

end strength for year *t*. If the user enters a target end strength of 45,000 for year *t*, the model will generate a value of 500 required new hires in year *t*, equal to the difference between the target (45,000) and the projection with no new hires (44,500).

Note that the year specified in row 64 refers to the fiscal year in which the quarter of interest falls. Thus, for example, the number of new hires in 2018 (column H, row 74) represents the number of new hires that will need to be made between Q4 FY 2017 and Q4 FY 2018 in order to meet the end-of-FY 2018 workforce size specified in column H, rows 70 (user-provided end strength in use) and 65 (updated projection).

If the user enters an end strength that is *lower* than the projected end strength in year *t* under the assumption of no new hires, the model calculates the number of mandatory additional reductions needed to meet the end strength in year *t* (row 76). Additional reductions represent the number of employees to be removed from the workforce, above and beyond expected separations and switches out; projected reductions are equal to the difference between the projected workforce in year *t* with no new hires and the user-provided end strength.

Columns H through Q of row 65 display the total projected workforce size after accounting for the new hires or additional reductions necessary to meet the user-specified requirements. The value in row 65 for year *t* is equal to the value in row 65 for year *t* – 1 minus the separations, switches out, and forced reductions in year *t*, plus the switches in and new hires in year *t*. If the user provides an end strength for year *t*, the value in row 65 will always equal the user-provided end strength. It will also equal the sum of the values in rows 77–79, representing the subtotal populations in the FERS, CSRS, and Other retirement plans, respectively.

Columns H through Q of row 66 represent the total projected workforce *prior* to new hires or mandatory reductions, based on user-provided end strengths. This allows the user to compare the year *t* projection before and after adjusting new hires and mandatory additional reductions to meet user-provided end strengths in year *t*. Note that the row 66 projection does incorporate user-provided targets for previous years.

Model 2 provides users with a way to think about how hiring targets could be adjusted to achieve workforce goals, assuming that separation and switching rates remain the same. It also shows the scale of mandatory reductions that may be necessary to meet required end strengths.

Figure A.4
User-Provided Targets and Summary Statistics for Model 2

	A	G	H	I	J	K	L	M	N	O	P	Q
63		PROJECTED WORKFORCE BASED ON USER-INPUT ON-BOARD OR TARGET STRENGTHS										
64	Year	2017Q4	2018Q4	2019Q4	2020Q4	2021Q4	2022Q4	2023Q4	2024Q4	2025Q4	2026Q4	2027Q4
65	Total Workforce (Actual or Projected), Based on User-Provided End Strengths	149,280	143,419	137,601	131,892	126,296	120,815	115,473	110,274	105,235	100,373	95,719
66	Workforce Prior to New Hires and/or Additional Reductions		143,419	137,601	131,892	126,296	120,815	115,473	110,274	105,235	100,373	95,719
67												
68	On-Board Strength (User Input)											
69	Target Strength (User Input)											
70	User-Provided End Strength Used in Model											
71												
72	Separations Due to Attrition	7,684	7,728	7,632	7,469	7,305	7,134	6,941	6,741	6,528	6,294	6,032
73	Switches Out	2,030	2,228	2,144	2,056	1,966	1,879	1,790	1,704	1,619	1,538	1,458
74	New Hires to Meet Target or On-Board Strengths	7,643	0	0	0	0	0	0	0	0	0	0
75	Switches In	3,910	4,095	3,958	3,817	3,675	3,531	3,388	3,247	3,107	2,970	2,836
76	Additional Reductions to Meet Target or On-Board Strengths	0	0	0	0	0	0	0	0	0	0	0
77	Total FERS Workforce	141,956	137,560	132,966	128,261	123,469	118,632	113,796	108,993	104,258	99,629	95,152
78	Total CSRS Workforce	6,942	5,581	4,433	3,484	2,720	2,106	1,620	1,240	947	722	551
79	Total "Other" Workforce	382	278	202	147	107	78	56	41	30	22	16
80												
81	Percent of workforce with:											
82	YORE -21 and less	26.4%	24.0%	21.6%	19.6%	17.6%	15.8%	14.1%	12.7%	11.5%	10.4%	9.7%
83	YORE -11 to -20	25.7%	26.8%	28.0%	28.7%	29.7%	30.7%	31.5%	31.7%	31.7%	31.3%	30.3%
84	YORE -6 to -10	13.9%	13.8%	13.9%	14.2%	14.5%	14.7%	14.9%	15.2%	15.8%	16.8%	17.8%
85	YORE -1 to -5	17.1%	16.7%	16.5%	16.4%	16.2%	16.2%	16.2%	16.4%	16.8%	17.1%	17.4%
86	YORE 0 to 4	12.6%	13.7%	14.2%	14.7%	15.0%	15.1%	14.9%	14.9%	14.9%	14.7%	14.8%
87	YORE 5 and more	4.4%	5.0%	5.7%	6.3%	7.0%	7.5%	8.4%	8.9%	9.3%	9.7%	10.0%
88												
89	% Eligible for Retirement	17.0%	18.7%	20.0%	21.0%	22.0%	22.7%	23.3%	23.8%	24.2%	24.5%	24.7%

Clearly, policymakers could also consider influencing continuation rates through other, non-mandatory means. The following section discusses ways in which users can modify assumed continuation and other rates to reflect such policies or other changing conditions.

Changing Key Parameters

The models described in the preceding sections make a number of default assumptions, most critically that gain and loss rates are based on average, historical gains and losses over the FY 2013–FY 2017 period. Using these base rates, workforce managers can project what various aspects of the workforce would look like in the future if historical patterns were to continue.

