

**DEPARTMENT OF DEFENSE AUTHORIZATION FOR  
APPROPRIATIONS FOR FISCAL YEAR 2017 AND  
THE FUTURE YEARS DEFENSE PROGRAM**

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**HEARINGS**

BEFORE THE

**COMMITTEE ON ARMED SERVICES**

**UNITED STATES SENATE**

ONE HUNDRED FOURTEENTH CONGRESS

SECOND SESSION

ON

**S. 2943**

TO AUTHORIZE APPROPRIATIONS FOR FISCAL YEAR 2017 FOR MILITARY  
ACTIVITIES OF THE DEPARTMENT OF DEFENSE, FOR MILITARY CON-  
STRUCTION, AND FOR DEFENSE ACTIVITIES OF THE DEPARTMENT OF  
ENERGY, TO PRESCRIBE MILITARY PERSONNEL STRENGTHS FOR  
SUCH FISCAL YEAR, AND FOR OTHER PURPOSES

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**PART 4  
AIRLAND**

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MARCH 8, 16; APRIL 5, 2016



**DEPARTMENT OF DEFENSE AUTHORIZATION FOR APPROPRIATIONS FOR FISCAL YEAR 2017 AND THE FUTURE YEARS DEFENSE PROGRAM—Part 4 AIRLAND**

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**DEPARTMENT OF DEFENSE AUTHORIZATION  
FOR APPROPRIATIONS FOR FISCAL YEAR  
2017 AND THE FUTURE YEARS DEFENSE  
PROGRAM**

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**TUESDAY, MARCH 8, 2016**

U.S. SENATE,  
SUBCOMMITTEE ON AIRLAND,  
COMMITTEE ON ARMED SERVICES,  
*Washington, DC.*

**AIR FORCE MODERNIZATION**

The subcommittee met, pursuant to notice, at 2:31 p.m. in Room SR-222, Russell Senate Office Building, Senator Tom Cotton (chairman of the subcommittee) presiding.

Subcommittee members present: Senators Cotton, McCain, Inhofe, Wicker, Rounds, Ernst, Lee, Manchin, Blumenthal, and Donnelly.

**OPENING STATEMENT OF SENATOR TOM COTTON**

Senator COTTON. This hearing will come to order.

The Airland Subcommittee meets today to consider Air Force modernization in the context of review and oversight of the fiscal year 2017 defense budget request.

I welcome our witnesses, Acting Assistant Secretary of the Air Force for Acquisition, Ms. Darlene Costello; the Military Assistant to the Secretary of the Air Force for Acquisition, Lieutenant General Arnold Bunch; Deputy Chief of Staff for Strategic Plans and Requirements, Lieutenant General James Holmes; and Deputy Chief of Staff for Operations, Lieutenant General John Raymond. Thank you all for your service and we appreciate your testimony here today.

At \$18 billion less than last year, the President's defense budget request for this fiscal year is disappointing. The President has submitted five budgets since 2011. Each budget has under-resourced the military, while the President has also portrayed the world as safer than it was when he took office or asserted that the U.S. needed to step back from the world stage. The current budget request has rhetorically acknowledged an increase of worldwide threats and that our military's capabilities are eroding. However, it still conforms to arbitrary budget caps put in place five years ago.

This is nowhere more apparent than in the Air Force modernization program. Atop the service's priorities are the F-35A next gen-

eration fighter aircraft, the KC-46A air refueling tanker aircraft, a replacement for the legacy KC-135, and the B-21 long-range strike bomber. While all three are needed, the focus on these three priorities could put at risk modernization in future years and gives our priorities the appearance of being somewhat unfocused.

For example, they are the highest priority. The President's budget cuts procurement of five F-35A fighters. Further, it cuts modernization of F-15 fighter aircraft and reduces procurement of C-130J aircraft by \$724 million.

Unfortunately, unlike the other services, the Air Force did not grow much during the post-9/11 buildup. Rather, it got smaller as older aircraft were retired and replacement programs, such as the F-35, experienced excessive delays in bringing new aircraft into the fleet. For example, air superiority is overwhelmingly being supported by the F-15, which makes up 71 percent of air superiority platforms but has consumed over 90 percent of its estimated 30-year service life. The eventual retirement of 438 F-15's in the fleet and the replacement by only 177 F-22's, with eventual support from the F-35, is a serious gamble.

We cannot afford to assume that the enemy will resemble threats of recent wars, nor can we assume that future fights will not require greater numbers of advanced aircraft. We have to be ready to fight tonight on any battlefield and with any foe. The current investment strategy is too risky and will prove only to be riskier in the near future.

To that end, in January of this year, the Center for Strategic and International Studies released a report detailing the impending modernization bow wave for the DOD [Department of Defense]. When you also include all the other Air Force modernization imperatives, the annual price tag for this wave peaks in 2023 at nearly \$35 billion and accounts for more than half of the entire DOD's investment wave.

Yet, modernization, particularly capability and capacity, cannot be placed at odds with readiness or other needs. Simply reducing quantities of other aircraft, retiring legacy systems, or deferring modernization on other programs will not achieve the Air Force the Nation needs for the next fight. Increasing the top line of defense spending is the only solution that will ultimately blunt the bow wave and achieve the concurrent capability and capacity we need.

After that, we should next consider fencing off funding for platforms and systems crucial to the Nation's nuclear deterrent and maintaining the nuclear triad. Second, we should continue investment and procurement of next generation technologies to build capability while also maintaining and upgrading the legacy fleets to preserve capacity. Both are essential to preserving America's global dominance of the skies.

Again, I want to thank our witnesses. We look forward to your testimony.

Senator Manchin?

**STATEMENT OF SENATOR JOE MANCHIN III**

Senator MANCHIN. Thank you, Mr. Chairman.

Mr. Chairman, I want to extend the welcome and thank each of our witnesses for appearing before this subcommittee today.

I also want to thank each of you representing the men and women of the armed forces for the wonderful jobs they are performing in Afghanistan and all around the world. We keep all of those who are serving right now in our thoughts and prayers and also remember that both they and their families are serving and sacrificing every day.

Our witnesses this afternoon face huge challenges as they strive to balance the need to support ongoing operations and sustain readiness with the need to modernize and keep the technological edge so critical to military success.

These challenges have been made particularly difficult by the spending caps imposed in the Budget Control Act, caps that were relieved somewhat for fiscal year 2016 and 2017 in the Bipartisan Budget Act of 2015 that we enacted late last year.

However, these caps are scheduled to resume again in fiscal year 2018 and beyond. Unless modified for years after fiscal year 2018, they will threaten our long-term national security interests.

Every year we are challenged to make decisions balancing a number of competing demands for resources, including resources for current operations and investment in future modernization. In this case, we will be assessing plans and programs regarding the current status and future prospects for tactical aviation programs. Again, this year, the Air Force is proposing further reductions in the future years defense program, including eliminating the entire A-10 aircraft fleet.

The Air Force awarded the long-range bomber, the LRS-B, contract last fall. The Air Force has named the bomber the B-21. The award just came through the protest with the Government Accountability Office, GAO [Government Accountability Office], denying the protest. The Air Force awarded a contract that provides for a cost plus incentive fee structure for the engineering and manufacturing development phase of the program, with fixed price contracts for production. I know that Chairman McCain has taken exception to this contracting approach. I look forward to hearing from our witnesses about why they think the Air Force plan represents the best value for the taxpayer.

There are several other force structure adjustments that are of concern. The Air Force plans to eliminate six Compass Call EC-30H aircraft in fiscal year 2019. There are other reductions, including the AWACS [Airborne Warning and Control System] and JSTARS [Joint Surveillance Target Attack Radar System], that are planned for later in the future years defense program. While there is a plan to recapitalize the JSTARS with new aircraft and a radar program, I am concerned that the Air Force plans to retire aircraft like AWACS and Compass Call with no planned replacement in sight.

There are a number of other issues that we may discuss, but in the interest of time, I am going to stop here.

Again, I want to thank our witnesses. I look forward to hearing your testimonies.

I want to thank you again, Mr. Chairman, for this hearing. Senator COTTON. Thank you, Senator Manchin. Ms. Costello?

**STATEMENT OF DARLENE J. COSTELLO, ACTING ASSISTANT SECRETARY OF THE AIR FORCE FOR ACQUISITION; ACCOMPANIED BY: LIEUTENANT GENERAL ARNOLD W. BUNCH, JR., USAF, MILITARY DEPUTY, OFFICE OF THE ASSISTANT SECRETARY OF THE AIR FORCE FOR ACQUISITION; LIEUTENANT GENERAL JAMES M. HOLMES, USAF, DEPUTY CHIEF OF STAFF FOR STRATEGIC PLANS AND REQUIREMENTS; LIEUTENANT GENERAL JOHN W. RAYMOND, USAF, DEPUTY CHIEF OF STAFF FOR OPERATIONS**

Ms. COSTELLO. Chairman Cotton, Ranking Member Manchin, members of the committee, thank you for your continued support of the U.S. Air Force, our airmen, and their families. We welcome today's opportunity to discuss the Air Force's current and projected operations around the world, our plans for the modernization of key Air Force weapon systems, and to allay our concerns regarding the programmatic impacts that budget uncertainty brings. It is a privilege to be here, and we look forward to answering your questions.

For the past 25 years, the U.S. Air Force has been the most globally engaged Air Force on the planet. Within the past year, our 24,000 deployed airmen have flown missions over the Korean peninsula with F-22's and B-52's to dissuade the North Korean regime and demonstrate our resolve to our South Korean allies.

Our bombers are patrolling the South China Sea to validate the right for all nations to maintain freedom of navigation in internationally recognized waters.

Remotely piloted aircraft, combat search and rescue, and mobility assets are operating throughout Africa combating transregional violent extremist organizations.

We have invested in building partner capacity with our friends and allies in South America, as well as conducting counternarcotics operations.

Of course, we continue our commitment to Europe through our strategic partnerships and deployment of theater security packages.

We continue prosecuting operations against the Islamic State in Iraq and Syria, and we provide training and operational support to the Afghan National Defense and Security Forces in Afghanistan.

The Air Force has done all this while committing over 200,000 airmen in place to defend the homeland, operate remotely piloted aircraft, control our nuclear space and cyber forces, and provide rapid global mobility.

However, during those 25 years of continuous combat operations, budget decisions have taken a toll on our ability to provide for the joint force in the future.

For example, the Air Force has simultaneously reduced total force military and civilian personnel over 30 percent, cut combat-coded fighter squadrons by 59 percent, and slashed annual procurement of fighter aircraft by 88 percent, all while standing up new

ISR [Intelligence Surveillance & Reconnaissance] and cyber missions.

When combined with the fiscal restraints levied by the Budget Control Act and our extended combat operations in a permissive air environment, our Air Force today stands at less than 50 percent ready for full spectrum conflict and operates the oldest fleet of aircraft in its history at an average age of 27 years.

Additionally, during that same quarter century, our adversaries have shrunk the technological gap. They have deployed new air, space, cyber, surface-to-air, and surface-to-surface capabilities aimed at neutralizing the American air, space, and maritime advantages that underwrite the joint force. Iran and North Korea have acquired new capabilities that threaten our allies and the stability of the regions where they live. Islamic extremists have expanded conflict from the Middle East into Africa and created a heart-rending flow of refugees. In short, we face new capabilities and new threats that will require new ways of thinking and consistent investment to counter.

To frame the discussion of our fiscal year 2017 presidential budget, it is important to understand the environment in which our strategic decisions were made. The limited resources available since the Budget Control Act of 2011 have hampered our ability to balance readiness, capability, and capacity. The fiscal year 2017 presidential budget trades modernization, particularly the F-35 production rate and fourth generation fighter modifications, along with delayed recapitalization of the C-130H fleet, to sustain the capacity necessary to meet the combatant commanders' urgent needs for air, space, and cyber forces and begin recovering readiness levels after 25 years of continuous combat.

While we are grateful for the additional resources the Bipartisan Budget Act provides, compared to the Budget Control Act caps, we need your support in the form of stable and predictable budgets if we are going to build the Air Force that ensures the joint force can continue to deter, deny, and decisively defeat any enemy that threatens the United States or our national interests. Any return to sequestration-level funding will force us to chase short-term requirements at the expense of long-term strategic planning, modernization, and readiness, and our budget problems will only get worse between now and the end of this five-year plan.

On the acquisition front, first let me say that I am humbled by the selection to this position by the Air Force. I have watched the Air Force from my oversight roles with the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, and I have seen a transformation over the last few years. Through the development of Air Force acquisition priorities, the wholesale adoption of better buying power practices, and through their own bending-the-cost-curve initiatives, the Air Force has emerged as a disciplined, deliberate, value-focused enterprise that is stretching every dollar to obtain capability for our warfighters. I am proud to now lead this enterprise, if only temporarily, as we all look forward to the appointment of a permanent Assistant Secretary for Acquisition and Logistics as soon as possible.

Again, thank you for your service to the United States and for your continued support of our airmen, both military and civilian, serving our great Nation.

I would like to introduce the other witnesses you have invited today. It is a privilege to be sitting here next to my partner in acquisition, the Military Deputy, Lieutenant General Arnie Bunch, and two of my distinguished colleagues: Lieutenant General Mike Holmes, who leads the development and integration of the Air Force strategy, long-range plans, as well as operational capabilities-based requirements; and Lieutenant General Jay Raymond, who is responsible for Air Force operations to include air, space, cyber, irregular warfare, counterproliferation, homeland security, and weather.

You have assembled a broad group here, and we all look forward to your questions. Thank you.

[The prepared statement of Ms. Costello, General Holmes, General Raymond, and General Bunch follows:]

PREPARED COMBINED STATEMENTS BY MS. DARLENE J. COSTELLO, LT. GEN. JAMES M. "MIKE" HOLMES, LT. GEN. JOHN W. "JAY" RAYMOND, AND LT. GEN. ARNOLD W. BUNCH, JR.

#### I. INTRODUCTION

Chairman Cotton, Ranking Member Manchin and distinguished members of the Airland Subcommittee, thank you for the opportunity to provide an update on the United States Air Force's Force Structure and Modernization. Today's demand for Air Force capabilities continues to grow as airmen provide America with unmatched global vigilance, global reach and global power. Airmen are engaged defending United States interests around the globe, supporting combatant commander requirements in response to growing challenges from Russia, China, North Korea and Iran, all in addition to the ever present counter-terrorism mission in the Middle East and around the world. While our forces have been heavily engaged in deterring or addressing these operational challenges, our adversaries have taken the opportunity to invest in and advance their own capabilities. For the first time in decades, our adversaries are closing in on our capability advantage. Our efforts to address these increasing challenges have been stymied by reduced and unpredictable appropriations.

The limited resources available since the Budget Control Act of 2011 have hampered our ability to balance readiness, capability and capacity. The Fiscal Year 2017 Presidential Budget balances modernization requirements with the requirement to sustain the capacity necessary to meet the combatant commanders' urgent needs for air, space and cyber forces and begin recovering readiness levels after 25 years of continuous combat. We're grateful for the additional resources the Bipartisan Budget Act provides compared to Budget Control Act caps; however, even at these funding levels, we continue to face difficult choices between capacity, readiness and modernization. We need your support in the form of stable and predictable appropriations if we are going to build the Air Force that ensures the joint force can continue to deter, deny and decisively defeat any enemy that threatens the United States or our national interests. Any return to sequestration-level funding will force us to chase short term requirements at the expense of long term strategic planning, modernization and readiness.

#### II. OPERATIONS UPDATE

The Air Force flies and fights in air, space, and cyberspace—globally and reliably—as a valued member of our Joint and Coalition teams. Approximately 200,000 Total Force Airmen are "committed in place" supporting daily Combatant Command (COCOM) operations to defend the homeland, provide command and control of our nuclear forces, operate remotely piloted aircraft, provide rapid global mobility, and many other requirements. Approximately 24,000 airmen are deployed across the globe, including nearly 16,000 in the U.S. Central Command Area of Responsibility. The Air Force is an active partner in Department of Defense planning that will shift our emphasis from today's wars to a broader range of challenges and opportunities.

The Department of Defense is currently reassessing strategic guidance issued last year, but we anticipate continued emphasis on and planning for a rebalance to the Asia Pacific region. Our challenge is to provide those who deploy in support of our global commitments an Air Force that is capable, agile, flexible, ready, and technologically advanced.

During 2015, Air Force aircraft flew over 295,000 hours in support of Overseas Contingency Operations (OCO). On the home front, Air Force fighter, air refueling, and early warning aircraft have flown over 69,000 total sorties supporting Operation Noble Eagle since September 11, 2001. As a testament to the capability of our Total Force, the Air National Guard and Air Force Reserve have flown more than 70 percent of these sorties.

Today, the Air Force is actively engaged in two major efforts; conducting operations against the Islamic State (ISIL) in Iraq and Syria as part of Operation Inherent Resolve (OIR), and providing training and operational support to the Afghan National Defense & Security Forces (ANDSF) as part of Operation Freedom's Sentinel (OFS) and NATO-led Operation Resolute Support (ORS).