Managers may, however, have reasons to suspect that historical patterns may not continue, or they may seek to understand the effects of policies that they expect will change such patterns and affect future trends. The models are very flexible, providing various options to allow managers to examine a number of different “what-if” scenarios simply by entering specific continuation or gain rates. For example, a manager might modify the new-hire rate in Model 1 to reflect an anticipated hiring freeze or might use Model 2 to identify the new-hire rates needed to maintain the current workforce size. These models cannot, however, predict the direction and magnitude of changes in gain or loss rates or distributions, as these will be influenced by policy decisions and economic conditions that cannot be anticipated by the model. Managers must therefore use their best judgment to adjust the historical averages as needed to reflect expected future conditions. One way to do so would be to base estimates on rates derived from a previous time period with similar policies or other situational factors.

The bottom half of the “Overview Page” (rows 91–234) displays key modeling assumptions and allows users to provide alternative modeling assumptions regarding continuation, separation, switch-in, switch-out, and new-hire rates. These parameters are displayed separately for each retirement plan. Row 93 indicates whether the population was considered “small,” as described earlier, and whether career field or “binned” career field rates were therefore used (cell D93). Rows 96–219 display and allow users to change parameters governing the population of employees covered by FERS and CSRS retirement plans, with FERS parameters in columns A through E and CSRS parameters in columns I through O. The last part of this section, rows 221–234, displays and allows users to change parameters governing employees covered by retirement plans other than FERS or CSRS. Managers can use the “Overview Page” to easily make adjustments to the underlying assumptions and explore how those changes alter the projected size and distribution of the workforce.

The “Overview Page” provides a summary of the historical data on each element of the model that can be modified by the user (e.g., the new-hire rate) and provides a place for the user to input alternative assumptions for each element. Cells containing model assumptions (based on five-year historical averages) are identified with a light blue background; cells in which the user can input values are identified with a yellow background. Note that changes to assumed new-hire rates will affect only Model 1, because Model 2 takes user-specified end strengths as given and automatically calculates the new-hire rates required to meet those end strengths. All other changes (to continuation, separation, or switching rates) are automatically applied to Model 1 and Model 2.

Parameters Governing Workforce Gains: New Hire and Switch-In Rates

Managers may choose to specify different new-hire or switch-in rates for one or more of the retirement plan populations. For the FERS and CSRS populations, this section of the user

interface can be found in rows 97–103, columns A through N (Figure A.5a). The historical new-hire rate for employees covered by FERS is displayed in row 98. As discussed above, the model assumes that no new hires will be covered by CSRS. The historical switch-in rates for employees covered by FERS and CSRS are displayed in row 102. Note that while the model assumes that there will be no new hires covered by CSRS, CSRS employees hired prior to 1987 may still switch into and out of the AW or a subpopulation.

These historical rates shown in cells F98, F102, and N102 are used as baseline assumptions and are identified with a light blue background. The adjacent cells (cells F99, F103, and N103, yellow background) allow the user to input different new hire or switch-in rates. It is important to recall that the new-hire rate assumption is relevant only for Model 1.

New-hire and switch-in rates for employees covered by retirement plans other than FERS or CSRS are displayed in row 226 (new hires) and row 227 (switches in) (Figure A.5b).

As an illustrative example, a manager may believe that the future new-hire rates for FERS will be lower than the historical rate over the past five fiscal years (0.056, or 5.6 percent, as shown in Figure A.5a). She can therefore input a different new-hire rate in cell F99, and Model 1 will use the user-specified rate. If she inputs a different switch-in rate in cell F103 or cell N103, Models 1 and 2 will both incorporate the user-specified switch-in rate.

Parameters Governing Workforce Gains: New-Hire and Switch-In Distributions by YORE

Organizations do not hire only at the entry level; they also hire mid-career and senior workers. Our analyses indicate that YORE is strongly associated with retention behavior. As a result,

Figure A.5a
New-Hire and Switch-In Rates for Employees Covered by Federal Employees Retirement System and Civil Service Retirement System

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
91	KEY DATA AND MODEL ASSUMPTIONS														
92															
93	Small Population? Use MCO (or FC) Data for Rates?			No		Model assumption, based on past 5 years' data					Optional user input				
94	<small>*If the total workforce population is less than 500 in any historical year, the model will use data from the MCO (or the FC if the MCO is also too small) when calculating the actual/historical overall and by-YORE rates. These data are found on the "RatesData - FERS" and "RatesData - CSRS" Tabs. Regardless of the size of the population, user provided rates will always be used if they are provided.</small>														
95															
96	KEY DATA AND MODEL ASSUMPTIONS: FERS							KEY DATA AND MODEL ASSUMPTIONS: CSRS							
97	OVERALL FERS NEW HIRE RATE (MODEL 1)							CSRS NEW HIRE RATES (MODEL 1)							
98	Actual/Historical, Overall FERS New Hire Rate (Model 1)							0.05613							
99	User Input, Overall FERS New Hire Rate (Model 1)														
100															
101	OVERALL FERS SWITCH-IN RATE (MODEL 1 & 2)							OVERALL CSRS SWITCH-IN RATE (MODEL 1 & 2)							
102	Actual/Historical, Overall FERS Switch-In Rate (Model 1 & 2)							0.0284							
103	User Input, Overall FERS Switch-In Rate (Model 1 & 2)							0.00916797							
104								User Input, Overall CSRS Switch-In Rate (Model 1 & 2)							

Figure A.5b
New-Hire and Switch-In Rates for Employees Covered by Other Retirement Plans

	A	B	C	D	E
221	KEY DATA AND MODEL ASSUMPTIONS: Other Retirement Plans				
222	Number of Workers in 'Other' Retirement Category				
223	FY2017Q4				
224	382				
225	Rate			Actual/ Historical	User Input
226	New Hire Rate (Other)			0.1954	
227	Switch-In Rate (Other)			0.0000	
228	Continuation Rate (Other)			0.6706	
229	Separation Rate (Other)			0.2743	
230	Switch-OUT Rate (Other)			0.0551	

it is important to account for how workforce gains are distributed across YORE in order to understand the long-run implications of those gains. A new employee who is mid-career will obviously have a different expected retention pattern than a new employee who has just completed his or her education.

The projection model assumes that future workforce gains (both new hires and switches in) will be distributed across YORE categories as they have been in the past. However, managers can change the distribution of gains by YORE to explore how a shift in recruiting policies or actions might affect the size as well as the YORE distribution of the workforce. For example, suppose a manager has been hiring recent graduates but requires a more experienced workforce and thus wishes to hire employees who already have several years of experience. He might consider adjusting the YORE distribution to increase the share of expected new hires in the range of YORE -20 to -10 . Workforce managers could also consider experimenting with different configurations of the new-hire age distribution to examine the long-term implications for workforce size and composition.

Rows 105–161 display and allow users to modify the assumed distributions of new-hire or switch-in distributions by YORE for both FERS employees (columns A through E) and CSRS employees (columns I through K) (Figure A.6). Parameters for new-hire and switch-in rates by YORE are not provided for employees in retirement plans other than FERS or CSRS, as the model considers that set of employees as a whole rather than by YORE.

As shown in Figure A.6, columns B and D display the actual historical distributions of new-hire and switch-in rates, respectively, for FERS employees, based on data for FY 2013 through FY 2017. Managers may input different new-hire distributions in column C and switch distributions in column E. This section is similar for CSRS employees, except that there are no columns for new-hire rates, because new hires cannot be covered by CSRS. The actual historical distributions of switches in for CSRS employees are displayed in column J, and users may input values for the switch-in distributions in column K.

Managers may choose to change the distribution of gain rates for all YORE, or for selected YORE. If a manager does not enter a value for a particular YORE, the model will use historical data for that YORE. The distributions of new hires and switches in across YORE must, by definition, add up to one. The model normalizes any user-inputted data to ensure that the final distributions continue to add up to one.⁶

Parameters Governing Workforce Losses: Switch-Out, Separation, and Continuation Rates, by YORE

There are a number of reasons that managers may want to alter assumed continuation rates, overriding the rates provided by five-year historical trends. For example, if managers anticipate that a downsizing will occur, then they may want to assume a higher separation rate. Managers may also want to manipulate the separation rates by YORE. For example, they may believe that the downsizing is most likely to result in a higher involuntary separation rate for individuals farthest from retirement eligibility. Therefore, managers may want to increase the assumed separation rates for those particular YORE bins. In contrast, they may expect to offer Voluntary Early Retirement Authority (VERA), which would increase separation rates for individuals with YORE close to regular retirement eligibility.

⁶ Interested users may want to note that the model assumes that the CSRS population at the most negative YORE is diminishing. In this case, the distribution across the remaining YORE adds up to one.

Figure A.6
New-Hire and Switch-In Distributions, by Years Relative to Retirement Eligibility, Federal Employees Retirement System and Civil Service Retirement System

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
105	FERS GAINS DISTRIBUTIONS BY YEAR OF RETIREMENT ELIGIBILITY							CSRS GAINS DISTRIBUTION BY YEAR OF RETIREMENT ELIGIBILITY						
106		NEW HIRE		SWITCH-IN						SWITCH-IN				
		Actual/Assumed in Models 1&2	User Input	Actual/Assumed in Models 1&2	User Input	Note: Distributions must add up to one. If user input distributions do not add up to one, they will be normalized to do so.				Actual/Assumed in Models 1&2	User Input	Note: Distributions must add up to one. If user input distributions do not add up to one, they will be normalized to do so.		
107	YORE								YORE					
108	-40	0.000		0.000					-16	0.000				
109	-39	0.000		0.000					-15	0.000				
110	-38	0.000		0.000					-14	0.000				
111	-37	0.000		0.000					-13	0.000				
112	-36	0.001		0.000					-12	0.000				
113	-35	0.004		0.003					-11	0.000				
114	-34	0.044		0.022					-10	0.002				
115	-33	0.054		0.027					-9	0.004				
116	-32	0.047		0.023					-8	0.004				
117	-31	0.041		0.019					-7	0.013				
118	-30	0.036		0.022					-6	0.013				
119	-29	0.103		0.021					-5	0.020				
120	-28	0.032		0.030					-4	0.018				
121	-27	0.030		0.034					-3	0.036				
122	-26	0.032		0.033					-2	0.061				
123	-25	0.038		0.031					-1	0.118				
124	-24	0.031		0.037					0	0.101				
125	-23	0.029		0.033					1	0.090				
126	-22	0.025		0.035					2	0.086				
127	-21	0.023		0.032					3	0.090				
128	-20	0.038		0.031					4	0.084				
129	-19	0.033		0.030					5	0.081				
130	-18	0.025		0.031					6	0.045				
131	-17	0.027		0.028					7	0.048				
132	-16	0.028		0.028					8	0.025				
133	-15	0.025		0.028					9	0.018				
134	-14	0.025		0.029					10	0.018				
135	-13	0.022		0.032					11	0.009				
136	-12	0.024		0.032					12	0.005				
137	-11	0.021		0.032					13	0.004				
138	-10	0.022		0.031					14	0.005				
139	-9	0.019		0.030					15	0.000				
140	-8	0.017		0.029					16	0.002				
141	-7	0.017		0.026					17	0.000				
142	-6	0.014		0.028					18	0.000				
143	-5	0.014		0.025					19	0.000				
144	-4	0.033		0.025					20	0.002				
145	-3	0.006		0.021					SUM	1.000	0.000			
146	-2	0.005		0.020										
147	-1	0.004		0.016										
148	0	0.003		0.014										
149	1	0.002		0.011										
150	2	0.002		0.008										
151	3	0.001		0.005										
152	4	0.001		0.004										
153	5	0.000		0.002										
154	6	0.000		0.002										
155	7	0.000		0.001										
156	8	0.000		0.001										
157	9	0.000		0.000										
158	10	0.000		0.001										
159	11	0.000		0.000										
160	12	0.000		0.000										
161	SUM	1.000	0.000	1.000	0.000									