Our two main efforts in OFS are continuing counterterrorism (CT) operations against the remnants of al Qaeda, and training, advising and assisting (TAA) our Afghan partners. The CT and TAA efforts are concurrent and complementary. While United States and Afghan forces continue to attack the remnants of al Qaeda, we are also building the ANDSF structure so they can secure the Afghan people and contribute to stability throughout the region. Both of these efforts will contribute to a more secure and productive Afghanistan and prevent the re-emergence of terrorist safe havens. As an example, the U.S. Air Force helped develop the Afghan Special Mission Wing (SMW), which provides the Afghan Special Security Forces (ASSF) with the operational reach and manned Intelligence, Surveillance, Reconnaissance (ISR) capability required to support counterterrorism and counter narcotics missions. The SMW is now capable of executing long-range, full-mission profiles in low illumination. Working together with the ASSF, the commando units and SMW consistently conduct unilateral direct action missions against insurgent leaders and facilitators.

The NATO Resolute Support mission provides training, advice and assistance in eight key areas: multi-year budgeting; transparency, accountability and oversight; civilian governance of the Afghan Security Institutions; force generation; force sustainment; strategy and policy planning, resourcing and execution; intelligence; and strategic communications. In support of these essential functions, United States Air Force advisors work to develop the Afghan Air Force across their entire air enterprise—from fixed and rotary wing operations and maintenance, to engineering and logistics, and force development and budgeting. The Afghan Air Force operates the Mi-17 transport helicopter, Mi-35 attack helicopter, Cessna 208B basic trainer and light lift aircraft, MD-530 light attack helicopter, A-29 turbo prop light attack aircraft, and the C-130 medium lift Hercules. Recently the first four A-29 Super Tucano light air support fighters were delivered to Afghanistan. The aircraft are scheduled to go into action in early April when four more will be delivered. The Afghan Air Force has a total of 20 A-29 aircraft on order. Future Afghan pilots are currently in training at Moody Air Force Base. In the last year, the Afghan Air Force has taken over much of the mission, providing casualty evacuation and aerial attack in support of Afghan ground forces and providing the majority of helicopter and much of the fixed wing maintenance.

Our two main efforts in OIR are to systematically attack ISIL's critical capabilities and support indigenous forces on the ground as they take the fight to ISIL. United States Airpower has already achieved positive effects in Iraq and Syria. By virtue of the pressure we're putting on ISIL from the air, we've disrupted their communications, reduced their financial capacity and degraded their freedom of maneuver. They've dispersed, they're hiding among the population more, and they aren't as free to operate as they once were. In Iraq and northern Syria, airstrikes and resupply efforts have helped indigenous forces to retake and hold key territory, although the situation on the ground remains dynamic. Airstrikes have destroyed ISIL command and control (ex: headquarters buildings), logistics (training camps & vehicle staging areas), and revenue sources (oil infrastructure & bulk cash storage), making it harder for ISIL to sustain itself as a fighting force.

The U.S. Air Force takes great care in everything from our intelligence collection and analysis to our choice of weapons used for targeting to minimize the chance of harming civilians. No other military in the world takes the responsibility to protect civilians more seriously than we do. In addition, the United States Air Force has alleviated civilian suffering in Iraq through delivery of meals, water, and other vital supplies via airdrops and, more importantly, by providing advice and training that

have enabled the Iraqi air force to continue independent humanitarian relief and operational resupply efforts.

Despite differences, the United States and our International Coalition partners are united over the long term against the common threat posed by ISIL. More than a dozen coalition nations are supporting air operations against ISIL, where they are responsible for more than 20 percent of all sorties and more than 15 percent of all strikes. As of February 23rd, the United States and coalition partners have conducted a total of 10,545 strikes (7,061 Iraq / 3,484 Syria). The United States has conducted 8,076 strikes in Iraq and Syria (4,809 Iraq / 3,267 Syria) and the rest of the Coalition has conducted 2,469 strikes in Iraq and Syria (2,252 Iraq / 217 Syria). As of February 22nd, United States and partner nation aircraft have flown an estimated 69,877 sorties in support of operations in Iraq and Syria. More than 60 nations have expressed willingness to participate in the effort against ISIL, and more than 30 nations have indicated their readiness to offer military support. All 22 nations of the Arab League have adopted a resolution calling for comprehensive measures to combat ISIL.

The ISIL contagion is a transregional threat that extends outside of Iraq and Syria and across COCOM borders. As demonstrated by the deliberate airstrikes against Islamic State in Libya, the flexibility, precision and lethality of United States Air Force airpower continues to provide effective options against transregional threats. Despite these successes in CENTCOM and AFRICOM, we recognize there are limits to what U.S. Airpower can accomplish. Airstrikes alone will not achieve our full military objectives. The forces that matter most are indigenous ground forces. This is going to be a long, difficult struggle that requires strategic patience.

### III. FORCE STRUCTURE AND MODERNIZATION

#### *Fighters*

Four years ago, based on the 2012 DSG and severe fiscal constraints, the Air Force rebalanced our fighter force structure using analysis which showed the Air Force could decrease fighter force structure by approximately 100 aircraft if it were willing to accept higher risk. This resulted in the current fighter inventory of approximately 1,100 primary mission aircraft and slightly more than 1,950 total aircraft. This inventory complies with fiscal year 2016 NDAA language on the limitation on retirement of Air Force Fighter Aircraft.

The Air Force needs an affordable force structure that meets the needs of today's counter terrorism fight while still advancing our capabilities to fight the most advanced threats in the future. The Air Force is committed to balancing the costs of maintaining an adequate number of fighters that can operate across the spectrum of conflict to meet strategic guidance and will continue to pursue modernization efforts, recapitalization, and multi-domain capabilities that assure our freedom to operate in future threat environments.

The Air Force's fighter fleet is approaching 30 years old on average—the oldest in our history. Without recapitalization and selective capability upgrades, it will not be possible to mitigate the growing risk. Gaining and maintaining air and space superiority in increasingly contested environments will be our toughest mission. The Air Force is currently pursuing programs that will modernize and potentially extend the service life of our existing fleets. The F-35 acquisition program is key to our efforts to improve our capabilities relative to improving threats and maintain capacity as our legacy fleets become unsupportable. Any further delay in the F-35 program will create a serious shortfall (mid and far-term) in fighter capabilities and force structure. Maintaining the 1900 TAI fighter force mandated in the 16 NDAA will require selected fourth generation sustainment and modernization efforts, F-22 modernization, and F-35 Full Rate Production (FRP). Fighter combat is a technologically driven that requires constant effort—agility is key. We have to reduce technology risks and field advanced capabilities in time to meet the operational needs over the long term. Following the top-down, multi-domain Air Superiority 2030+ Flight Plan being produced by the Air Superiority 2030 Enterprise Capability Collaboration Team (ECCT), the Next Generation Air Dominance concept development and technology assessments will identify concepts and technologies that improve persistence, survivability, lethality, connectivity, interoperability and affordability. This effort will prove critical to the joint force's ability to engage in the most highly contested environments around the globe.

Air Force mission success also depends on efficient management of our rated force, the most challenging of which is fighter force structure manning. The Air Force is currently 511 fighter pilots short of the total manning requirement and our projections indicate this deficit will continue to grow to approximately 834 by 2022.

The shortfall is the result of force structure reductions of Active Duty fighter and fighter training squadrons. The remaining Active component fighter squadrons do not produce enough experienced fighter pilots to meet all of the staff, test, and training requirement. The Air Force prioritized overall available rated manpower to fill our operational cockpits, at significant risk to institutional requirements. Projected impacts include reductions in air-operations expertise during the development of war plans and a gradual erosion of fighter pilot experience in test and training. Recent programming and policy actions raised production and absorption capacities, and the Air Force has developed plans for future actions to address the shortfall, but current fiscal constraints place the implementation of these actions at risk. In addition, the Air Force created the non-rated 13L Air Liaison Officer (ALO) career field to reduce fighter pilot requirements in the ALO function. However, even with these changes, the Air Force is only able to slow the decline in fighter pilot inventory and will be incapable of meeting our overall requirement for fighter pilot expertise for the foreseeable future. Without these fighter pilots, the Air Force will be very challenged to continue to provide the air supremacy upon which all our other forces depend.

#### *A-10*

The fiscal year 2017 budget includes an Air Force decision to re-phase A-10 retirement (fiscal year 2018–fiscal year 2022) to sustain capacity for the current fight against ISIL while balancing long term capability requirements. This re-phase will cost \$3.4 billion over the FYDP. The fiscal year 2017 budget fully funds the A-10 through the planned retirements, to include training, flying hours, depot maintenance, and required modernization efforts. The A-10 continues to be a steady, cost effective performer in today's permissive environment; however, it cannot survive or operate effectively in a highly contested environment dominated by more advanced aircraft or air defenses.

The Air Force is funding a Combat Air Force Study over the next year, with a portion of this study dedicated to informing the fiscal year 2018–22 budget cycle on possible Tactical Air Support (TACAIR) Platform Alternatives for Low-intensity/Permissive Conflict. This will serve to ensure that other current platforms and future systems meet future close air support requirements. As part of this study, the Air Force will assist OSD Cost Assessment and Program Evaluation (CAPE) and USD for Acquisition, Technology, and Logistics (AT&L) as they lead a joint/inter-service team to assess needed capabilities for prolonged operations (greater than one year) in permissive environments, such as counterinsurgency, counterterrorism, stability operations, homeland defense, and peacekeeping operations. The analysis will address readiness costs, operating environment, basing, weapons carriage, time-on-station, ISR capability, survivability, and communications capability.

#### *F-16*

The multi-role F-16 comprises 50 percent of our fighter fleet. The fiscal year 2017 budget request invests \$2.03 billion across the FYDP for F-16 modernization and service life extension to meet critical warfighter needs to 2030 and beyond. The majority of efforts in the FYDP focus on Legacy Service Life Extension Program (SLEP), Operational Flight Program (OFP) enhancement, upgrades to the Modular Mission Computer (MMC) and Programmable Display Generator (PDG), upgrades to the Multifunctional Information Distribution System (MIDS), and a radar upgrade to meet a USNORTHCOM Homeland Defense Joint Urgent Operational Need (JUON).

Fatigue testing completed in 2015 shows that Legacy SLEP will extend the airframe structural service life for up to 300 aircraft by approximately 50 percent from the current 8,000 hours to 12,000+ hours, adding about fifteen to twenty years of service life. The fiscal year 2017 budget request begins initial procurement funding for Legacy SLEP needed for the Block 40–52 fleet to remain responsive to the Air Force's total fighter requirement. The fiscal year 2017 budget request for OFP enhancement will continue the integration of new weapons, avionics, improved targeting pods, and airspace compliance systems. The MMC and PDG upgrade will resolve processor, memory, and bandwidth issues that will allow capability growth through future OFP development. The MIDS upgrades will improve operational Link 16 reliability while also incorporating frequency remapping, crypto upgrades and growth capability. The USNORTHCOM Homeland Defense Active Electronically Scanned Array (AESA) radar JUON provides an upgrade from the current APG-68 radar to a radar that offers advanced capabilities as well as improved reliability and maintainability to support the Aerospace Control Alert (ACA) mission.

*F-15*

The fiscal year 2017 budget request invests approximately \$6.5 billion across the FYDP on modernization and sustainment programs for the F-15 fleet. On-going structural tests indicate the C and D models airframes will reach their service life starting in the mid-2020s, and will likely require an airframe service life extension to operate beyond that timeframe. The FY17PB includes initial funding in fiscal year 2020/2021 for C/D airframe upgrades, but the final results of the structural testing and costs associated with a service life extension program must be weighed against the opportunity costs of investing in a 30 year old airframe. The Air Force expects the F-15E to be an integral part of the Nation's force through at least 2040. A full-scale fatigue test, due to be complete in 2018 will provide data regarding the feasibility of a service life extension for the F-15E. Currently, the Air Force manages the fleet through scheduled field and depot inspections under an individual aircraft tracking program.

In the meantime, we are continuing to modernize all F-15 models with state-of-the-art AESA radar systems with advanced capabilities to identify and engage targets. We will equip the F-15Cs with an infrared frequency targeting sensor that will vastly improve its targeting capabilities. The FY17PB also provides for upgrading F-15 C and E models with a more capable aircraft mission computer, a more robust and powerful data link, and a new electronic warfare self-protection suite, the Eagle Passive/Active Warning Survivability System (EPAWSS). This EW system will be absolutely crucial to ensuring the F-15C's and E's are able to operate well into the future, especially in contested environments. Lastly, the FY17PB request includes funding for the F-15E to integrate the latest precision weapons to accurately hit targets with reduced collateral damage, and adds a more robust and powerful data link to ensure the aircraft can accurately and securely be assigned targets when in support of ground units.

*Fifth Generation Fighters*

Fifth generation fighters like the F-22A and F-35 are vital elements of our nation's defense and deterrent capability. These advanced, state-of-the-art aircraft are absolutely essential in maintaining our current global air superiority that permits air, sea, and ground forces freedom of action. Each aircraft possess exclusive, complementary, and indispensable capabilities that provide synergistic effects across the spectrum of conflict. While our potential adversaries continue to modernize, our legacy fourth generation aircraft are rapidly approaching the end of their effective service lives and are limited in their ability to operate in a highly contested environment. Our Air Force must rapidly re-capitalize our fourth generation aircraft. At the same time, we must sustain and modernize our fifth generation fleet in order to maintain our ability to execute our National Defense Strategy in the near to mid-term while looking even further into the future at further modernization efforts that ensure continued dominance in the air.

*F-22*

The F-22 Raptor is the only operational U.S. fighter currently capable of operating in highly contested environments. F-22 attributes of stealth, super cruise, integrated avionics and sensors combine to deliver the Raptor's unique operational capability. F-22 modernization is required to counter advancing threats that specifically target F-22 capabilities. Focused on maintaining operational superiority against the evolving threat, the fiscal year 2017 budget request for F-22 modernization includes \$457.9 million in RDT&E in addition to \$354.3 million in procurement. Increment 3.1 fielding continues, delivering advanced air-ground capabilities including Synthetic Aperture Radar (SAR) ground mapping, threat geolocation, and Small Diameter Bomb (SDB) I carriage. Increment 3.1 is scheduled to complete in fiscal year 2018. Increment 3.2A is fielding concurrently with Increment 3.1, delivering critical electronic protection and combat identification upgrades. Increment 3.2 billion remains on track to field in 2018, and will deliver AIM-120 D and AIM-9 X missile capability and significantly-improved ground threat geolocation. The fiscal year 2017 budget also implements open mission systems—the essential, common enabler for three new programs that accelerate development, integration and fielding of 5th-5th / 5th-4th communications interoperability, helmet-mounted weapons cueing & GPS M-Code upgrades on the F-22.

*F-35*

During fiscal year 2017, the Air Force will continue to manage risk across the global precision attack portfolio by prioritizing investment in fifth-generation aircraft while sustaining legacy platforms as a bridge to the F-35 Joint Strike Fighter.

The aforementioned legacy fighter modifications are intended to keep a viable air superiority fleet in operation as the F-35 program works toward IOC in 2016.

The multi-role F-35A is the centerpiece of the Air Force's future fighter precision attack capability, and it is of vital importance to our nation's security, forming the backbone of U.S. air combat superiority for decades to come. In addition to complementing the F-22's world class air superiority capabilities, the F-35A is designed to penetrate air defenses and deliver a wide range of precision munitions. This modern, fifth-generation aircraft brings the added benefit of increased allied interoperability and cost-sharing across Services and eight partner nations. The fiscal year 2017 budget request includes \$5.85 billion for continued development and procurement of 43 F-35A, conventional take-off and landing (CTOL) aircraft.

The F-35 program reached several milestones in 2015. Luke Air Force Base, Arizona, began training F-35 student pilots on January 23, 2015. The 31st Test and Evaluation Squadron's F-35As, from Edwards Air Force Base, California, flew close air support during the Green Flag 15-08 exercise and in June, they worked with soldiers from the 1st Brigade Combat Team, Fort Bliss, Texas, to provide Close Air Support; one of the baseline missions for our IOC declaration. Also in June, two F-35As assigned to the 16th Weapons Squadron, Nellis Air Force Base, Nevada, were the first F-35s to participate in a capstone large-force employment exercise with the United States Air Force Weapons School. Finally, the first external weapons release tests, internal gun tests, and the first operational ordnance expenditures all occurred during 2015, showing clear progress towards operationalizing the F-35.

Today, the program is on the road to IOC for the Air Force, and we expect to declare IOC as planned in 2016. The 34th Fighter Squadron at Hill Air Force Base, Utah, the Air Force's IOC fighter squadron, took delivery of its first two F-35As on September 2, 2015, and it expects to have 12 aircraft by the end of May 2016. On September 23, 2015 the Integrated Test Force at Edwards Air Force Base, California, completed planned developmental test of the Block 3i mission software, which will be the baseline for the Air Force IOC declaration, and F-35A aircraft are in place at Nellis AFB to support tactics development for the warfighter. Going forward, we will continue to closely monitor progress toward IOC including implementation of any required post-DD-250 air system modifications, delivery of necessary Mission Data File loads, and the continued maturation of ALIS, a system that is critical to F-35 operations at home and abroad. The Air Force will also continue to watch Block 3F (full warfighting capability), which currently has 4-6 months of schedule risk. Production affordability remains a major priority, and the F-35 program continues to make great strides on this front. The price of F-35s continues to decline steadily lot after lot. For example, the price of a Lot 7 F-35A was 4.3 percent less than a Lot 6 F-35A aircraft and a Lot 8 F-35A aircraft was 3.6 percent less than a Lot 7 F-35A, including the engine and profit for both contractors. We expect this trend to continue over the next two lots.