Rows 163–219 display historical distributions of separation, switch-out, and continuation rates by YORE and allow users to change assumed distributions for employees covered by the FERS (columns A through G, Figure A.7a) and CSRS (columns I through O, Figure A.7b) plans. Users may change the continuation rates, separation rates, and switch-out rates individually, and they may change both the separation and switch-out rates simultaneously. By definition, the continuation rate is equal to one minus the switch-out rate minus the separation rate. If a manager specifies only the separation rate, the model will calculate the continuation rate based on the user-specified separation rate and the historical switch-out rate. Similarly, if a manager specifies only the switch-out rate, the model will calculate the continuation rate based on the user-specified switch-out rate and the historical separation rate. If both separation and switch-out rates are specified, the continuation rate will be calculated based on both user-specified rates. The sum of the historical or user-specified separation and switch-out rates in

any given YORE must be less than or equal to one. If only a continuation rate is specified, the model will use the specified continuation rate and impute the separation and switch-out rates based on the historical ratio between the two. If the continuation rate is specified along with another, conflicting rate, the user-specified continuation rate will be used, and the two other rates will be imputed as noted above. Managers may choose to specify rates for all YORE or for selected YORE. If a manager does not enter a value for a particular YORE, the model will use historical data for that YORE.

Figure A.7a illustrates these parameters for the FERS population. Columns B, D, and F display the assumed baseline rates for continuation, separations, and switches out by YORE, respectively. Users can modify these rates in columns C, E, and G.

This section is conceptually identical for the CSRS population (Figure A.7b). Columns J, L, and N show the actual historical rates of continuations, separations, and switches out by YORE, respectively, for CSRS employees. Users can modify these rates in columns K, M, and O.

For employees covered by plans other than FERS or CSRS, switch-out, separation, and continuation rates are provided for the entire population and are not distributed by YORE. These rates are displayed in rows 228–230 (Figure A.7c). Assumed continuation, separation, and switch-out rates are based on historical averages and are displayed in column D; the user can modify these rates in column E. The same guidelines discussed above, governing how the model will incorporate user-specified rates, apply in this case.

Implications of Changes in Workforce Patterns and Trends

As described above, the projection model provides users with a way to think about how hiring or other policies could be adjusted to achieve workforce goals. To make such assessments, it may be useful for managers to consider the patterns observed in these rates and the trends or events they suggest. For example, gradual changes in gain or loss rates over extended periods of time may suggest a general shift toward some new state. Alternatively, significant political events or trends may cause large peaks or spikes in the size of the workforce, hiring rates, or separation rates. Different patterns may be observed for anticipated events (e.g., adoption of new hiring policies) than for unanticipated events (e.g., outbreak of war). Some trends or patterns, such as those due to broader economic conditions or the outbreak of war, may apply to all parts of the AW. However, there are also likely to be trends or patterns that are specific to a functional community, occupation, service, or another subset of the AW. As a result, it is critical for managers to understand the policy setting and labor market dynamics relevant to their areas so that they can track and interpret historical trends and consider how the projection models may need to be modified to suit the circumstances of their particular workforces.

Figure A.7a
 Switch-Out, Separation, and Continuation Rates, by Years Relative to Retirement Eligibility and Federal Employees Retirement System

	A	B	C	D	E	F	G
163	FERS LOSS RATES BY YEAR OF RETIREMENT ELIGIBILITY (Model 1 & Model 2)						
166		CONTINUATION		SEPARATION		SWITCH-OUT	
167	YORE	Actual/Assumed in Models 1&2	User Input	Actual/Assumed in Models 1&2	User Input	Actual/Assumed in Models 1&2	User Input
168	-36	0.737		0.263		0.000	
169	-35	0.901		0.079		0.021	
170	-34	0.948		0.051		0.002	
171	-33	0.935		0.057		0.008	
172	-32	0.938		0.052		0.010	
173	-31	0.929		0.058		0.013	
174	-30	0.935		0.051		0.014	
175	-29	0.940		0.049		0.011	
176	-28	0.936		0.048		0.016	
177	-27	0.936		0.045		0.019	
178	-26	0.943		0.040		0.017	
179	-25	0.943		0.039		0.018	
180	-24	0.946		0.036		0.018	
181	-23	0.946		0.034		0.019	
182	-22	0.951		0.032		0.018	
183	-21	0.951		0.028		0.021	
184	-20	0.954		0.029		0.017	
185	-19	0.953		0.029		0.018	
186	-18	0.949		0.031		0.020	
187	-17	0.954		0.027		0.019	
188	-16	0.953		0.027		0.020	
189	-15	0.952		0.028		0.019	
190	-14	0.957		0.026		0.017	
191	-13	0.957		0.023		0.020	
192	-12	0.963		0.021		0.016	
193	-11	0.959		0.023		0.018	
194	-10	0.961		0.021		0.019	
195	-9	0.967		0.018		0.016	
196	-8	0.965		0.020		0.015	
197	-7	0.966		0.020		0.014	
198	-6	0.965		0.021		0.014	
199	-5	0.966		0.021		0.013	
200	-4	0.965		0.022		0.012	
201	-3	0.966		0.022		0.012	
202	-2	0.963		0.024		0.012	
203	-1	0.964		0.024		0.011	
204	0	0.859		0.130		0.011	
205	1	0.884		0.106		0.010	
206	2	0.868		0.121		0.011	
207	3	0.847		0.141		0.012	
208	4	0.826		0.167		0.007	
209	5	0.813		0.179		0.007	
210	6	0.760		0.232		0.007	
211	7	0.764		0.226		0.010	
212	8	0.787		0.205		0.007	
213	9	0.729		0.266		0.005	
214	10	0.760		0.234		0.006	
215	11	0.760		0.234		0.006	
216	12	0.760		0.234		0.006	
217	13	0.760		0.234		0.006	
218	14	0.760		0.234		0.006	
219	15-24	0.760		0.234		0.006	

Figure A.7b
Switch-Out, Separation, and Continuation Rates, by Years Relative to Retirement Eligibility and Civil Service Retirement System

	I	J	K	L	M	N	O
163	CSRS LOSS RATES BY YEAR OF RETIREMENT ELIGIBILITY (Model 1 & Model 2)						
166		CONTINUATION		SEPARATION		SWITCH-OUT	
167	YORE	Actual/Assumed in Models 1&2	User Input	Actual/Assumed in Models 1&2	User Input	Actual/Assumed in Models 1&2	User Input
168	-16	1.000		0.000		0.000	
169	-15	1.000		0.000		0.000	
170	-14	1.000		0.000		0.000	
171	-13	1.000		0.000		0.000	
172	-12	1.000		0.000		0.000	
173	-11	1.000		0.000		0.000	
174	-10	1.000		0.000		0.000	
175	-9	0.980		0.000		0.020	
176	-8	0.947		0.011		0.042	
177	-7	0.970		0.020		0.010	
178	-6	0.970		0.012		0.017	
179	-5	0.974		0.014		0.012	
180	-4	0.970		0.018		0.012	
181	-3	0.974		0.018		0.008	
182	-2	0.971		0.021		0.008	
183	-1	0.976		0.018		0.007	
184	0	0.759		0.234		0.008	
185	1	0.817		0.178		0.005	
186	2	0.831		0.163		0.006	
187	3	0.830		0.163		0.006	
188	4	0.809		0.184		0.007	
189	5	0.778		0.217		0.005	
190	6	0.771		0.219		0.009	
191	7	0.762		0.233		0.006	
192	8	0.751		0.243		0.006	
193	9	0.738		0.257		0.005	
194	10	0.732		0.263		0.005	
195	11	0.730		0.267		0.003	
196	12	0.713		0.284		0.003	
197	13	0.747		0.251		0.002	
198	14	0.759		0.238		0.003	
199	15	0.769		0.231		0.000	
200	16	0.742		0.258		0.000	
201	17	0.759		0.241		0.000	
202	18	0.723		0.266		0.011	
203	19	0.819		0.181		0.000	
204	20-28	0.767		0.233		0.000	

Figure A.7c
Switch-Out, Separation, and Continuation Rates, Other Retirement Plans

	A	B	C	D	E
221	KEY DATA AND MODEL ASSUMPTIONS: Other Retirement Plans				
222	Number of Workers in 'Other' Retirement Category				
223	FY2017Q4	382			
224					
225	Rate			Actual/ Historical	User Input
226	New Hire Rate (Other)			0.1954	
227	Switch-In Rate (Other)			0.0000	
228	Continuation Rate (Other)			0.6706	
229	Separation Rate (Other)			0.2743	
230	Switch-OUT Rate (Other)			0.0551	

Summary Information on Acquisition Workforce Gains and Losses

On a quarterly basis, RAND generates updated summary information on AW gains and losses, for the AW as a whole and for subpopulations of the AW. We tabulate both year-over-year changes through the most recent quarter (e.g., from Q4 2016 to Q4 2017) as well as quarter-over-quarter changes (e.g., from Q3 2017 to Q4 2017). We transfer this information to DoD in a series of Excel workbooks, for the civilian AW overall, for individual AW career fields, for services and agencies, and for career fields within services and agencies. We also provide summary workbooks that allow the data to be viewed and manipulated in pivot tables.

Table B.1 presents summary information for the civilian AW overall and for select AW career fields, showing year-over-year data through Q4 2017. Information on other career fields is available from the authors upon request. The table provides information on the total population, the number of gains and losses experienced over the fiscal year by type, and some summary ratios that should be of interest to managers. These ratios include the proportion of workforce gains that are new hires (rather than switches in), the proportion of workforce losses that are exits from DoD (rather than switches out), new hires as a proportion of the previous year baseline workforce (hiring rate), and exits from DoD as a proportion of the previous year baseline (exit rate). Military AW data are tabulated separately and are in Table B.3.