#### *Air-to-Surface Weapons*

All three mission areas (Stand-Off, Direct Attack, and Penetrator munitions) in the Air-to-Surface munitions inventory are short of inventory objectives. SDB weapons along with low observable platforms are force multipliers in a highly contested environment and their shortage could increase friendly force attrition. The shortage of penetrator weapons will increase risk to our forces and decrease our ability to target adversary critical capabilities. Combat operations and support for our coalition partners in Iraq and Syria are reducing inventories of JDAM tail kits, Hellfire missiles, and SDB I weapons faster than we are procuring them. Future Hellfire shortfalls were mitigated by fiscal year 2015 reprogramming for \$400 million that increased production orders by 4,000 missiles. Those missiles will begin delivering in the fiscal year 2017 timeframe. In fiscal year 2015, the Air Force received approval to replace current operational forecasted expenditures of JDAM tail kits and SDB I weapons with Overseas Contingency Operations (OCO) funding. However it takes two to four years before procured assets make it back to the USAF inventory.

#### *Hellfire*

The Air Force continues to actively manage Hellfire inventories that have been depleted due to high expenditure rates in current operations against ISIL. Fiscal year 2015 reprogramming action sufficiently funded Hellfire inventories to begin inventory recovery in fiscal year 2017, allowing production orders in fiscal year 2016 and fiscal year 2017 to the maximum factory capacity.

#### *JDAM Tail Kits*

Due to current operations, the shortfall in JDAM tail kits will continue to increase. The root causes of the problem include extremely high expenditure rates—higher than previous contingencies—and a starting inventory below the desired ob-

jective. Additionally, historically low procurements over the past decade (7,758 average), driven by restricted budgets, led to diminished industrial capacity. The Air Force is mitigating the shortfall with three lines of effort: the rebalancing of stockpiles across combatant commands, the employment of alternative Precision Guided Munitions (PGMs) when possible, and increased production of tail kits. The Air Force is negotiating with Boeing to increase production capacity from 18,900 units per year to 36,500 by the fourth quarter of fiscal year 2017.

#### *SDB I and II*

Prior to current operations, the Air Force was already short of the SDB I inventory objective and had ceased procurements. Combat operation in Iraq and Syria have expended significant numbers of SDB I. In fiscal year 2017, the Air Force plans to procure 4,195 SDB I missiles with OCO funding.

The SDB II will fill a key capability gap by using a multi-mode seeker and dual band weapon data link to enable attacks against mobile targets at standoff ranges, through the weather, outside of point defenses. SDB II will be a force multiplier by increasing the number of target platforms that can be attacked per sortie while inherently limiting collateral damage. Providing a four-fold increase in load out with its carriage system will allow the limited number of survivable initial combat forces to achieve operational objectives early in conflicts, paving the way for follow-on forces. SDB II is an Acquisition Category (ACAT) 1D program with the Air Force as the lead service in partnership with the Navy. Initial aircraft integration of the SDB II will be on the F-15E (Air Force threshold), F-35B & C (Department of Navy threshold), and F/A-18E/F.

SDB II currently remains in Engineering, Manufacturing and Development and successfully received a favorable Milestone C decision in May 2015. Subsequently, the Air Force awarded the first Low Rate Initial Procurement (LRIP) contract to procure 144 weapons in June 2015. In fiscal year 2016, SDB II will continue developmental and live fire testing and conduct government confidence test shots. The fiscal year 2017 procurement plans are to buy 312 weapons with deliveries starting in fiscal year 2018. Currently, the Air Force's total planned procurement for SDB II is 12,000 weapons.

#### *JASSM and JASSM-ER*

JASSM (baseline) and JASSM-ER (Extended Range) are currently the nation's only stealthy, conventional, precision, launch-and-leave, standoff missiles capable of fighter and bomber aircraft employment. They are capable of penetrating next generation enemy air defenses to strike high value, hardened, fixed, or mobile targets. The JASSM (baseline) has a range greater than 200 nautical miles while the JASSM-ER has a range greater than 500 nautical miles.

The JASSM (baseline) weapon is in Full Rate Production (FRP); the 14th production contract was awarded to Lockheed Martin on December 1, 2015, for 100 missiles. About 1,520 missiles have been delivered. Of these about 1,227 are in the field and 278 at the Lockheed Martin production facility for repair, mostly for the surface wrinkling due to exposure to high humidity conditions. The repair is fully covered by warranty with no additional cost to the Air Force. A new coating (starting at lot 8) has corrected the surface wrinkling problem. Fiscal year 2016 procurement of 100 is the last JASSM (baseline) buy, for a total procurement of 2,034 missiles.

JASSM-ER started FRP in fiscal year 2015, after completing four LRIP lots. As part of the 14th production contract awarded to Lockheed Martin on December 1, 2015, a total of 140 missiles were awarded, along with an option for an additional 100 missiles anticipated to award in March 2016. Currently, 96 missiles have been delivered. In fiscal year 2017, the combined JASSM production line transitions to JASSM-ER only at the maximum and most efficient rate of 360 missiles per year. Currently, the last JASSM-ER procurement is planned for fiscal year 2023, for a total JASSM-ER buy of 2,866 missiles.

#### *Air-to-Air Weapons*

Air-to-Air missile inventories in their latest variants are also short of objectives. The AIM-120 Advanced Medium Range Air to Air Missile (AMRAAM) and the AIM-9X Block II are in limited supply, placing reliance on less capable variants to meet combat objectives. These weapons enable the joint force to achieve Air Superiority by providing a first look first kill capability. A shortage of Air-to-Air missiles will increase the number of days required to gain Air Superiority, and will decrease the amount of time the Joint Force can maintain Air Superiority, which may leave the combatant commander short of their campaign objectives. Adversary capabilities and capacity continue to challenge the Joint Force's historical advantage in the air superiority arena.

*AIM-120D AMRAAM*

The AIM-120 AMRAAM is the Department of Defense's premier beyond-visual-range missile, operating at high or low altitude with electronic attack capabilities to counter existing and emerging air vehicle threats. AMRAAM is a key enabler for gaining air superiority and air dominance providing F-15, F-16, F/A-18, F-22 and eventually F-35 aircraft the ability to achieve multiple kills per engagement. The latest evolution of AMRAAM is the AIM-120D, which brings increased range and kinematics, improved high off-boresight targeting, and an enhanced two-way data link for improved accuracy and lethality at range. AIM-120D is an ACAT 1C joint program, with the Air Force as lead service in partnership with the Navy.

The AIM-120D completed operational testing in July 2014. The Navy fielded the missile and declared IOC for the F/A-18E/F on 7 January 2015. The Air Force fielded the missile and declared IOC for the F-15, F-16, and F-22 on 9 Jul 2015. In fiscal year 2017, the Air Force plans to procure 256 AIM-120D's and the Navy plans to procure 163 AIM-120D's. The program will continue to update the AMRAAM technical data package to ensure a viable, producible design through the expected production life of the AMRAAM program, and to maintain a robust supplier base capable of sustaining production for the life of the program.

*Space*

We view our national security as inextricably dependent on space-enabled capabilities. At the same time, space has become contested, congested and competitive; our space capabilities today are facing advanced, demonstrated, and evolving threats, which require fundamental changes in the way we organize, train, and equip our forces. Congestion has increased the complexity of maintaining space situational awareness. There are over 60 active space-faring nations, nine of which have indigenous space launch capability. Almost any nation or state actor can access space services globally and globalization has made the latest technology available to our competitors and adversaries.

Legacy space acquisitions relied on packing as much capability as possible into a few systems creating critical vulnerabilities. Current budget realities drive us to rely on legacy systems, while warfighter demands have driven the need for more capable systems. We must provide space capabilities that assure performance of military space functions, regardless of the hostile action or adverse condition. We must invest smartly in the highest payoff capabilities that enhance space domain mission assurance to include resilience, defense operations, and reconstitution of our space systems and architectures to ensure United States and Allied use of space through all phases of conflict. We seek to balance military and commercial systems and leverage international partner capabilities to allow the U.S. to share the cost of space power; provide additional coverage in areas the U.S. requires assistance in, and create a coalition structure that can promote deterrence.

We recognize a conflict in space would hurt world economies and global stability; therefore, to address growing space threats, we are focused on sustaining our space capabilities, deterring threatening activity, and if necessary, pursuing means to mitigate counterspace threats.

*Cyber*

The Air Force continues to build its contribution to joint cyber mission forces by adding manpower for offensive and defensive cyber operations and equipping them with the right capabilities to ensure effective operations. We are building a standard cyber mission platform to simplify training and enable full-spectrum operations and continue to invest in converged cyber and electronic warfare capabilities. We are working with others across the Department of Defense to build a persistent training environment, consisting of jointly-interoperable ranges, dedicated operating forces, and supporting structures. We are enhancing our capacity to test our critical weapon, intelligence, and business systems for survivability in the increasingly hostile cyber environment.

Further, we are leading the effort, in partnership with the other Services and Department of Defense agencies, to build Joint Regional Security Stacks. When fielded, this defensive boundary will provide global insight into activity, enabling rapid, coordinated Joint defensive operations. The standardized approach will enable sharing of Tactics, Techniques, and Procedures (TTP) across the Department of Defense, so that detection of an attack on one Service, and the resultant mitigations, can be seamlessly applied across the entire Department of Defense. This reduces operational response times and mission impact. No individual service could have afforded this level of capability with its own resources; it is only by pooling funding across the entire department that we can obtain the level of capabilities we require

to counter the growing cyber threats. This new defensive boundary is the foundational step toward a trustworthy, efficient Joint Information Environment.

In short, we are on the path to put Cyber on par with Air and Space forces to achieve a multi-domain approach to mission accomplishment.

#### *Airborne Electronic Attack*

The Air Force is committed to providing airborne electronic attack capability in support of operations across all operational warfighting domains. The EC-130H COMPASS CALL is required in multiple war plans by multiple combatant commanders. House and Senate consensus language in the fiscal year 2016 National Defense Authorization Act stated that the divestiture, retirement or placing in storage any of the EC-130H COMPASS CALL aircraft would present unacceptable risk to ongoing and future combat operations. Thus, the Air Force has delayed the divestiture of six EC-130H COMPASS CALL aircraft until fiscal year 2019. The Air Force will continue to investigate alternatives for airborne electronic attack capabilities to replace and rebuild capacity of the existing EC-130H COMPASS CALL fleet as part of the Joint Airborne Electronic Attack Family of Systems concept.

#### *Rapid Global Mobility and Personnel Recovery*

The Rapid Global Mobility fleet continues to pursue capability enhancements balanced by recapitalization and required modifications to operate in international airspace and avoid diminishing manufacturing source issues. Comprised of 396 KC-135 Stratotankers and 59 KC-10 Extenders, our tanker fleet provides the backbone of rapid U.S. global operations. In addition to ongoing modernization efforts for our legacy tanker fleets, the FY17PB requests \$2.9 billion to procure 15 KC-46A Pegasus tankers. Stability of requirements and funding are the keys to KC-46 program success.

The Air Force is modernizing the C-130H fleet through a four-phased approach emphasizing aircraft safety, compliance, modernization, and recapitalization. First, we are ensuring that the C-130H is safe to operate by keeping the aircraft structurally sound through programs such as ongoing center wing replacements. Second, we will focus on meeting U.S. and foreign airspace compliance mandates through the C-130 Avionics Modernization Program (AMP) Increment 1. The FY17PB accelerates this program to deliver 172 airspace compliant aircraft by December 2019, before the FAA 2020 deadline. Third, C-130 AMP Increment 2 will improve the fleet's maintainability and reliability by providing a new avionics suite, enhanced communications, and electrical improvements. It also solves pending obsolescence and DMS issues. The FY17PB accelerates AMP Increment 2 to complete installations in 2028. Finally, the Air Force will continue to recapitalize the C-130H fleet through procurement of new C-130Js. We plan to field 134 total C-130J aircraft by fiscal year 2019.

The strategic airlift fleet of C-5s and C-17s is capable of supporting the million ton miles per day metric established in our most stressed response scenarios. The Air Force continues to modernize and enhance 52 legacy C-5 aircraft to a common configuration to ensure fleet viability to 2040. The C-17 fleet of 222 aircraft was completed in September 2013 and provides our nation unmatched flexibility to conduct direct delivery, airdrop, aeromedical, and special operations airlift missions.

The Air Force is the only Service with a dedicated force organized, trained, and equipped to execute theater-wide Personnel Recovery. The Combat Rescue Helicopter will replace 112 of our aging HH-60G aircraft specifically equipped to conduct Combat Search and Rescue across the entire spectrum of military operations. The program remains on schedule to meet initial operational capability in 2021 and full operational capability in 2029.

Despite supporting a wide range of missions for five major commands, the current UH-1N fleet does not meet speed, range, payload, or survivability requirements. The risk created for our nuclear support mission by these capability gaps makes replacing the UH-1N a critical priority and a vital element of our nuclear enterprise reform initiative. A decision on the way forward for procurement of the portion of the UH-1N fleet servicing the nuclear support mission is anticipated soon.

#### IV. CONCLUSION

The United States Air Force continues to be the world's finest Air Force across the spectrum of conflict, but our potential adversaries employ increasingly sophisticated, capable, and lethal systems. The Air Force must modernize to deter, deny, and decisively defeat any actor that threatens the homeland and our national interests. A return to sequestration-level funding would result in a less ready, less capable, less viable Air Force that is unable to fully execute the defense strategy or fully support the joint force. Furthermore, the Air Force faces a modernization

bow wave over the next 10 years that requires funding well beyond the BCA caps—this includes critical programs necessary to meet our capacity and capability requirements across all mission areas. Although we are grateful for the Bipartisan Budget Act relief, we still face great uncertainty for Fiscal Year 2018 and beyond. Without the funding requested in this budget, we cannot meet current demand for Air Force capability and capacity without sacrificing modernization.

Our sister services and allies expect the Air Force to provide critical warfighting and enabling capabilities. We remain focused on delivering Global Vigilance, Reach and Power, through our core missions of Air Superiority, Space Superiority, Global Strike, Rapid Global Mobility, Intelligence, Surveillance and Reconnaissance and Command and Control. We look forward to working closely with the committee to ensure the ability to deliver combat air power for America when and where we are needed.

Senator COTTON. General Bunch?

General BUNCH. Sir, we have given the one statement. She spoke for all of us. We now look forward to answering the committee's questions.

Senator COTTON. Outstanding. We will have to do that with members of the committee.

[Laughter.]

Senator COTTON. I would like to start, Ms. Costello, with the B-21 bomber. As you know, we have had a classified hearing last week, in which we explored it. I think we need to explore some elements here in this open setting.

Why did the Air Force choose a cost plus incentive fee contract vehicle over a fixed price contract for the engineering and manufacturing development phase of the B-21?

General BUNCH. Senator Cotton, if I can sir, most of those will come my way. I will just go ahead and let you know that now.

To start off with, sir, the determination of a contract type—there is no one-size-fits-all. You have to look at each individual acquisition case and you have to look at the risks involved with that acquisition and the maturity of the technologies and variety of different factors. That is what we did in this case.

After carefully considering the full spectrum of contracting options and looking at all the factors that go into selecting a contract type, the Milestone Decision Authority determined that the most appropriate contract vehicle for the acquisition of the B-21 was a cost plus incentive contract.

The key factors that went into making that decision were the technical risk, and that falls into two categories. One of those is that we did use mature technologies to meet this requirement and deliver this capability, but those mature technologies must now be integrated together on a never-before-built platform. The risk is in the platform development of something that has not been built ever and the integration of those mature technologies.

The other factor that was critical in this was the determination of the contractor's ability to continue the operation if they were to be put in a loss environment or where they were losing profit. In the case of the KC-46 right now, Boeing is running at about a 25 percent loss over what the contract was. In the case of the KC-46, that contractor can capitalize on the commercial market to be able to get additional continued sales or they can capitalize on foreign military sales to make up any losses that they may have had. In the case of the long-range strike bomber with highly classified ac-

tivity going on and highly classified technologies, there is not a commercial application.

Senator COTTON. General Bunch—

General BUNCH. Yes, sir.

Senator COTTON.—if I can interject here.

You said something similar last week—

General BUNCH. Yes, sir.

Senator COTTON.—at the Subcommittee on Seapower. What bearing does that particular characteristic have on the decision that should ultimately hinge on best value to the taxpayer?

General BUNCH. Sir, we believe—well, it is best value for the taxpayer, but it is also a capability that we need to be able to meet a critical gap, a gap that was identified through the entire Department as a way looking at the technologies that were out there. It is a balancing act of trying to ensure that we get it in the most cost-effective manner and also meet the capability gap that we need to meet from a requirements perspective.

Senator COTTON. Some of the things you have cited, though, like the mature technologies or stable requirements, specified aircraft price, and the inability to recoup cost overseas, when you think about it in the context value, I mean, those characteristics would seem to point at least as strongly in favor of a fixed price contract as they would cost-plus because they should give you a fairly definite idea of what that price is going to be. Is that wrong?

General BUNCH. Sir, the mature technologies—I believe we do have a good idea of what those would be. The risk involved is the integration of those technologies and building a never-before-built aircraft. That moves it on the risk perspective more to the cost-plus arena than it does to the fixed price arena.

Senator COTTON. I have seen reports that during industry discussions prior to the bid submission, that one potential offeror indicated that they would not bid on the RFP [Request for Proposals] if it was a fixed price development contract. Do you or any of our witnesses have any knowledge of that?

General BUNCH. Sir, I will take that for the record to make sure that I answer that in appropriate classification levels of what I am supposed to be doing.

Senator COTTON. General Holmes?

General HOLMES. I do not have any knowledge of that, sir.

General RAYMOND. I do not have any knowledge of that either, sir.

General BUNCH. I will take that for the record, sir.

Senator COTTON. Let me speak hypothetically for a moment. What would be the impact on value to the taxpayer if the Air Force issued an RFP [Request for Proposals] for such a major weapon system under a fixed price contract vehicle and only one vendor submitted a bid?

General BUNCH. Under that construct, we would still go into the—we would get the proposal in. We would evaluate what we believe the performance of that could be, and then we would look and make sure that we were getting a fair and reasonable price for what we were doing, and we would determine if it was a contract that we could let.

Senator COTTON. In my final question, let me ascend from this particular point to a more general question related to this matter, General Holmes. In discussions with the committee and staff, you have championed a return to developmental planning, experimentation, prototyping, and developing future capabilities. We all understand the severe budget constraints the Air Force has faced for the last seven years. But hypothetically, if sufficient funds were available from a capabilities development perspective, do you believe that a return to prototype development and so-called “fly before you buy” methodology for large, complex weapon systems before down-selecting a winning manufacturer would be the preferred approach?

General HOLMES. Senator, thanks for the question.

I think it depends on the system, both in complexity and the cost. We are moving forward, and we hope to continue to expand the prototyping and experimentation to look at specific aspects and to reduce risk in different programs. If you are going to go to a weapon system that has a unit cost of \$500 million, then you would have to weigh the cost of competing prototypes built at that initial fly-away cost against what you think you could learn in risk reduction in systems first. I think it would depend on the aircraft or on the program.

Senator COTTON. Thank you.

Senator Manchin?

Senator MANCHIN. Just to follow up very quickly on that, I think the concerns we might have is because the F-35 strike fighter—was it not a cost-plus?

General BUNCH. It was, sir.

Senator MANCHIN. You can understand our chairman’s consternation about that, and I think you have heard it over the years. We are looking for every way possible not to repeat the mistakes of that type of a contract, and I think that is what we are kind of all leading to.

How can you assure us we are not going to go down that same path?

General BUNCH. Yes, sir. That is a valid question because we are very worried about cost growth, and it is something that we want to make sure we control as we execute the program. The two things that we have done—two of the main things—we have done more than two, but two of the main things we have done to control cost growth on the program—the first of those is we conducted an independent cost estimate outside the program office, which is something that the SASC [Senate Armed Services Committee] was a champion for with SARA [Services Acquisition Reform Act] to form an independent cost estimate so that a program office that may be optimistic about what it might cost to develop a capability would not be able to do that. It is an independent cost estimate. In this case, we actually had two. Those were very close numbers, and we funded to the higher of the two numbers. That is a key indicator, in past studies by RAND and others, of controlling costs is to have an independent cost estimate to make sure you are not overly optimistic as you start.

The second one is stable requirements, and we have had no changes in the requirements since 2013. Our requirements control

officer is our Chief of Staff of our Air Force. He has made that very clear to all of us that he controls the requirements and he does not wish to see those change because he knows if you change requirements, you can increase the cost and you can change what you are trying to get in the technology perspective, and he wants to control that.

Those are the two main drivers that we have seen over the years that have driven cost.

The other piece that we are doing is we are using mature technologies. The analogy that I use here is we do not have developmental programs going on inside a major developmental program for the platform. I am not developing a brand new radar at the same time I am building a never-before-built aircraft. I am not building a brand new defensive management system at the same time I am building an aircraft that has never been built. The mature technologies—the risk there is the integration. The technologies are proven, and we should be able to do those. That is another one to control costs, sir.

The last of those is we have crafted an incentive structure for the contract so that the contractor must perform on cost and schedule to be able to garner or gain the profit and the fee that is associated with the contract. It is made up of two components. It is made up of cost and it is made up of performance. The performance aspect is based on schedule. The schedule incentive is the heavier weighted of the two, and it is not just making a date. It is delivering capabilities and meeting requirements. That schedule incentive is loaded toward the back of the EMD [Engineering Manufacturing & Development] phase, and it goes larger as the program goes forward such that if the contractor is not able to make those dates, then they will lose a portion of the incentive fee up to the point that they will lose it all for that scheduled event. If they do not execute on cost and on schedule, they end up executing the program at no profit and with no fee.

Senator MANCHIN. Thank you, sir.

I want to go to General Holmes real quick. But I want to say on that, General Bunch, we would like to compare that to the anticipation we had when we started the F-35 strike fighter. Some of us who were not there when that started, if this was the same anticipation as you have now with this set of criteria, it was the same back then. What have we learned? We are just hoping that we do not repeat the same. I will get into that in more detail with you, sir, if I can.

General BUNCH. Yes, sir.

Senator MANCHIN. General Holmes, I mentioned in my opening statement, the Air Force is planning to retire some aircraft, including AWACS and this EC-130H. Why would they plan to retire aircraft in high demand without planning to replace them? I think that is about as straightforward as I can make it.

General HOLMES. Thank you, Ranking Member Manchin.

If we go back to the fiscal year 2012 President's budget and we compare the spending levels that we expected to see between 2012 and this year, from the President's budget that was turned in, the Air Force has lost about \$70 billion in buying power. From the 2012 budget as it was enacted, which was actually a little lower

than that, the Air Force has lost about \$40 billion in buying power. To try to upgrade all of the Air Force, the money is just not there to do it. We are forced to make some tough choices.

Senator MANCHIN. The only thing I say is should we assess the risks of failing to meet combatant commander demands. These are people on the front lines. These are aircraft they very much need.

General HOLMES. Absolutely, sir, we do. Everything I have in the Air Force is very much in need by the combatant commanders. They participate in the budget review process. They participate at every step on the way in building our budget, and the budget that we provide you is a combination of the Air Force and the combatant commanders' best military advice on where to accept risk.

We are accepting risk in areas we do not want to. We know we are accepting risk in areas they do not want to. We are just trying to make the best budget we can within the buying power that we have left under the BCA [Budget Control Act], as modified by the BBA [Bipartisan Budget Act] that we are grateful for.

Senator MANCHIN. Then why would we eliminate?

General HOLMES. Sir, because we only have enough money to do—we do not have enough money to do all of the things that you expect the Air Force to do.

We hope not to eliminate. We have a plan to recapitalize the EC-130. We plan to bring that forward to you next year. We have brought a plan to you to recapitalize the JSTARS. For the AWACS, our plan is to draw down a portion of the numbers so that we can make money available to upgrade the rest of the fleet to be effective for the combatant commanders and the missions that they are expected to do. In general, we are trying to do the best we can to provide all the combatant commanders' requirements within the budget limit that we have and in consultation with them.

Senator MANCHIN. Thank you, sir.

Senator COTTON. Senator Inhofe?

Senator INHOFE. What you are saying is it is budget-driven. I think that the other two Lieutenant Generals there with you would agree with the statement that General Holmes just made. Is that correct?

You know, I can remember back when the discussion was—we were talking about the F-15 and F-16. That was quite some time ago. But again, at that time, the argument was always, well, you can do it with one or the other, but not both of them. Yet, we know now that the missions were different at that time. We knew it at the time.

We are going through kind of the same situation now with the F-22 and the F-35. The F-22 has been carrying a load that it should not have carried. Originally—and I recall this, and each one of the three of you remember this also—there were going to be—what—750 F-22's and that slowly went down to—I cannot remember who it was. In 2008, it went down to 381. Then Gates changed that to 243. Now we are down to 187 operational F-22's.

All we hear about is how great—what a great job they are doing. In the statement that was made—let me see who it was who made this. I think it was when we had Secretary James and General Welsh in here at our general committee. I said I understand the F-22 has been deployed against ISIL [Islamic State of Iraq and the

Levant] in Iraq, Syria, has been deployed in the Pacific, Middle East, and Europe. The Air Force chose to cut its force structure over the past several years. It is now paying for it.

A lot of us complained about this back when we decided that we were going to be downsizing the F-22. I think that probably all of you would agree now that probably was not a good idea. There was a reason for coming up with the 750 to start with, and I have just always wondered what the reasoning was, other than the budget, of bringing it down over the last seven or eight years. Do you agree that that was the problem?

General HOLMES. Sir, I think it was certainly a budget involvement there. Seven hundred fifty is about the same number that we built of the F-15A and C in our air superiority role in the Cold War.

The budget came down for a couple reasons, one, budget-driven. I think you are right. Also, I think the Department and the Congress made a decision that we would not see a near peer threat within a number of years, and that decision also proved to be—that judgment also proved to be optimistic. We have seen both Russia and China develop airplanes faster than was anticipated.

Senator INHOFE. I appreciate that.

Staying on the F-22, I am not sure who they are quoting, but it was in the “Air Force Times.” They said the biggest challenge for the F-22 Raptor community now is to stretch the limited fleet so the Air Force can guarantee air superiority until a successor aircraft comes along. That may not happen for another 20 years. The biggest deficiency in the F-22 fleet, though, has to do with the number of F-22’s. There just are not enough of them.

I have often wondered. At least I have not heard the discussion in our Senate Armed Services Committee about reopening that line. Is there any thought along that line? I think we all know we do not have enough F-22’s. What are the arguments against trying to go back and reopen the line?

General BUNCH. Senator, there have been RAND studies in that area. They have looked at it and there are rough order of magnitude numbers that are in the billions of dollars and years. We viewed it in the light of the balancing act we are already doing between readiness and modernization as something that would be cost prohibitive, and we would have to take something else out that we value right now to try to meet the requirements to be able to do that. We have not put any further analysis into that.

Senator INHOFE. As far as the F-35, we really need more of those, and cutting it down from 48 to 45, I do not know what that amount does to the cost. Was that a decision you agreed with, or is it another budget-driven—

General BUNCH. Sir, I will address the cost. It did not increase our costs. We are in a different position on the F-35 program than we were on the single Air Force program on the F-22. The Navy, the Marine Corps, our partners and foreign military sales have continued to fill the production line so that the cost estimates have continued to come down. That is still on track. We did not pay increase for the aircraft that we got through the FYDP [Future Years Defense Program] at this time.

Senator INHOFE. In his opening statement, Senator Manchin talked about the current plan to replace the AWACS. Does anyone want to tell us what the current plans are to replace the AWACS?

General HOLMES. Senator, we are looking in the long term at a replacement. Our short-term plans were focused on upgrading the airplanes we have and making them both able to keep flying and relevant as they keep flying through the block 40 and block 45 upgrade. We have taken a recent study to look at our air superiority needs starting in 2030. One of the factors that has come out of that will be choices in what we need to do with the recapitalization program.

We hope that our JSTARS recapitalization program can provide a model for recapitalizing the rest of what we are doing now with the wide body aircraft fleet and a way to bring the radar—the air battle management and an airframe together in a way that is cheaper to be able to continue to do those missions.

Senator INHOFE. Okay. I appreciate it. My time has expired, but I am hoping some of the other members might bring up the shortage of pilots, fighter pilots, that we are facing right now.

Thank you, Mr. Chairman.

Senator COTTON. Senator Donnelly?

Senator DONNELLY. Thank you, Mr. Chairman.

As you may know, Indiana is home to Grissom Air Base and the 434th air refueling wing. Our Hoosier Airmen had the opportunity to host Secretary James at Grissom a few months ago. They were able to share with her the incredible job they are doing flying and maintaining the KC-135's they have. Grissom was among the Air Force's top candidates in the last KC-46 basing round. I expect they will be topping the list next time.

General Holmes, in the last KC-46 decision, the Air Force emphasized the importance of Reserve-led associate units. This aligns with the recommendation of the Air Force Commission report in 2014 that recommended expanding the number of associate units in the Air Force. Can you speak to how associations are a force multiplier in air, space, and cyber and whether you anticipate the Air Force creating more Reserve-led associate wings in the future.

General HOLMES. Yes, sir. Thank you, Senator Donnelly. That is a great unit you have at Grissom. I have hidden from many a hurricane there from the east coast, bringing fighter airplanes there.

Senator DONNELLY. I can tell you where you will get a good meal, sir.

General HOLMES. They serve a great service to us.

We have a KC-135 associate that is a Reserve wing with an Air Force association on it at Seymour Johnson Air Force Base in North Carolina, and that is probably our highest performing KC-135 unit. When you combine a Reserve unit with the experience that goes with the aviators and mechanics you find in a Reserve unit with a small Active Duty component that makes the aircraft a little more usable—they can deploy more often than a citizen airman can on a more regular basis—then there is a synergy there that makes both sides of it more effective.

Over the last year, we have looked at 100 percent of the Air Force's mission areas in our Reserve and Active component mix. We have taken steps in each of the last three budgets to adjust

that mix, and we will continue to do that as we go forward in the places where it makes us better or it helps us save money.

Senator DONNELLY. Well, let me ask you this again. Do you anticipate the Air Force creating more Reserve-led associate wings in the future?

General HOLMES. Yes, sir, I do, but I could not tell you where they would be yet.

Senator DONNELLY. General Raymond, concerns that warnings from our military about growing threats to U.S. air superiority posed by advanced adversaries are often dismissed as distant and far away. But in fact, while we do have to prepare for large-scale conflict, the more immediate concern is the spread of advanced Russian and Chinese weapon systems into the wars we are already fighting. We are seeing advanced air defenses spread to countries throughout the Middle East and Africa, including Syria where our pilots are flying as we are here.

How is the Air Force responding to the proliferation of these very present threats to our air superiority?

General RAYMOND. Thank you for the question.

Let me go back real quick, if I could, to the mobility. I was just in the AOR [Area of Responsibility], and on the mobility piece of it, our mobility aircraft are doing incredible work. They are passing over 2.75 million pounds of fuel a day to feed that fight.

On the question that you just asked now on what are we doing, clearly the Air Force has a modernization program and we say that we fly, fight, and win in airspace and cyberspace. There are several things that we are doing. One, you have to be able to fly, and that is the SLEP [Service Life Extension Program] programs that we have got going on to increase the age of our aircraft to be able to maintain those in years to come.

Then there is the part to fight. We are looking at modifications and modernization programs to be able to do a better electronic warfare, to have better radars, to have better ability to share data back and forth between platforms, to have better command and control over those capabilities, to have better weapons that they can drop to be able to do that fight.

I agree with your assertion that the technology gap is closing, and we need to move on with those modernization programs.

Senator DONNELLY. Well, how concerned are you for our airmen if they have to face the S-400 in the near future?

General RAYMOND. I am very concerned for our airmen against the advanced threats.

Senator DONNELLY. General Holmes, would you care to comment?

General HOLMES. Yes, sir. Specifically to your question, in this budget we will have to continue to spend money to improve the capability of both the F-22 and the F-15 while we work our way through to a replacement.

But air superiority is about more than just those air-to-air airplanes. It is about being able to attack advanced systems like the S-400 or neutralize them with electronic combat or cyber attacks. We will continue to try to hold onto the gap that we have while we try to work out a way to move to the future and start with an-

other higher gap in our air superiority capability, a gap between our performance and theirs. We need to make that bigger again.

Senator DONNELLY. Ms. Costello, is the Air Force committed to commonality as a means to modernize and maintain the triad? If so, what elements do you see as most applicable for commonality with the ICBMs?

Ms. COSTELLO. For the GBSD [Ground Based Strategic Deterrent] program, we are committed to commonality, and we are working with the Navy on how we can achieve commonality in there. We are early in the analysis there to find out where we can pursue that further. We are heading towards a milestone, and we are working closely with the Navy in order to do that within that program in particular.

Senator DONNELLY. Mr. Chairman, thank you.

Senator COTTON. Senator Rounds?

Senator ROUNDS. Thank you, Mr. Chairman.

I would like to follow up on Senator Inhofe's line of discussion with regard to the F-22 for just a few minutes, recognizing that at one point with the B-1 program we started that line up again, and it is a good thing that we did.

Now we clearly understand that the near peer threats have increased over what had been anticipated. I am wondering when we talk about a successor aircraft, it may be 20 years in the future. But somewhere down the line, we are going to have an additional cost with regard to the planning and the layout and the modernization that goes into a brand new aircraft. Yet, we have taken the F-35 and we have been modernizing the F-22 based upon what we learned with the new technologies in the F-35.

Has there been any analysis as to what the actual costs would be to start up that F-22 line with the new systems that are currently available with the F-35 and how that would compare with the extended life that we might get out of that aircraft versus a new aircraft being developed as its successor 20 years from now?