Table B.1
Summary Information on Civilian Acquisition Workforce Gains and Losses, by Career Field

	Q4 2014	Q4 2015	Q4 2016	Q4 2017	% Change Q4 2016– Q4 2017
Civilian AW Overall					
Total	134,558	140,460	145,683	149,280	2.47
New Hires	49,17	8,921	9,569	7,643	-20.13
Substantive Switches In ("Internal Hires")	3,204	4,120	3,979	3,910	-1.73
Administrative Switches In ("Recode-Gains")	23,17	3,475	2,672	3,391	26.91
Exits from DoD	7,540	7,003	7,271	7,684	5.68
Substantive Switches Out ("Internal Losses")	1,893	2,154	2,288	2,030	-11.28
Administrative Switches Out ("Recode-Losses")	1,740	1,457	1,438	1,633	13.56
Total Switches In	5,521	7,595	6,651	7,301	9.77
Total Switches Out	3,633	3,611	3,726	3,663	-1.69

Table B.1—continued

	Q4 2014	Q4 2015	Q4 2016	Q4 2017	% Change Q4 2016– Q4 2017
Proportion of Gains That Are New Hires	0.47	0.54	0.59	0.51	-13.31
Proportion of Losses That Are Exits from DoD	0.67	0.66	0.66	0.68	2.42
New Hires as a Proportion of Previous Year Baseline	0.04	0.07	0.07	0.05	-22.99
Exits from DoD as a Proportion of Previous Year Baseline	0.06	0.05	0.05	0.05	1.89
Engineering					
Total	37,483	39,374	40,852	41,541	1.69
New Hires	1,430	2,908	2,835	2,319	-18.20
Substantive Switches In ("Internal Hires")	692	784	845	821	-2.84
Administrative Switches In ("Recode-Gains")	519	738	663	643	-3.02
Exits from DoD	1,682	1,421	1,613	1,887	16.99
Substantive Switches Out ("Internal Losses")	606	617	688	625	-9.16
Administrative Switches Out ("Recode-Losses")	563	501	564	582	3.19
Total Switches In	1,211	1,522	1,508	1,464	-2.92
Total Switches Out	1,169	1,118	1,252	1,207	-3.59
Proportion of Gains That Are New Hires	0.54	0.66	0.65	0.61	-6.09
Proportion of Losses That Are Exits from DoD	0.59	0.56	0.56	0.61	8.33
New Hires as a Proportion of Previous Year Baseline	0.04	0.08	0.07	0.06	-21.16
Exits from DoD as a Proportion of Previous Year Baseline	0.04	0.04	0.04	0.05	12.75
Program Management					
Total	11,378	12,053	12,364	12,426	0.50
New Hires	300	681	595	477	-19.83
Substantive Switches In ("Internal Hires")	641	874	731	659	-9.85
Administrative Switches In ("Recode-Gains")	406	375	366	456	24.59
Exits from DoD	612	545	634	713	12.46
Substantive Switches Out ("Internal Losses")	394	454	439	408	-7.06
Administrative Switches Out ("Recode-Losses")	310	256	308	409	32.79
Total Switches In	1,047	1,249	1,097	1,115	1.64
Total Switches Out	704	710	747	817	9.37
Proportion of Gains That Are New Hires	0.22	0.35	0.35	0.3	-14.80
Proportion of Losses That Are Exits from DoD	0.47	0.43	0.46	0.47	1.51

Table B.1—continued

	Q4 2014	Q4 2015	Q4 2016	Q4 2017	% Change Q4 2016– Q4 2017
New Hires as a Proportion of Previous Year Baseline	0.03	0.06	0.05	0.04	-21.85
Exits from DoD as a Proportion of Previous Year Baseline	0.05	0.05	0.05	0.06	9.63
Contracting					
Total	24,802	25,152	25,851	26,139	1.11
New Hires	927	1,638	2,010	1,481	-26.32
Substantive Switches In (“Internal Hires”)	737	798	794	785	-1.13
Administrative Switches In (“Recode-Gains”)	143	197	194	181	-6.70
Exits from DoD	1,762	1,692	1,707	1,641	-3.87
Substantive Switches Out (“Internal Losses”)	357	414	417	356	-14.63
Administrative Switches Out (“Recode-Losses”)	230	177	175	162	-7.43
Total Switches In	880	995	988	966	-2.23
Total Switches Out	587	591	592	518	-12.50
Proportion of Gains That Are New Hires	0.51	0.62	0.67	0.61	-9.73
Proportion of Losses That Are Exits from DoD	0.75	0.74	0.74	0.76	2.37
New Hires as a Proportion of Previous Year Baseline	0.04	0.07	0.08	0.06	-28.31
Exits from DoD as a Proportion of Previous Year Baseline	0.07	0.07	0.07	0.06	-6.47
Auditing					
Total	4,560	4,279	3,986	4,112	3.16
New Hires	501	144	149	402	169.80
Substantive Switches In (“Internal Hires”)	0	0	0	0	0.00
Administrative Switches In (“Recode-Gains”)	1	2	2	3	50.00
Exits from DoD	274	323	308	223	-27.60
Substantive Switches Out (“Internal Losses”)	82	98	115	71	-38.26
Administrative Switches Out (“Recode-Losses”)	9	26	42	20	-52.38
Total Switches In	61	22	23	38	65.22
Total Switches Out	91	124	157	91	-42.04
Proportion of Gains That Are New Hires	0.89	0.87	0.87	0.91	5.47
Proportion of Losses That Are Exits from DoD	0.75	0.72	0.66	0.71	7.22
New Hires as a Proportion of Previous Year Baseline	0.11	0.03	0.03	0.1	189.63
Exits from DoD as a Proportion of Previous Year Baseline	0.06	0.07	0.07	0.06	-22.28

Table B.2 presents the same information provided in Table B.1, but with breakdowns for selected services and agencies. Data for other components are available upon request.