General BUNCH. We have not analyzed as, again, there were some initial rough order of magnitude estimates as to what the costs would be. We have not estimated what it would be to reopen the line and populate it with more modern technology. We have not done that at this time, sir.

General HOLMES. Senator Rounds, the Air Force and the Navy have been collaborating on a future capability that was called the next generation air dominance platform. We have worked together in our studies. We have worked together in providing technology together. The Navy has gone ahead and moved toward an analysis of alternatives. We delayed a year because we wanted to take a broader look at the picture. We will move forward next year with a plan on how we want to get after a solution there.

I think because we want to do it faster and we cannot afford to do another 20-year development program for a host of reasons, we will try to go with technology that is at a high readiness level now with manufacturing capabilities that are at a high readiness level now. I think it is completely possible, as we get to a requirement, that there may be competitors that bid on modification of an existing technology or platform like the F-22 and the F-35.

Senator ROUNDS. Very good. Thank you.

Let me go back. Now that we have talked a little bit about the items which we add to the cost, I want to just touch base—the other day in open committee hearing, there was a discussion about the A-10. We did not get very far into it because it seemed as though at that stage of the game, it was more a matter of sending the message that we wanted the A-10 to remain operational.

Yet, I would like to hear from you, just in terms of—my personal opinion is that while we would all like to see F-15's available throughout the areas in which right now the A-10's are out there, we do not have enough F-15's to go around unless we start determining that we have got some that can be in two places at the same time. We do not have that. The A-10 seems to be working right now in this area where we do not have—or, as they would call it, a low-threat environment.

I understand that long-term you do not want to continue down the line where you may very well need an aircraft that can handle near peer challenges. But with regard to the A-10 right now, it looks to me like we need it right now because the demand is there for it in the field of battle today. Yet, you are trying to do modernization.

How do we work these two together? What is your analysis about how and where do we go with the A-10 and modernizing the other platforms that are there?

General HOLMES. Thank you, Senator.

You know, I have heard it said that the Air Force wants to move away from this mission. What I would tell you from my experience, including as a wing commander in Afghanistan with the F-15E and the A-10, is that over the last 12 years, the Air Force has moved to turn almost our whole combat Air Force's fleet into airplanes that are capable in this mission. What does that mean? It means we took airplanes that did not have all the capabilities they needed and we added the radios so that a strike Eagle crew member or a B-1 crew member can talk directly to the ground commander, directly to the JTAC [Joint Tactical Air Controller], and directly to the air operations center. Flying the F-15E in Afghanistan, I can talk on UHF [Ultra High Frequency] SATCOM [Satellite Communications] over the high mountains there to the command and control element. I could have one radio with the JTAC who was in the battalion TACP [Tactical Air Control Party] who was looking at the picture from my targeting pod next to the battalion commander, and then one radio talking to the platoon leader.

We added advanced targeting pods that combine the geolocation capability so that when you type in a coordinate, it will look exactly at that spot and—

Senator ROUNDS. General, what I am really curious about—and I do not mean to interrupt, but I am going to run out of time.

General HOLMES. Yes, sir.

Senator ROUNDS. Are you saying that you have enough F-15's that are capable today of actually doing the jobs that the A-10's are doing, that you have got enough aircraft right now to replace those one for one?

General HOLMES. All the airplanes that we use have some unique capabilities that they bring to the situation. Some are fast-

er, some stay out there longer, some carry a bigger load, some can get down lower. We are using all those in the right place for them.

My problem is I need no less than about 54 fighter squadrons or the 1,900 limit that the Senate gave us in the NDAA last year. But I cannot afford any more than 54 fighter squadrons either. The problem is, as I stand up F-35 squadrons, that would be a 56th squadron and a 57th squadron. Then without additional funds, I have to take some squadrons down to go through that.

Our best judgment, as we came forward to this point, was that the way to do that was to start to retire our aging A-10 squadrons, but we know we are going to work with the Congress to come up with that what that solution is. We think we need at least 55. We are unable to afford more than that. We are not retiring any squadrons this year, and we hope to work with the Congress to find out what the right answer is as we move forward.

Senator ROUNDS. Thank you, sir.

Senator COTTON. How many fighter squadrons did we have in the Gulf War?

General RAYMOND. Sir, we had 134 fighter squadrons in the Gulf War.

Senator COTTON. Wow, astonishing.

Senator Blumenthal?

Senator BLUMENTHAL. Thank you, Mr. Chairman.

I was struck by the comment in your testimony, and I am going to quote it. The Air Force is currently 511 fighter pilots short of the total manning requirement, and our projections indicate this deficit will continue to grow to approximately 834 by 2022. That sounds pretty alarming.

General RAYMOND. It is alarming, Senator. It is one of great concern for our Air Force. It is one that we are putting a lot of attention and focus on. On the one hand, we have got the airlines that are hiring about 3,500 fighter pilots every month. Our focus is increasing the pipeline, bringing pilots in and maximizing the UPT [Undergraduate Pilot Training] that we have to ramp up those numbers. We also have to look at absorption, being able to season those fighter pilots and working total force requirements to put fighter pilots in cockpits to be able to do that seasoning. Then we are working very closely on retention issues as well to try our best to maintain the fighter pilots that we do have in the service as we speak.

Senator BLUMENTHAL. We tend to be focusing here on all the hardware and the bright, shiny objects and all the stuff that people find glamorous about the Air Force. But if you do not have enough good pilots, all this stuff is worthless. Right?

General RAYMOND. We are an air force and we need pilots, and we need—all of our pilots are good pilots. We need fighter pilots as well.

Senator BLUMENTHAL. I may have overstated it somewhat, but that is the way it looks like to—

General RAYMOND. Again, it is a big focus item for our Air Force. I am 100 percent in agreement with you. We are working this hard.

Senator BLUMENTHAL. Let me ask you what can we do to help you with either recruitment or the training or the retention, whatever it is. Maybe you have some recommendations.

General HOLMES. Well, Senator, we are going to bring forward a plan that will both increase production. We think we need to stand up two more fighter training units that train students out of undergraduate pilot training and turn them into fighter pilots. We are going to work with the Guard and Reserve to ask them to absorb more of our Active Duty young pilots into their squadrons. Then we will have to increase our UPT production also to be able to make that happen.

We think if we do that, we can start to address that gap, and next year we will bring you a plan. We are going to make it fit into our budget, but there will be something else that falls out. We will bring you a plan next year to address it.

Senator BLUMENTHAL. Well, if I may just suggest, with all respect, I think to have a plan next year is great, but it seems to me if we are expecting a deficit of 834 by 2022, the sooner the better.

General HOLMES. Yes, sir. In the short term, we will use the bonus and the tools that we have to try to retain as many of those pilots as we can. We know that their readiness is a big part of that. To keep fighter pilots, you need to give them a chance to be good at their jobs and be ready, and we are working to fund the requirements of readiness as we go through. We also think that there is a reduction in tempo that is a part of that. We need to give them more time to train and more time to have a full career in the airplane. Then we are going to work to make sure we absorb every person we can that leaves Active Duty into the Reserve or the Guard so that we hold onto that experience.

Senator BLUMENTHAL. I think that is a very important point. If I may just make a request from someone who is a supporter, not a critic, that if you could give us a plan, even if it is only a chalkboard plan, even if it is only scribbles or whatever, it is not a final finished product, but just so we can reassure ourselves that we are on track to fill this gap.

General HOLMES. Yes, sir. We will be happy to work through that with you and your staff and tell you what we are planning to do.

Senator BLUMENTHAL. Thank you.

Let me just quickly ask Lieutenant General Bunch. I think you were at last week's Armed Services Committee hearing when Secretary James testified that the Air Force believes that foreign military sales will protect unit costs from increasing as a result of some of the cuts in the F-35 so that, in effect, there will be no increase in cost per unit despite a reduction to 43 instead of 48 in the procurement in F-35's. I asked the question where are those foreign military sales going to go. I think that Secretary James said she would produce more information about it. Maybe you have some more information now.

General BUNCH. Sir, I was not at the hearing, but I did hear the question. It was we are not going to pay an increase. The gap of us moving our aircraft out of the FYDP was filled by the Navy and the Marine Corps, our partner nations, and foreign military sales. I thought I had written down the three nations that we were doing

the foreign military sales with, but I do not have them in my notes—so I apologize for that—that we would attribute, and we have other ones that are there. But I will get you that information, sir. I apologize.

General HOLMES. Senator, the partners that are buying aircraft are the United Kingdom, Italy, the Netherlands, Australia, Norway, and Turkey. Denmark and Canada are still making up their mind, and they may move in. On the FMS [Foreign Military Sales] side, it is Israel, Japan, and Korea. Then the combination of all those partners, plus the Navy and the Marine Corps—the program manager has assured us that the price will stabilize.

Senator BLUMENTHAL. There will be an increase somewhere in that group.

General HOLMES. The quantity is big enough that taking that small amount down will not have much of an impact. Then every year, each lot—the price is going down, and that also figures into it too. The lots that are being negotiated now are at a lower price than the previous lots.

Senator BLUMENTHAL. If you could or maybe she or somebody get back to me with a somewhat more definitive answer. I understand those are the nations that are buying planes. I know that the Marine Corps and the Navy are buying planes also. But if you could just give me a rationale and an explanation, I would appreciate it.

General HOLMES. Sir, we will take that. That is to me.

Senator BLUMENTHAL. Thank you.

Thanks, Mr. Chairman.

Senator COTTON. Senator Ernst?

Senator ERNST. Thank you, Mr. Chair.

Gentlemen and Ms. Costello, thank you for being here today. I appreciate it.

I am going to go back to something that Senator Blumenthal was mentioning with our pilots. General Holmes, you mentioned moving some of those pilots' capabilities into the Guard and Reserve. I just want to address the fact that Iowa—just in recent years, our Iowa Air Guard lost its F-15's. Those went away. It was replaced with an ISR unit, which is great. Unfortunately, we lost those pilots. They had to go elsewhere. Now we have RPA [Remotely Piloted Aircraft] capabilities with the ISR unit.

Has there been discussions that we are not aware of with the Guard or Reserve, or is this just an idea for the future?

General HOLMES. We have done several specific things, Senator Ernst. Thank you.

One of them is our Air Force Reserve is now taking students straight of commissioning that there was not a spot for them in the Active Duty Air Force, and they are bringing them straight out of ROTC direct into the Air Force Reserve without knowing what unit they will go to, send them to pilot training, and banking on the fact that there will be a requirement for them.

On the Air National Guard side, we have associations where we are already sticking some of our brand new Active Duty pilots there to gain more experience.

Then we are recruiting hard with our Active Duty pilots that are leaving the service. There are vacancies in both Reserve and Guards units, more in the Guard than in the Reserve, that we are

working hard to try to help them fill either with Active component airmen that are leaving Active Service and want to continue to serve or by bringing in even brand new lieutenants into the Guard and Reserve to make sure that we keep their roles filled as well.

Senator ERNST. We still have a need for those pilots. I guess going through discussions a number of years ago, I guess I am having a hard time following then why we moved away from the F-15's in the Guard and the decision behind that.

General HOLMES. Well, so the decision, ma'am, was that again in the Department, the Department of Defense believed that we had excess capacity in what they call TACAIR [Tactical Air], which in the Air Force is our fighter force. They decided that we could accept some risks there. The Air Force's answer for the Air Force, that meant to go down to somewhere around 48 or 49 fighter squadrons was the fiscal year 2015 proposal. We think that was too small. We are happy to be back at 55, and we do not think we can go below that. Of that 55, roughly half of those squadrons are in the Guard and Reserve already. We are already making really good use of that capability.

Senator ERNST. Thank you, General Holmes. I agree it was too low as well.

I would like to turn to the 400 fighter aircraft that have been retired from the Air Force since 2010. We have had delays in the F-35A's—those deliveries. This has caused what I believe to be a combat fighter shortfall in relation to the combatant commanders' operations plans requirements. At least that is what it looks like.

Is there a current Air Force combat fighter shortfall?

General HOLMES. Thank you, ma'am.

That 55 fighter squadrons, when applied against the problem set that the Department asked us to model against, we would say is barely enough. There is nothing extra in there to be able to meet the requirement. As we go forward beyond this year, then because the average age of our fighter force is 27 years old, because we curtailed the F-22 buy, because the F-35 is not coming aboard in the numbers we expected, and the second FYDP starting in fiscal year 2022 is where we will start to run into a real problem. It is going to require us to extend the service life of older airplanes, hopefully increase the production buys on the F-35, and then think about some options beyond that, both some higher-end options and some lower-end options that might be more affordable.

Senator ERNST. With the decline in the combat fighter squadrons, has this impacted the ability to deploy air power assets to prosecute the air campaign against the Islamic State? I think that is a large part of why we need these assets.

General RAYMOND. Senator Ernst, it has not impacted our ability to deploy fighter squadrons for the current fight. When we talk about readiness, Air Force readiness, we talk about full spectrum readiness, and part of the equation that goes into this is that less than 50 percent of our fighter squadrons today are full spectrum ready. They are ready to do what we are asking them to do today, but they are not ready to cover all of the requirements that they may have to be required to cover in an operational plan to meet a combatant commander's requirements.

Senator ERNST. That is where the assuming risk comes into play is that you focus in one area, but you may not be able to cover down in other areas.

General RAYMOND. It comes at a cost of readiness in the full spectrum, and it would require time to be able to recoup that readiness.

Senator ERNST. Very good. Any other thoughts? General Bunch?

General BUNCH. Senator, thank you. I would just add that we do have a continuing requirement in the combat in Syria and Iraq, and when you put that with the requirements in Afghanistan, with the requirements to deploy to the Pacific to reassure our allies and to deter potential adversaries there, and now we have added an additional requirement in Europe with the Russian activity where we are now also deploying TDY [Temporary Duty] squadrons there from both the Active and the Reserve component, the cost of that is readiness to the force that we have. Every time we do that, it makes them less ready if they have to go fight a near peer adversary or a very capable adversary. That is what the Department has to balance, how many they provide and how much opportunity they allow our crews to train to make sure that they are full spectrum ready.

Senator ERNST. Certainly. Thank you very much for being here. Thank you, Mr. Chair.

Senator COTTON. Senator Lee?

Senator LEE. Thank you, Mr. Chairman.

Thanks to all of you for being with us today, for all you do for our country.

I want to talk a little bit about the Utah testing and training range. As we discuss the modernization of our aircraft and of our weapon systems, it seems appropriate to me that we ought to discuss the need to make sure that our test and training ranges are there and available to be used so that we can test fifth generation weapon systems against emerging threats that are becoming more and more sophisticated all the time and that are sort of closing the gap.

I am pleased to report that just two weeks ago, an F-35 with the 34th Fighter Squadron at Hill Air Force Base successfully deployed and dropped a laser-guided bomb over the UTTR [Utah Test & Training Range].

I am a cosponsor of a piece of legislation, along with Senator Hatch, that would enhance the UTTR, and that I think would, in turn, enable the Air Force to more effectively test the F-35 and other fifth generation aircraft in the coming decades.

General Holmes and General Raymond, I would like to ask you detail for the committee the importance of preparing these ranges for testing fifth generation weapon systems and protecting them from issues that could compromise our ability to use them.

General RAYMOND. Senator, it is a great point. It is one that we are also putting a lot of focus on. As part of our readiness pillars, one of the pillars of readiness that we focus on is training. Over the course of this budget, we have put forward about a billion dollars extra to focus on that training, focusing on making sure the ranges have those capabilities that they need to simulate that high-end threat, to make sure that we have the airspace required

to be able to do that. We are working live, virtual, and constructive training as well to help with that effort. But it is something that is going to be absolutely critical for our readiness going forward. We put some funding into it this year to be able to start that and to seeing that growth.

Senator LEE. I am glad to hear that.

General?

General HOLMES. Sir, we appreciate, Senator, the efforts that you and Senator Hatch have made in your act to avoid encroachment on the ranges. That is certainly important to us to keep that airspace. We will have to move a lot of our highest-end training into simulators because we do not want people to watch us do that highest-end training.

Senator LEE. That would be fun for everyone.

General HOLMES. But we are always going to have a need for the real ranges to fly real airplanes against real threat emitters so we can make sure that things work. That is where we are trying to put that money over the next 5 years that Jay talked about.

Senator LEE. Great. Thank you.

Several of my colleagues and I have expressed concerns about hiring issues at Air Force depots, which is a challenge faced by depots across the services. The time it takes to hire civilian workers for some of these positions, including especially things like engineers and some of our maintenance technicians, are ridiculously long. I mean, these are time frames that would put a private sector business really out of business.

I know this is something the Air Force is working on, and we look forward to assisting in any way we can to alleviate the problem. How will these hiring issues impact your modernization efforts if they are not addressed?

General BUNCH. Senator Lee, thank you for the question.

Hiring of civilians at our depots is a key concern and one we are working very feverishly. I know that we have been over and presented information to you and the depot caucus on some of those initiatives.

It can impact. We make decisions based on a number of people coming in. We have had an action team going from an FMC. We have also got a team at AFPC [Air Force Personnel Center] and the air staff, A-1, has rolled into this trying to streamline that process, trying to get as many authorities as low in the organization as is possible. It is something that we are tracking very closely, but it is critical that we hire more people in a more timely manner.

Senator LEE. Well, thank you. I appreciate that.

Over the last two years, there have been a lot of discussions in this committee regarding the Air Force's plans to retire the A-10 and move its uniformed maintainers to new F-35 units. Now that you have decided to keep the A-10 operational, what steps are being taken to ensure that the F-35 has the required maintenance personnel so that we can make sure this is covered both in the short term and in the long term?

General HOLMES. Thank you, Senator. We are kind of doing everything we can think of, including the suggestions that we got from this committee in previous years. We are contracting out maintenance in some of our nondeployable squadrons, particularly

training units. In this budget, we asked to hire civilian contractors to do the work at places where we train people to fly the fighters so that we can free maintenance people up there to go to F-35 school. We are asking our Reserve and Guard to help us in several places, notably they are primarily at Luke and at Hill, as we change the mission there. We are amending our high-year tenure rules so that we can keep a tech sergeant skilled mechanic longer than the rule set would allow them to stay in the Air Force at that grade. We have reviewed the bonuses for maintainers to try to retain more so that we have a larger force. Then with the end strength that we have requested an increase in this budget, a healthy portion of that end strength goes to training more maintainers to fill in that gap, and we stood up additional instructors and classroom time in our tech training school to try to provide people to fill those requirements.

General RAYMOND. Could I add? We also made a down payment and procured some additional manpower in this budget and specifically targeted them to maintainers. One of our big readiness levers is having the right folks with the right skill set, and we have started that initial procurement of additional bodies this year.

Senator LEE. Wonderful. That is helpful. Thank you very much. Thank you, Mr. Chairman.

Senator COTTON. Senator McCain?

Senator MCCAIN. General Holmes, I believe that the 2016 NDAA required a reporting on the total number of F-35's that will be procured. I believe that that information was supposed to be submitted to the committee some months ago. Do you have any response to that?

General HOLMES. Senator, I believe that the Department made that a CAPE [Cost Assessment and Program Evaluation]-led study that the Air Force is participating in. I will double check to make sure, but I believe we are working with the CAPE to provide the answers back in that study.

Senator MCCAIN. Have you notified the committee as to why you have not complied with the law?

General HOLMES. Sir, again, I will check with CAPE, and if they have the lead on that study, I would have expected them to.

Senator MCCAIN. You do not know whether they have complied with the law or not?

General HOLMES. No, sir, I do not.

Senator MCCAIN. I am curious why not.

It is my understanding that you are keeping the cost of the program classified. Is that correct?

General BUNCH. Sir, are you addressing the B-21, sir? I am sorry. I apologize. I misunderstood the question, Senator.

Senator MCCAIN. Yes, the B-21.

General BUNCH. Yes, sir. At this time, we have not released contract value to everyone. We have released the service cost position and the independent cost estimate. We did release that. In the base year 2016 dollars, it was \$23.5 billion for the EMD [Engineering Manufacturing and Development] phase.

Senator MCCAIN. Why would you not ever want to tell the American people how you are going to spend their dollars?

General BUNCH. Sir, one of the things that we are doing is we had a closed session with this committee. We are also trying to arrange closed sessions with the House SASC.

Senator MCCAIN. Why should the taxpayers not know? Why should the average citizen not know what the cost of a—whatever—how many tens of billions of dollars—\$80 billion to \$100 billion program? Should the taxpayers not know that?

General BUNCH. Sir, we are trying to balance the transparency that we want do with the public so that they understand what we are doing, but we are also trying to protect the critical capabilities of this asset.

Senator MCCAIN. By saying how much it cost?

General BUNCH. Sir, we are trying to prevent the ability of individuals to link different pieces that may be unclassified together to get an idea of how the money is being spent so that they—

Senator MCCAIN. Tell me another time where we have not told the American people the cost of something that they are paying their tax dollars for.

General BUNCH. Sir, we have given Congress and we have given the taxpayers the amount of money that we are expecting to pay—what the acquisition program baseline is and the amount of money that we, the Air Force, are committed to get this capability delivered so that we can serve the Nation.

Senator MCCAIN. General, you are not serving the Nation or the taxpayers if they do not know how much of their taxpayer dollars are being spent. You and I have a very different view of our obligation to the taxpayers. Frankly, I have never heard of this before, that they should not know how much of their dollars that they pay in taxes are being spent because somebody might connect the dots? What is that all about?

General BUNCH. Sir, I believe we have shared with the public and with the committee—

Senator MCCAIN. The public knows exactly what the cost of it is?

General BUNCH. They know our average procurement unit cost. We have released that and we have released our independent cost estimate and our service cost position.

Senator MCCAIN. You have not complied with the laws, the total number of F-35's. You do not want to tell the taxpayers how much the B-21 costs. We now are finding ourselves in a shortfall of aircraft of the F-35 which you say will not increase the unit costs because of foreign sales. Is that correct, General Holmes?

General HOLMES. The program office says that with the total number of aircraft that are being bought that our reduction of five will be made up by the other partners and that we should not see any increase in cost.

Senator MCCAIN. It will be met by the other partners. How much is five aircraft?

General HOLMES. It depends on which lot we are talking about, Senator. But five aircraft are roughly \$700 million I think.

Senator MCCAIN. So \$700 million of five less aircraft will be made up by increased foreign sales?

General HOLMES. Sir, the program office says that total buy is big enough that a change in five in 1 year will not have a big impact on the price.

Senator MCCAIN. So \$700 million. That will be just chump change.

General HOLMES. Well, sir, so we pay by the airplane, and we are not buying those airplanes. The impact is on the cost spread across all the fleet and there is a factor, the more you build in a year, the cheaper they are. But we are not amortizing that \$700 million over the rest of the airplanes that are being bought. We are not spending that money. We are not giving it to Lockheed. The price is based on the number that you buy in a year and a lot and not on the other parts.

Senator MCCAIN. Then why do we not do 10 less since it would be cheaper then?

General HOLMES. Because it is a capability we believe is very important to us. But at the budget totals we were told to plan under, that was all we could afford and hold onto the rest of the force structure that the NDAA told us to and meet the other requirements that we are asked to meet.

Senator MCCAIN. Now, is there a proposal? I understand there is a proposal to transition out of rated pilots for operation of drones. Is that correct?

General RAYMOND. Yes, Senator McCain, there is. We are going, starting in fiscal year 2016 or fiscal year 2017, to begin the transition to enlisted RPA pilots for the Global Hawk aircraft.

Senator MCCAIN. But not the rest.

General RAYMOND. Not at this time. We have done a similar thing. I grew up in space operations. Years ago, we started out with engineer officers that flew satellites. We went to operator officers. You did not have not have an engineering degree, and then we transitioned to enlisted operators. We are taking a very deliberate approach to this. We are going to start with the Global Hawk. We are very comfortable that our enlisted airmen are going to be able to do that. We want the "get well" plan and the other initiatives that we have for the MQ-1 and MQ-9 to take root, and then we will evaluate further going forward.

Senator MCCAIN. Do you think it was a good idea to start with to require rated pilots, particularly given the shortfall we have?

General RAYMOND. I was not in this position or in this job at that time, but it is where we are. I think it was important that we have a capability. It was a technology demonstrator with significant growth, and I think using the pilots that we had to do that was a smart move at that time.

Senator MCCAIN. I thank you, Mr. Chairman.

Senator COTTON. Now we will go into a second round of questions. I have some questions first about the tanker program, Ms. Costello.

The delay in the first flight of the first fully missionized KC-46 Alpha and subsequent slipping of required testing caused a postponement of the milestone C full rate production decision until May of this year. How will this slip of that milestone C decision impact Boeing's ability to deliver its required 18 aircraft by August of next year?

Ms. COSTELLO. That slip is not expected by Boeing to cause a problem with the RAA [Rapid Acquisition Authority]. They are holding to their belief and their expectation that they can deliver

the 18 aircraft on time for RAA. The milestone C is currently still planned for May of 2016 and the RAA for August of 2017, and we are proceeding on that path.

Senator COTTON. We can expect 18 aircraft on August 2017?

Ms. COSTELLO. Boeing is standing by their position that they can deliver that, and the Air Force is cautiously optimistic that we can, in fact, achieve that, sir.

Senator COTTON. On an anomaly, I understand there are concerns that higher than expected axial loads on the boom when in contact with the receiver aircraft that was discovered during refueling test flights. Can you explain that a little bit further and comment on any schedule impact that it might have?

Ms. COSTELLO. We are currently working with the contractor in order to assess that. They have got a CDR [Critical Design Review] plan for some fixes. They are looking at the analysis. It will be a couple weeks before we know what their recommended solution is, and at that time, we will have to figure that in whether it has an impact on any of our future decision points. They will at least have to do some software work, and we are determining what else, if anything, has to happen.

Senator COTTON. Let us return to today's aircraft, specifically fourth generation fighter aircraft. General Holmes, in the fiscal year 2017 budget request, you stated there were additional fourth generation fighter capability upgrades that you lacked sufficient to include in the request. Could you please describe the upgrades, the threats they counter, and the specific aircraft which would be modified? Please do so in layman's terms—

General HOLMES. Yes, sir, I will.

Senator COTTON.—understood by normal citizens, not Appropriations Committee staffers.

General HOLMES. Thank you, sir.

Senator COTTON. Could also be understood by subcommittee chairmen.

General HOLMES. Yes, sir.

The two primary airplanes we will look at for fourth generation modifications are the F-15 and the F-16. On the F-15 side, we have run a test to see how long the airplanes will last. We take a test stand that is built by engineers, and it bends the airplane and moves it around, and you can see what the service life will be in advance by simulating hours of flight. We found that the F-15 will not last in its current state as long as we hoped it would. We are going to have to put some money in the depot schedule and to repairing parts that we predict through that process will fail. That is so that it will be around long enough that we can keep flying it.

Then the capabilities that they will need to stay relevant against the threat are they will need a new radar. An electronically scanned radar is very important to counter advance jamming threats that have been propagated primarily by the Russians and Chinese and others. They will need a digital radar warning receiver which allows you to know whether an advanced radar is looking at you or targeting you. They will need advanced electronic combat capabilities to defeat that radar. Then they will need a new

computer to tie all that together and make it work. That is pretty much it for the F-15 side.

On the F-16 side, there is some service life left on those airplanes, and we had not planned to use it because we thought they would be replaced by F-35's, but some of them will not be because of the delays in that program. There is a very limited number of them that will have to have some service life extension to make them last longer, and then we will do the same kind of upgrade on them if we can get the money to do it, which would be a new radar, a new central computer, a new radar warning receiver, and new electronic combat gear.

We could not get to those as fast as we would like to. We do make a down payment on that in this program. If we had extra money, we would put money there. Thank you.

Senator COTTON. Ms. Costello, I want to turn to the UH-1 November helicopter replacement program. Secretary James recently testified that an acquisition decision is due soon on the replacement program. She also testified there is a sole source option under consideration to replace the current fleet. I understand that a request for information was issued to industry last year, which would seem to indicate the Air Force's intention to conduct an open and competitive bid process.

If the decision is to proceed with the sole source award for the helicopter replacement program, are you prepared to present this committee with the overwhelming evidence necessary that such an award would actually provide best value to the American taxpayer?

Ms. COSTELLO. Yes. We would share the information that we can gather along the way. What is going on right now is we have gone out and mitigation efforts have been taken over the last year, but we believe we still need to look at what we can do with the helicopters that support the nuclear mission especially.

We are looking—and we have asked for STRATCOM and for the Air Force Global Strike Command to outline the criticality of their requirements so we can prioritize which helicopters need to be replaced immediately as opposed to in the long term. When we get that information, we have asked for our team to put together some options. Sole source is one of those options, but they are looking at a couple COAs right now. They are supposed to come back over the next couple weeks for me to hear what they are representing, and then we will make a decision on our way forward at that point in time.

Senator COTTON. I understand—correct me if I am wrong—that the helicopter will be used both for the ICBM [Inter Continental Ballistic Missile] security mission and then for what you might call Washington-centric missions, continuity of government, VIP transport, and so forth.

Ms. COSTELLO. That is part of what we are looking into. Right now, we are focused on the nuclear support mission, which is the ICBM convoy, and support in that area. We are looking at options that might break out the other missions separately and consider that for future procurement. It has not been decided yet, but these are the type of COAs [Course of Action] that are being looked at.

General BUNCH. Senator Cotton, Ms. Costello is exactly right. The nuclear deterrent that we have is safe, secure, ready to go if

needed. Our focus right now is a capability gap that the UH-1N cannot quite meet despite the mitigation steps that we have taken, and we are going to weigh the risks associated with that and the critical nature of that requirement against the urgency of need and that would be—I am sorry, sir.

Senator COTTON. Why can it not meet those requirements?

General BUNCH. There is a time to respond and a carriage capability they cannot quite meet. I believe those are two that we are short in. We are going to look at the urgency of that requirement. If we do decide that we wish to go sole source, it will solely be focused in those areas to address the nuclear mission. It will not be used to address the entire fleet. It would be an urgency need to meet that what we would come forward with, sir, if the evidence that comes to Ms. Costello is appropriate for that.

Senator COTTON. Some observers might say that a next generation fighter or bomber is a uniquely complex kind of platform that might need special contracting consideration, but a helicopter to fly even long distance with heavy loads is a pretty traditional kind of platform. What would necessitate a sole source contract for a helicopter?

Ms. COSTELLO. In this case, what we are looking at is the time in which they need it. If they need it to be procured in a certain amount of time and the mission requirement is in fact validated, then we have to look at how fast we can buy it. There are opportunities to buy off existing contracts that are one of the COAs as opposed to going off and doing a whole new contracting event. Those are the types of things that we have asked them to look at, what are the pros and cons of each option. A decision has not been made yet. We have got to get the data. We have to assess it against the timeliness required, weigh the pros and cons, and then make a decision.

Senator COTTON. Thank you.

Senator Manchin?

Senator MANCHIN. Just very quickly. General Bunch, what would be the impact of reforming the contract for the B-21 to a fixed price contract?

General BUNCH. Sir, we have looked at it and the assessment is we cannot shape the contract that we have to that. We would have to terminate that contract. That would have a cost of over \$300 million to do the termination. We would then have to have a re-compete. If we did that re-compete, that would be somewhere in the neighborhood of 24 to 30 months to complete the re-compete. There would be a commensurate delay in fielding the aircraft, sir.

Senator MANCHIN. What is the \$300 million? What constitutes the cost of \$300 million?

General BUNCH. We are on contract with a company that has gone out and put suppliers on contract and on order, and they have started their business case. The analysis that we have done to—

Senator MANCHIN. There is a penalty clause by them if we break it.

General BUNCH. Yes, sir, because the contract that we have with Northrup.

Senator MANCHIN. Yet, they are on a cost-plus.

General BUNCH. They are on a cost-plus, sir, and they have gone out to try to do—

Senator MANCHIN. You know it is not real popular here. Right?

General BUNCH. I do understand that, sir, and I still believe it is the best choice for the contract type with the risks associated. We look forward to the discussion on this because we realize there are a lot of different opinions.

Senator MANCHIN. I respect that. I really do respect where you are coming from. It is just that we all have to get there, and I think right now there is such a bad taste in everybody's mouth that it is going to be a tough one. We will try it. We are going to be open-minded and try.

General BUNCH. Yes, sir.

Senator MANCHIN. With that being said, I think, Secretary Costello, you General Holmes, in your prepared statement for the record, you alluded to a possible replacement for the A-10 and its close air support capability. This is what you all said. The Air Force is funding a combat Air Force study over the next year with a portion of this study dedicated to informing the fiscal year 2018 to 2022 budget cycle on possible tactical air support platform alternatives for low-intensity permissive conflict. This will serve to ensure that other current platforms in future systems meet future close air support requirements.

If the study were to lead to a decision to select the material solution for this mission, how long would it take to deliver a new tactical air support platform or a new aircraft into the operational force?

General HOLMES. I will defer the how long question, Senator. Briefly, the Department has directed in one of their RMDs and the direction to us that came with the budget for us to work with the study to look at low-cost platforms and to work through that. We will, and we will evaluate keeping older platforms longer, adding new capabilities to existing platforms, and developing a new platform. I will defer to General Bunch for how long that might take.

General BUNCH. It depends how off-the-shelf we are talking about, sir, and what kind of capabilities. We have to look at what is out there in off-the-shelf, some of the aircraft that we are using in the more permissive environment and determine what capabilities they have and if those would fit the immediate need. If it was very well developed and did not have to have a stretch for the requirements, we could do that in a pretty quick manner. If it is a stretch for the requirements, then it may take longer, and we would have to look at the individual case study as it comes forward.

Senator MANCHIN. My final would be—I also mentioned in my opening statement concerning the Air Force's plans to retire, as we talked about, the A-10. We just talked about it some more. As the new F-35A joint strike fighter aircraft replaces them on a one-for-one basis, I understand that while there is a one-for-one replacement for the aircraft in squadrons under the Air Force plan, it is not clear that close air support capability of the modernized force will equal or exceed the close air support capability of the current force.

General Holmes or General Raymond, what is the Air Force doing to ensure that as the A-10 aircraft basically is retired, the Air Force will not be losing that close air support? Do you believe that the F-35 will equal or exceed the A-10 in close air support? In the past, you have pointed to the F-15 and F-16 as picking up close air support missions being vacated by the retiring A-10's. I guess you believe that the 15's and 16's will be able to equal or exceed, and you believe the F-35 will be able to fill in one for one.