Table B.2
Summary Information on Civilian Acquisition Workforce Gains and Losses, by Service

	Q4 2014	Q4 2015	Q4 2016	Q4 2017	% Change Q4 2016– Q4 2017
Civilian AW Overall					
Total	134,558	140,460	145,683	149,280	2.47
New Hires	4,917	8,921	9,569	7,643	-20.13
Substantive Switches In ("Internal Hires")	3,204	4,120	3,979	3,910	-1.73
Administrative Switches In ("Recode-Gains")	2,317	3,475	2,672	3,391	26.91
Exits from DoD	7,540	7,003	7,271	7,684	5.68
Substantive Switches Out ("Internal Losses")	1,893	2,154	2,288	2,030	-11.28
Administrative Switches Out ("Recode-Losses")	1,740	1,457	1,438	1,633	13.56
Total Switches In	5,521	7,595	6,651	7,301	9.77
Total Switches Out	3,633	3,611	3,726	3,663	-1.69
Proportion of Gains That Are New Hires	0.47	0.54	0.59	0.51	-13.31
Proportion of Losses That Are Exits from DoD	0.67	0.66	0.66	0.68	2.42
New Hires as a Proportion of Previous Year Baseline	0.04	0.07	0.07	0.05	-22.99
Exits from DoD as a Proportion of Previous Year Baseline	0.06	0.05	0.05	0.05	1.89
Army					
Total	35,066	34,454	35,098	36,905	5.15
New Hires	340	1,105	1,497	1,412	-5.68
Substantive Switches In ("Internal Hires")	672	1,052	1,327	1,387	4.52
Administrative Switches In ("Recode-Gains")	412	505	794	1,856	133.75
Exits from DoD	2,243	1,882	1,793	1,824	1.73
Substantive Switches Out ("Internal Losses")	1,228	976	934	756	-19.06
Administrative Switches Out ("Recode-Losses")	803	416	247	268	8.50
Total Switches In	1,084	1,557	2,121	3,243	52.90
Total Switches Out	2,031	1,392	1,181	1,024	-13.29
Proportion of Gains That Are New Hires	0.24	0.42	0.41	0.3	-26.69
Proportion of Losses That Are Exits from DoD	0.52	0.57	0.6	0.64	6.23
New Hires as a Proportion of Previous Year Baseline	0.01	0.03	0.04	0.04	-7.41
Exits from DoD as a Proportion of Previous Year Baseline	0.06	0.05	0.05	0.05	-0.14

Table B.2—continued

	Q4 2014	Q4 2015	Q4 2016	Q4 2017	% Change Q4 2016– Q4 2017
Navy					
Total	47,178	51,034	53,381	54,347	1.81
New Hires	2,234	4,556	4,004	3,171	-20.80
Substantive Switches In (“Internal Hires”)	1,375	1,865	1,647	1,519	-7.77
Administrative Switches In (“Recode-Gains”)	379	1,160	868	539	-37.90
Exits from DoD	2,278	2,182	2,412	2,551	5.76
Substantive Switches Out (“Internal Losses”)	852	1,003	1,197	1,023	-14.54
Administrative Switches Out (“Recode-Losses”)	342	540	563	689	22.38
Total Switches In	1,754	3,025	2,515	2,058	-18.17
Total Switches Out	1,194	1,543	1,760	1,712	-2.73
Proportion of Gains That Are New Hires	0.56	0.6	0.61	0.61	-1.27
Proportion of Losses That Are Exits from DoD	0.66	0.59	0.58	0.6	3.51
New Hires as a Proportion of Previous Year Baseline	0.05	0.1	0.08	0.06	-24.29
Exits from DoD as a Proportion of Previous Year Baseline	0.05	0.05	0.05	0.05	1.11
Air Force					
Total	25,234	26,775	28,117	28,719	2.14
New Hires	1,044	1,956	2,193	1,649	-24.81
Substantive Switches In (“Internal Hires”)	919	1,103	965	928	-3.83
Administrative Switches In (“Recode-Gains”)	424	558	652	436	-33.13
Exits from DoD	1,264	1,229	1,355	1,530	12.92
Substantive Switches Out (“Internal Losses”)	473	549	808	553	-31.56
Administrative Switches Out (“Recode-Losses”)	412	298	305	328	7.54
Total Switches In	1,343	1,661	1,617	1,364	-15.65
Total Switches Out	885	847	1,113	881	-20.85
Proportion of Gains That Are New Hires	0.44	0.54	0.58	0.55	-4.92
Proportion of Losses That Are Exits from DoD	0.59	0.59	0.55	0.63	15.59
New Hires as a Proportion of Previous Year Baseline	0.04	0.08	0.08	0.06	-28.40
Exits from DoD as a Proportion of Previous Year Baseline	0.05	0.05	0.05	0.05	7.53
Marine Corps					
Total	2,039	2,013	1,996	1,943	-2.66
New Hires	42	95	110	80	-27.27