General HOLMES. Thank you, Senator.

We do believe that we will be able to maintain the capacity that we need to support the close air support mission. All the platforms have some different capabilities that make them better in one area than in others. But we think we will be able to do that. We are working to make sure that we have the procedures to do it. We are establishing a CAS integration center at Nellis to make sure that those airplanes are ready to do that role, both with the tactics, techniques, and procedures and the com systems set to do it. Ultimately we are going to do it in the same way that the Navy and the Marines are doing it with similar platforms.

We believe the F-35 will be a capable CAS aircraft. It will be particularly capable in contested environments like in Russian doctrine, if you bring forward your air defenses with you, there will be a limited number of airplanes that can operate in that role. It certainly would be an expensive way to go after a permissive environment mission, and we hope to not have to do that. We will look at other options, as you talked about before, of how can you do that permissive environment role cheaper.

Senator MANCHIN. Thank you.

Senator COTTON. Just a few wrap-up questions here. First, returning to some of Senator McCain's questions about the B-21 program. I certainly understand the need for secrecy among many of the programs of our military, as well as our intelligence communities, and highly value those. At the same time, I think we should try to be as transparent as we can with taxpayers. If we cannot say today what this information is—we know it because we have had classified briefings on it. But if we cannot say today the answer to some of these questions like the contract award value, can you tell us when we might be able to provide that information to the taxpayer?

General BUNCH. Sir, I think we will be able to provide that in the upcoming months. We are still working our way through the GAO [Government Accountability Office] reports, and we are working our way through looking at the classification of those things. That is something the Secretary has asked us to do. One of the issues that we have found as we looked and tried to map the path forward, we felt that one of the things that was not as transparent with the American public was the way the B-2 program was handled. We are trying not to mirror that. We are trying to release as much information and be as forward as we can. We just have not gotten to the point that we can release that at this stage.

Senator COTTON. Well, as we discussed in the classified setting last week, I hope we do not mirror the B-2 program or the F-22 program in the sense that we actually achieve the number of air-

craft we want to since the Air Force and our Nation badly need the B-21 bomber to be a complete success.

General BUNCH. Sir, we believe we have set in place a contract structure and a methodology—or an acquisition strategy that puts us in a different place than we were on those programs with the right oversight, the right incentive structure, the right requirements, and the independent cost estimate, and holding those requirements firm.

Senator COTTON. Second, I want to turn to the C-130H AMP. Ms. Costello, the NDAA from last year authorized a restructured AMP program and segmented the program in two increments. The first increment was aimed at upgrading airspace compliance and safety requirements, while the second increment provides upgraded cockpit display and commonality across the different aircraft variants. Can you please explain why there is no procurement funding in the C-130H AMP increment one for fiscal year 2017, but there are funds for fiscal year 2018 and beyond?

Ms. COSTELLO. In our budget this year, we do accelerate the increment 1 AMP program so that we do meet the FAA mandate. We have accelerated so that all 172 H's will have increment one installed in time for that to be done. While most of the funding is later in the FYDP, it does get that done. We will complete all of that work by December of 2019 so that our aircraft will meet the mandate.

For increment 2 AMP, we also have accelerated that in this year's budget, and we brought forward 14 years earlier when we will complete having install of the increment 2. It will be completed by 2028 now.

Senator COTTON. So all—I am sorry.

General BUNCH. We just released the request for proposal for the INC-1 [Increment] yesterday, so we are getting that program started. It is early in its phases, but we will complete it by the end—

Senator COTTON. As I understand, the budget tables include no funding for fiscal year 2017. Is that right?

General HOLMES. Sir, let me double check that for you. We believe we fully funded the program and we are going to get it done.

Senator COTTON. I know the omnibus last year included \$70 million for it. What I am curious about is whether that \$70 million is in your opinion adequate for the entire fiscal year 2017.

General HOLMES. Sir, can I take that for the record? We think it is fully funded.

Senator COTTON. You may take it for the record as long as you answer it for the record.

General HOLMES. Yes, sir, we will.

Senator COTTON. Okay.

General HOLMES. I will get it back to you right away. If there is not money in 2017, I am guessing it is because we are spending it in 2016, and then there will be a gap between the procurement. But let me double check that and make sure it is all there.

Senator COTTON. What are the Air Force's plans for the five operational C-130H aircraft that were upgraded in the previous AMP program but are currently stored at Little Rock Air Force Base in a non-flying status?

General BUNCH. Sir, they are going to be ones that we consider later on in the program, and we will not look at those in increment 1 at this time. We looked at the estimated cost to get those into the configuration to go INC-1, then INC-2 [Increment 2], and it is very much more expensive to get those into the increment 1 stage first and then to go to the increment 2, almost four to five times as much as taking a fielded C-130H and getting them to increment 2.

Our strategy is we are going to look at that as we go into increment 2. We will reanalyze where we are at with our inventory, and then we will assess it as we go into increment 2. We are not going to try to address it in increment 1.

Senator COTTON. Third and final. I have heard a lot from commanders around the world in different combatant commands in the different services about diminishing weapon stockpiles. General Holmes, do you have the appropriate authority to procure munitions based on expected expenditure rates, not simply past expenditure rates?

General HOLMES. We do this year, Senator, and that is a new change in the way OMB is dealing with OCO [Overseas Contingency Operations] and we hope that you will too. But they allowed us to predict our expenditures this year in 2017 so that we can reduce the time it takes us to replace OCO munitions.

Senator COTTON. When I hear you say we do this year, it raises a question of whether you are trying to say we do not for future years.

General HOLMES. Sir, I was not trying to avoid that question, but the administration decided to do it 1 year at a time and give us that authority 1 year at a time. I believe they did not want to tie the next administration's hands prior to them having a chance to decide. They did it in this year, and we expect it to follow.

Senator COTTON. What munitions, aside from JDAMS [Joint Direct Attack Munition], do you anticipate a future need for?

General HOLMES. Sir, I have got a long list of munitions. The primary OCO munitions that are being expended are JDAM kits, the bomb bodies that go with it. SDB-1 and Hellfire are the ones that we are looking to buy in advance as we go forward. Then my preferred munitions list to fill up the entire kind of magazine of my requirements include also air-to-air munitions and some more sophisticated air-to-ground munitions as well.

Senator COTTON. Do you have adequate funding for all those munitions?

General HOLMES. Sir, I believe that we could spend more money there. It is one of the places that we need to. It is one of the areas that, as we balance risk across the Department, we are accepting risk there.

Senator COTTON. Not many examples of something that is more suitable for OCO spending than replenishing rounds. Is there?

General HOLMES. No, sir. It is a great one. The problem is that our industry's capacity is limited on what they can do in 1 year. At the OCO rates we are buying now, we are maxing the capacity on JDAM. Most of the weapons we are buying we are buying at that economic order quantity that the manufacturer can build without losing money. To increase that procurement, we will have to go

back and also pay for increased tooling and other things at the manufacturer to be able to buy them at a great lot in 1 year. What we would propose, if you would like to work with it, would be a multiyear plan that gradually increases the amounts so that we can buy back what goes in those magazines. But we need more money if we are going to do that.

Senator COTTON. Is that primarily a question of budget resources and industry capacity versus your authorities?

General HOLMES. We have the authorities, sir, in our base budget to go out and procure munitions. It is a matter of deciding where we are going to take the risk. In the OCO area, we did not press beyond what industry could do in 1 year. I am not sure I can answer that. But we have the authority to go out and use the predicted expenditures and buy those in advance.

General BUNCH. Senator Cotton, we are in negotiation with Boeing on JDAM to ramp up so that we can meet not only our needs but our allies and foreign military sales and other requirements. We are doing those negotiations to try to get up to a higher production rate.

Senator COTTON. The Director of National Intelligence testified last year that the global threat environment was as severe as he had ever seen it in 45 years. He said he expected to say the same thing next year, and he did in fact say the same thing this year. It is the worst he has seen in 46 years. He did not make a prediction for next year. But I will ask you if you would expect us to have a lower or a higher need for munitions in the coming years.

General HOLMES. Sir, in my opinion, it will continue to be at the same way it is now at least for years to come.

Senator COTTON. Well, thank you all very much for your time. Thank you very much for your service. We appreciate everything you do for our country, and we look forward to working together over the coming months to make sure that our Air Force has the authorities and the budget it needs to perform all of its missions.

This hearing is adjourned.

[Whereupon, at 4:04 p.m., the hearing was adjourned.]



**DEPARTMENT OF DEFENSE AUTHORIZATION  
FOR APPROPRIATIONS FOR FISCAL YEAR  
2017 AND THE FUTURE YEARS DEFENSE  
PROGRAM**

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**WEDNESDAY, MARCH 16, 2016**

U.S. SENATE,  
SUBCOMMITTEE ON AIRLAND,  
COMMITTEE ON ARMED SERVICES,  
*Washington, DC.*

**ARMY UNMANNED AIRCRAFT VEHICLE AND AIR FORCE  
REMOTELY PILOTED AIRCRAFT ENTERPRISES**

The subcommittee met, pursuant to notice, at 2:33 p.m. in Room SR-222, Russell Senate Office Building, Senator Tom Cotton (chairman of the subcommittee) presiding.

Committee members present: Senators Cotton, Rounds, Ernst, Sullivan, Lee, Manchin, Gillibrand, Donnelly, and Heinrich.

**OPENING STATEMENT OF SENATOR TOM COTTON**

Senator COTTON. The hearing will come to order.

The Airland Subcommittee meets today to consider the Army's unmanned aerial systems and the Air Force's remotely piloted aircraft enterprises in the context of our review and oversight of the fiscal year 2017 defense budget request.

I welcome our witnesses: the Commander of Air Combat Command, Air Force General Herbert "Hawk" Carlisle; the Commander of Training and Doctrine Command, Army General David Perkins; and the Director of Defense Capabilities and Management for the Government Accountability Office, Ms. Brenda Farrell. Thank you all for your service, and we appreciate your attendance at the hearing today.

Unmanned aircraft systems are incredibly valuable, yet in short supply. These aircraft greatly increase the ability of commanders to gain situational awareness, exercise command and control, and provide strike capabilities over the modern battlefield.

Our combatant commanders have repeatedly testified to the importance of and the increasing but unmet demand for these aircraft. Most recently General Breedlove, the Commander of United States European Command and Supreme Commander of NATO, testified that definitely below 10 percent of his command's intelligence, surveillance, and reconnaissance, or ISR, requirements are currently being met. The story is similar around the world.

The Pentagon has long faced challenges with integrating and assimilating unmanned aircraft for both ISR and kinetic strike missions into its concepts of operations, doctrine, training organizations, and personnel processes. Another challenge is cultural, namely, moving from primarily manned aviation to a big increase in unmanned aircraft.

The Army and Air Force have taken different approaches to integrating unmanned aircraft in their services based on their unique competencies, roles, and mission requirements.

First, the Army employs their UAV [Unmanned Aerial Vehicle] systems in support of tactical units and key battlefield functions. Most are organized into platoons and are organic to brigades and divisions. Others are organized in larger formations to support corps and theater commanders.

The Air Force uses remote split operations to employ both their medium- and high-altitude remotely piloted aircraft primarily in a theater operational role.

Second, the Army uses enlisted UAV operators, supervised by warrant officers and commanded by officers, while the Air Force tasks their rated officer pilots to fly their remotely piloted aircraft organized like a traditional flying squadron.

Despite literally dozens of reviews, task forces, studies, and reports on unmanned aircraft enterprises by the Department and the GAO [Government Accountability Office], much room for improvement remains.

For instance, then-Secretary of Defense Robert Gates remarked in April 2008 that he had been trying to get more ISR assets into the CENTCOM [Central Command] theater and, quote, because people were stuck in the old way of doing business, it has been like pulling teeth. End quote.

Secretary Gates, therefore, established the ISR Task Force during which the Air Force presented a plan to reach 50 combat lines of MQ-1/MQ-9 aircraft by 2011 and 65 combat lines by 2013. Nevertheless, several years later, the Air Force still has an enterprise that is undermanned, overworked, and demoralized while facing a potential mass exodus of pilots and insufficient training infrastructure to replace these losses.

While I do not personally have fixed or preconceived notions about the right policy for either service, it is plain that the Department is still struggling with the transformation. I am keenly interested, as I know members of the committee are as well, in exploring the main issues facing the Army and the Air Force and how Congress can assist in this critical warfighting area.

I look forward to the witnesses' testimony.

I would note that several other subcommittees are meeting at this time, so we do expect Senators to be coming in and out, to include my ranking member. We will give him an opportunity to make his statement, should he arrive in the statement period.

At this point, we will turn to General Carlisle.

**STATEMENT OF GENERAL HERBERT J. CARLISLE, USAF,  
COMMANDER, AIR COMBAT COMMAND**

General CARLISLE. Chairman Cotton, Senator Rounds, thank you very much for having me today for this what I think is an incred-

ibly important hearing. I am grateful for the opportunity to participate and give you my views and hear your thoughts so we can move forward in the Air Combat Command.

As the Commander at ACC [Air Combat Command], I have the privilege to lead roughly 140,000 of our Air Force's most successful airmen and civilians. The air power they provide for our great Nation is both immense and absolutely indispensable. Air Combat Command is responsible for organizing, training, equipping, and the in-garrison employing of our Air Force's RPA [remotely piloted aircraft] enterprise.

The RPA mission is instrumental to achieving decision advantage against our adversaries. It is a powerful asset to our national decision-makers and our national security and is the backbone to the success of our current fights.

I am grateful that the committee shares our interests in the success of the RPA enterprise, and I know our combined concern, collaboration, and action will help advance the results this enterprise provides to our country.

As you stated, Chairman, our Nation's combatant commanders employ our Air Force RPAs across a range of military operations, and they are incredibly high in demand. They are employed in a very distinct way. Here again, as you stated, Chairman, they provide theater-level air power, primarily focusing their potent capabilities on strategic and operational functions. They deliver battle-field effects crucial to the conduct of our Nation's current fights and their mission is perfectly suited to our agile and amazing Air Force crews operating them.

We recognize our RPA's unique mission and its staggering importance to our national defense. Our RPAs can find themselves conducting a wide array of missions, again as you stated, Chairman. They can provide operationally strategic effects by monitoring and identifying and eliminating high-value targets, and they can deliver tactical air power during close air support engagements and in troops in contact situations, again often used in that way as well.

Our warfighters' demand for persist attack and reconnaissance through the use of RPAs has skyrocketed. To meet this demand, our RPA enterprise has expanded at an unprecedented rate over the past 10 years. In 2007, we started with seven CAPs [Combat Air Patrol]. Eight years later, we had 65 in 2015, over a fivefold increase in that time.

ACC does have a vision and an executable plan for our RPA enterprise's future to ensure continued success and, as importantly, take care of our airmen and their families.

First and foremost, we need more manpower in the RPA enterprise. Frankly, we are short and we have to plus that up. We are increasing our investments in our RPA airmen, their mission, and their resources to achieve the stable force the Nation requires within that enterprise. Our aircraft upgrades and acquisitions will allow us to provide this force with the most capable systems possible for the use in the joint warfight. The end result is RPAs delivering exactly what our combatant commanders are asking for now and in the future. No breaks, no reductions, just theater-level air power from this enterprise.

Mr. Chairman, I truly appreciate this committee's dedication to our armed forces and in particular in this case, the RPA enterprise. I look forward to continued cooperation and the success that I know that our collaboration can bring to this enterprise.

I thank you for the opportunity to participate in this hearing today and to share our ideas and advance ways that we together can make this better. I welcome any questions from the chairman and the members of the committee, and I ask that my written testimony be entered into the record. Thank you, Mr. Chairman.

Senator COTTON. Your testimony and all other written testimony will be written into the record.

[The prepared statement of General Carlisle follows:]

PREPARED STATEMENT BY GENERAL HERBERT J. CARLISLE

INTRODUCTION

Chairman Cotton, Ranking Member Manchin, and distinguished Members of the subcommittee, thank you for the opportunity to appear before you today to discuss how we deliver Persistent Attack and Reconnaissance with our Remotely Piloted Aircraft (RPA) Enterprise today and in the future. As lead command for the Combat Air Force and the RPA community, Air Combat Command is responsible for the organizing, training, equipping, and in-garrison employing of the RPA mission. This mission is instrumental to achieving decision advantage against our enemies, is an indispensable asset to our National Security, and is the backbone to the success of our fights in Iraq, Syria, Afghanistan, and other areas combating extremism and terrorism. The Air Force is fully invested in continuing to achieve sustainability of this enterprise.

Combatant commanders rely upon our RPA enterprise, and specifically our MQ-1 and MQ-9. As we speak, we are flying combat missions around the globe. They are arming decision makers with intelligence, our warfighters with targets, and our enemies with fear, anxiety, and ultimately their timely end.

But this enterprise is a victim of its own success. An insatiable demand for RPA forces has stretched the community thin, especially our airmen performing the mission. As much as we value our technology and weapons systems, our airmen are truly the most important aspect of this enterprise. We rely on their drive, commitment, performance, and innovation to find success. Due to mission demands, we have also been relying upon their sacrifice. We are taking steps to remedy this problem, stabilize the RPA enterprise, retain our valuable airmen, and sustain and eventually increase the capability our RPA community delivers to the warfighter. Our national defense requires it and we will deliver.