Table B.2—continued

	Q4 2014	Q4 2015	Q4 2016	Q4 2017	% Change Q4 2016– Q4 2017
Substantive Switches In (“Internal Hires”)	47	101	90	81	–10.00
Administrative Switches In (“Recode-Gains”)	37	43	31	14	–54.84
Exits from DoD	175	139	115	135	17.39
Substantive Switches Out (“Internal Losses”)	82	120	116	76	–34.48
Administrative Switches Out (“Recode-Losses”)	25	6	17	17	0.00
Total Switches In	84	144	121	95	–21.49
Total Switches Out	107	126	133	93	–30.08
Proportion of Gains That Are New Hires	0.33	0.4	0.48	0.46	–4.00
Proportion of Losses That Are Exits from DoD	0.62	0.52	0.46	0.59	27.69
New Hires as a Proportion of Previous Year Baseline	0.02	0.05	0.05	0.04	–26.65
Exits from DoD as a Proportion of Previous Year Baseline	0.08	0.07	0.06	0.07	18.39
DLA					
Total	5,752	7,208	7,819	8,397	7.39
New Hires	111	339	585	290	–50.43
Substantive Switches In (“Internal Hires”)	391	579	559	576	3.04
Administrative Switches In (“Recode-Gains”)	806	1,085	129	359	178.30
Exits from DoD	303	298	341	396	16.13
Substantive Switches Out (“Internal Losses”)	122	210	252	201	–20.24
Administrative Switches Out (“Recode-Losses”)	19	39	69	50	–27.54
Total Switches In	1,197	1,664	688	935	35.90
Total Switches Out	141	249	321	251	–21.81
Proportion of Gains That Are New Hires	0.08	0.17	0.46	0.24	–48.49
Proportion of Losses That Are Exits from DoD	0.68	0.54	0.52	0.61	18.82
New Hires as a Proportion of Previous Year Baseline	0.02	0.06	0.08	0.04	–54.30
Exits from DoD as a Proportion of Previous Year Baseline	0.06	0.05	0.05	0.05	7.05
DCMA					
Total	9,642	9,686	9,900	9,446	–04.59
New Hires	498	553	741	367	–50.47
Substantive Switches In (“Internal Hires”)	448	466	488	211	–56.76
Administrative Switches In (“Recode-Gains”)	17	41	41	17	–58.54
Exits from DoD	706	671	642	686	6.85

Table B.2—continued

	Q4 2014	Q4 2015	Q4 2016	Q4 2017	% Change Q4 2016– Q4 2017
Substantive Switches Out (“Internal Losses”)	170	305	347	267	–23.06
Administrative Switches Out (“Recode-Losses”)	34	40	67	96	43.28
Total Switches In	465	507	529	228	–56.90
Total Switches Out	204	345	414	363	–12.32
Proportion of Gains That Are New Hires	0.52	0.52	0.58	0.62	5.72
Proportion of Losses That Are Exits from DoD	0.78	0.66	0.61	0.65	7.57
New Hires as a Proportion of Previous Year Baseline	0.05	0.06	0.08	0.04	–51.54
Exits from DoD as a Proportion of Previous Year Baseline	0.07	0.07	0.07	0.07	4.54
MDA					
Total	1,916	1,879	1,940	2,018	4.02
New Hires	49	53	115	131	13.91
Substantive Switches In (“Internal Hires”)	29	44	91	71	–21.98
Administrative Switches In (“Recode-Gains”)	5	9	7	4	–42.86
Exits from DoD	85	87	90	82	–8.89
Substantive Switches Out (“Internal Losses”)	30	45	47	33	–29.79
Administrative Switches Out (“Recode-Losses”)	8	11	15	13	–13.33
Total Switches In	34	53	98	75	–23.47
Total Switches Out	38	56	62	46	–25.81
Proportion of Gains That Are New Hires	0.59	0.5	0.54	0.64	17.78
Proportion of Losses That Are Exits from DoD	0.69	0.61	0.59	0.64	8.19
New Hires as a Proportion of Previous Year Baseline	0.03	0.03	0.06	0.07	10.33
Exits from DoD as a Proportion of Previous Year Baseline	0.04	0.05	0.05	0.04	–11.75

Table B.3 presents summary information for the active duty military members of the AW. As with the civilian AW, we present information on entrants and exits as a share of the previous year’s workforce, on the share of new entrants that are new hires from outside the DoD military workforce, and on the share of losses that are exits from the DoD military workforce. Please note that we consider the military workforce separately from the DoD civilian workforce, meaning that movement from a military AW position to a civilian AW position would be considered an “exit from DoD” in the military data and a “new hire” in the civilian data. In addition, we do not distinguish between substantive and administrative switches in and out for the military AW. We also generate data tables by service branch, by career field, and by career field within each service branch. These more granular data tables are available from the authors upon request.

Table B.3
Summary Information on Military Acquisition Workforce Gains and Losses

	Q4 2014	Q4 2015	Q4 2016	Q4 2017	% Change Q4 2016– Q4 2017
Total	15,453	15,120	15,260	15,240	-0.13
New Hires	397	344	276	417	51.09
Switches In	3,023	2,790	3,088	2,919	-5.47
Exits from DoD	1,322	1,629	1,669	1,411	-15.46
Switches Out	1,916	1,798	1,813	1,910	5.35
Proportion of Gains That Are New Hires	0.12	0.11	0.08	0.13	52.36
Proportion of Losses That Are Exits from DoD	0.41	0.48	0.48	0.42	-11.36
New Hires as a Proportion of Previous Year Baseline	0.03	0.02	0.02	0.03	49.70
Exits from DoD as a Proportion of Previous Year Baseline	0.08	0.11	0.11	0.09	-16.23

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