VALUE OF THE RPA MISSION

Air Force MQ-1s and MQ-9s currently fly 60 Combat Lines (CL) every day. Combat Line replaced the term Combat Air Patrol (CAP) and is defined as one aircraft's sortie. Each Combat Line can last up to 22 hours. They aid ground forces by providing close air support during troops in contact situations, and employ their Hellfire missiles and guided bombs to neutralize their targets. Our intelligence airmen from our Distributed Common Ground System watch and analyze every second of their streaming video, monitor pattern of life to find potential targets, and arm our commanders with decision advantage.

Their video is also live streamed to devices in the field held by Air Force Joint Terminal Air Controllers accompanying Army units on the ground or observing the battle from nearby. US and allied forces can watch the enemy hide from or advance on their positions. They base their movements on the situational awareness provided by our MQ-1s and MQ-9s. There is not a ground unit to be found that does not request the support of an RPA.

When we find ourselves conducting combat operations against ISIL, al Qaeda, or its affiliates, our RPA enterprise quickly becomes one of the most valuable battlefield assets. Combatant Commanders may not have ground forces pushing through a city, able to identify enemy combatants or high value targets first hand, to radio the target information to overhead aircraft. Some of our combatant commander's only true on-the-battlefield eyes are viewing video streamed from our RPAs and manned ISR platforms. In our current conflicts, before an enemy target is destroyed by a precision guided munition, it is likely discovered and first viewed by an RPA.

RPA's are not the only aircraft in our inventory equipped with visual or infrared sensors commonly referred to as targeting pods. Our fighter aircraft such as our F-16s, F-15Es, and even our B-1 and B-52 bombers carry similar advanced sensors. But they cannot orbit unseen and unheard over a civilian population interspersed with enemy combatants. They are limited by their loiter time and aerial refueling requirements. Our MQ-1 and MQ-9 aircraft have no such limitations. They can loiter for longer periods of time and provide enduring battlefield effects, without which our combatant commanders would struggle to find and eliminate targets.

Our MQ-1 and MQ-9 enterprise has grown tremendously since its inception 20 years ago. In 2006 the Air Force flew 12 Combat Lines. Today we fly 60. That is a 5 fold increase and exemplifies the furious pace at which we have expanded our operations and enterprise. Today we have almost 8000 airmen solely dedicated to the MQ-1 and MQ-9 mission. Over 1400 of this 8000 are Guard and Reserve personnel dedicated to the MQ-1 and MQ-9 mission. 77 percent of our cockpits are dedicated to flying combat lines every single day. The other 23 percent are dedicated to sustaining combat capacity through formal training and test. Of the 15 bases with RPA units, 13 of them have a combat mission. This mission is of such value, that we plan on consistent increases in aircraft, personnel, and results.

Our RPA enterprise operates differently from others in our flying enterprise. Some of our RPA bases have aircraft for local training and cockpits where our crews fly combat missions. Some bases just have cockpits. Overseas we operate numerous Launch and Recovery Elements where our deployed crews take off and land our RPA's. Crews from one unit will likely be flying aircraft from another unit, and possibly multiple aircraft in different areas all in the same day. This stands in stark contrast to how a traditional squadron operates, where their aircrew, maintainers and aircraft deploy together, fly combat sorties together, and redeploy together.

Another unique aspect of our RPA enterprise is that our crews deploy in-garrison. They arrive at work, fly combat sorties, and then go home to their families. This occurs every single day. However, their services are in such high demand that a regular work week, a 5-ON 2-OFF work schedule, is prohibitive to adequately providing for combatant commander requirements. Our crews work a different and more demanding schedule. Their regular work days are 10 hours long. They fly for six days straight, conduct non flying duties for one day, and then receive two days off. Instead of a 7 day week they work a 9 day week and their two days off are not guaranteed to coincide with a weekend. This grueling schedule is necessary to meet mission requirements; however it is also a significant aspect of the enterprise we are committed to fixing.

The first step to fixing that is to increase the number of RPA crews by increasing the output of our training pipeline. Air Combat Command is responsible for the training of our Air Force's RPA pilots and sensor operators. We will graduate 384 next year which is 200 more than we have graduated annually in past years. This tremendous output is currently achieved with very limited resources as we strive to balance ACC's two main priorities: Provide for Today and Prepare for the Future. More pilots and sensor operators flying combat lines means less instructors available to train our pipeline students. Increasing the instructors available to train our pipeline students will decrease the number available to fly combat lines. This delicate balance is challenging, but achievable thanks to The Secretary of Defense's authorization to decrease our daily Combat Lines from 65 to 60. This slight reduction has allowed the Air Force to begin the process of righting our training pipeline and continuation training requirements by reinvesting those pilots into the school house.

Our process for training our RPA airmen has changed significantly from its inception years ago. Originally we pulled pilots and navigators from manned flying communities like fighters, bombers, transport, and special operations. Usually these were not voluntary assignments. This drained valuable experience and manpower from these other flying communities and was a stop gap measure. Additionally it was not a good use of resources as our Air Force expended tremendous time, money, and effort to train these airmen for flying manned aircraft only to retrain them in RPA's. As our RPA enterprise increased exponentially, we transitioned towards a sustainable training pipeline and initiated a new career field—18X RPA Pilot. We created a new focused training pipeline for RPA pilots that not only shortens the time required to complete, but also eases the strain on other flying communities. While only one third of our current RPA pilots are 18X RPA Pilots, our steady state goal is to reach 90 percent and we are well on our way to achieving that desired end state.

Our 18X training pipeline and RPA pilot career field is not the only recent measure to help improve our enterprise. Our total force has been integrated into our RPA enterprise and it is not just our active duty that fulfills our RPA requirements. Our Air Force has 17 total Guard and Reserve locations operating MQ-1s and MQ-9s.

Our Guard and Reserve components currently fly 19 of our 60 daily combat lines from 10 different locations with a planned reduction to 16 steady state combat lines. Our near term plans include converting all Guard units to MQ-9s, standing up units in Arkansas, Michigan, Pennsylvania, and initiating two active associate squadrons to be used for formal training in the New York Air National Guard at Syracuse and March Air Reserve Base in California.

As we have increased our RPA footprint with our Combatant Commanders over the past decade, our enterprise must now grow. Plans are in place to continue purchasing aircraft and cockpits to achieve the required force structure. This will strike through the top item on Combatant Commander's priority lists.

We in the Air Force and Air Combat Command fully understand the value of our RPA enterprise to our national defense, and that is why over the past 10 years we have added over 35,000 airmen to our ISR community, of which almost 8000 are dedicated to the RPA enterprise. This addition occurred while we shrunk the total force by over 50,000 airmen. That means 85,000 airmen were removed from other essential missions. This is the trade-off decision we made because we fully understand the value of their mission. It is not just value-added, but required.

#### CHALLENGES FACING THE USAF RPA ENTERPRISE

A robust RPA enterprise is essential for the successful conduct of armed conflict. The biggest challenge that we as an Air Force face with our RPA enterprise is that our airmen are leaving the service faster than we can replace them, taking with them years of training and combat experience. When an RPA airman separates, we do not just lose a body in the cockpit. We lose their expertise and experience too. While on paper, personnel may be a one for one swap that populates spreadsheets, their experience is incalculable and irreplaceable.

The surge that our RPA enterprise has experienced in recent history is now no longer a surge, but the new normal. We have surged RPA operations nine times over the past eight years. It has become routine, and is taxing our airmen and our RPA enterprise beyond their limits. Sustained high operations tempo and the corresponding high levels of stress is negatively impacting the RPA enterprise. It is robbing our airmen of the quality of life necessary to withstand grueling schedules and maintain a healthy force. This leaves many of our airmen with just one option: to separate; a decision they have chosen at an extremely high rate, which threatens the sustainment of our nation's essential RPA mission.

Our regular Air Force RPA pilot manning currently accounts for around 80 percent of our requirement. Of these pilots, only one third are career RPA pilots (18X) while two thirds come from manned flying communities. The Air Force has borrowed pilots from these other flying career fields to augment this steady state force, but it remains over 200 pilots short. This shortfall is based on our cap of 60 Combat Lines and would only increase should the requirement for CLs increase.

Due to the insatiable demand for their RPA combat services and the corresponding increase in MQ-1/9 Combat Lines, the Air Force has executed rapid growth of the RPA community. This generated a requirement for more operators. In order to produce this higher number of operators, the Air Force has made the difficult decision to augment our Formal Training Units with Instructor Pilots from operational squadrons, further reducing the availability of pilots to fly combat lines, and swelling the burden on the rest of the force. Second order effects of this decision include less Instructor Pilots available to train less experienced pilots in operational squadrons.

Additionally our combat surge has reduced the availability of training sorties for our operational units. These RPA units must now borrow time during combat sorties to conduct training, such as upgrades, and improving skills, tactics, and weapon delivery procedures. This places severe limitations of their effectiveness. This is opposite the rest of our flying communities where home station training, conducted during dwell time with dedicated training sorties, allows our operators to focus on a diverse skill set across the full range of military operations

#### RPA ENTERPRISE WAY FORWARD

Air Combat Command recognizes the stressors applied to the RPA community and we have taken the initial steps required to fix it. We are invested in this venture and we know that we must stabilize the enterprise in order to sustain the combat capability and capacity for America.

Recognizing the need for change in 2015 the Secretary and Chief of Staff of the Air Force initiated an RPA Get Well Plan. Also in late 2015 ACC initiated a Culture and Process Improvement Plan (CPIP) for the MQ-1 and MQ-9 enterprise, with the goals of providing relief to our taxed crews and constructing a sustainable plan for

the future. Our overriding goal was to determine why our MQ-1 and MQ-9 airmen are stressed and leaving the force and what we can do to improve their quality of life so they make the preferred decision to remain in the Air Force and continue to provide their in-demand services to the combatant commanders.

ACC's CPIP is an aggressive, action-oriented, field-influenced program with the goal of making lasting change for the MQ-1/9 enterprise. We want to move the RPA community toward the sustainment model we have established for other Air Force weapon systems. To tackle this challenge our team conducted 1,195 face to face interviews and 1,164 electronic surveys with our RPA airmen and families. This was a grass-roots initiative to listen to our airmen and ensure their voice was heard and incorporated into stabilizing the RPA enterprise.

CCIP responses cast light on the individual issues our RPA airmen have experienced, detrimental to the culture of their enterprise. Our RPA airmen are overtasked, their communities undermanned, and are lacking adequate support on their bases. This materializes as increased stress, reduced motivation, and a general reduction in job satisfaction, even though the airmen fully understand the incredible impact they have on our combat mission.

Our solutions generated from our CPIP process are extensive but achievable. We are examining the possible expansion of the RPA community to several new bases and overseas locations. This will this help by giving airmen and their families more diverse options where they can be based. We are evaluating base services to meet the personal and family requirements of our RPA airmen, and we are also taking a further look at other quality of life initiatives, compensation, and developmental opportunities.

There are also additional changes, resulting from our CPIP findings, the Air Force is enacting to continue to build our RPA capacity and capability for the future. We are committed to investing resources to meet our sustained requirement of 361 MQ-9s and 271 cockpits. We are growing our Formal Training Unit (FTU) capacity in order to increase RPA pilot production to over 400 per year by 2019. The most we have trained up through this year is 250. Our FTUs must continue to expand to fully realize the benefits of a stabilized and in-demand service.

The funding required to support out initiatives is essential to our national defense. Air Combat Command would like to express our sincere appreciation to Congress for their support regarding our MQ-9 initiatives. The 12 MQ-9 aircraft added in fiscal year 2015 and the addition of 4 more aircraft in fiscal year 2016 will greatly aid our combat and reconnaissance operations we provide to the Combatant Commanders. We also thank you for your continued support in our fiscal year 2017 budget request. This will allow us to purchase additional MQ-9s and help replace combat losses. All of these programs will not only help stabilize our RPA enterprise, but will also amplify our combat capability.

To further incentivize our airmen to remain in service, we have requested and received authorization for an annual \$25,000 aviator retention pay for RPA pilots to bring their total compensation to the levels of our most in-demand operators and pilots. Congress's support for this initiative has been indispensable and we thank you for your backing. Furthermore, we plan to add regular monthly flight pay with gate months which ensures flight pay during non-flying assignments. These additional compensation measures will align our RPA pilot force with the rest of our flying enterprise.

#### CONCLUSION

The Air Force has provided continuous combat airpower for our Nation. It has been continuous as there has been no break in combat sorties and units deployed to combat theatres in the last 25 years. But it has also been continuous in that it has continuously evolved.

In Desert Storm, only 8 percent of our weapons were precision guided. 92 percent were unguided. Today that number is 100 percent precision. As we have transitioned to the precision era, our Intelligence, Surveillance, and Reconnaissance has also become precise. To support our 100 percent precision operations, to find our enemies, to relay targets to aircraft, and to monitor and execute the strikes, we have grown our RPA enterprise exponentially, creating a bow wave of challenges.

There is no break in sight for this mission, and we must mitigate these challenges all while continuing to supply our combatant commanders with forces required to support the defense of our nation. We have plans in place to address our current challenges, and we have enacted further plans to grow our RPA enterprise to reach its full potential.

None of this can happen without our airmen. They are indispensable and our most valuable asset and this will never change. Recruiting, retaining, and pro-

moting our airmen is as vital to our service as our aircraft and weapon acquisitions. Our RPA airman and families have sacrificed greatly in the defense of our nation. I am proud to have the opportunity to make the necessary changes to give our airmen the resources and tools necessary to maximize their impact on our national defense.

Our Get Well Plan and CPIP initiatives have started the ball rolling, and the future only gets brighter for our RPA enterprise. I thank the committee for their dedication to our Armed Forces and attentiveness to our RPA enterprise. I have no doubt that this partnership will continue to do much to improve our forces, the lives of the airmen involved, and the combat output so desperately desired by our combatant commanders. I look forward to continued collaboration and the success it will bear for the Joint Force and our Nation.

Senator COTTON. We will now pause on witness statements and turn to the ranking member, Senator Manchin.

#### **STATEMENT OF SENATOR JOE MANCHIN III**

Senator MANCHIN. First of all, thank you all for your service and thanks for being here today.

Mr. Chairman, I want to also extend a welcome to all of our witnesses and thank you for holding this hearing today.

Our witnesses this afternoon will help us understand the issues surrounding a growing capability that many only dreamed about, unmanned aircraft systems. We only have to read the headlines about so-called drone strikes to understand that these systems have become an important element of modern warfare.

We have all been concerned about supporting the combatant commander requirements that result in a need for 65 combat air patrols, and this has led to placing significant strain on the Air Force's RPA operator community.

Last fall, Secretary Carter approved an Air Force MQ-1/9 RPA combat air patrol reduction from 65 to 60 CAPs. He said that this reset would allow the Air Force to redirect operational MQ-1/9 pilot manning to ameliorate schoolhouse manning challenges. Secretary Carter also announced a number of other changes that I hope we will be able to discuss today.

The Army operates, among other unmanned systems, the MQ-1C, which is the Gray Eagle UAV. I know from the prepared testimony that General Perkins also has problems, including having to expand the capabilities of the UAV school to meet increased manning requirements. This has caused a Gray Eagle operators and maintainers.

In the interest of time—I will turn my phone off.

[Laughter.]

Senator DONNELLY. You can blame it on me, Joe.

Senator MANCHIN. I am so sorry.

In the interest, I am going to stop there, and I look forward to hearing all your testimony and our questions to follow up.

Senator COTTON. Thank you, Senator Manchin.

General Perkins?

#### **STATEMENT OF GENERAL DAVID G. PERKINS, USA, COMMANDING GENERAL, U.S. ARMY TRAINING AND DOCTRINE COMMAND**

General PERKINS. Chairman Cotton, Ranking Member Manchin, and members of the subcommittee, I appreciate the opportunity to

be here today to discuss the Army unmanned aerial systems, or UAS, as we refer to them.

The United States Army organizes, trains, and employs our unmanned aerial systems primarily as an organic support asset to the ground commander to provide assured forward-based organic support to the maneuver commander from the platoon to division level.

On September 11, 2001, the U.S. Army UAS force consisted of a little less than 3 companies and less than 200 soldiers. Since then, the United States Army UAS force has grown to over 700 medium and large UAS and over 6,500 small UAS operated by more than 7,000 soldiers.

To address this rapid expansion and continued growing demand, the Army is executing a comprehensive strategy to ensure that UAS formations are capable of meeting the challenges now and in the future.

We have made great strides over the past year implementing changes that will result in higher levels of UAS readiness across the total Army. I will share a few examples of those here.

UAS are now fully integrated into Army doctrine and regulations. Our aviation brigades now have training oversight of the Shadow UAS platoons and then brigade combat teams to improve standardization, safety, and operational capability. We now also have lieutenant platoon leaders assigned to each brigade combat team Shadow platoon. We have assessed more than 100 former OH-58 Delta pilots as UAS tech warrant officers. We have improved the UAS and aviation warrant officer basic course to reflect these best practices.

All of our Army training standards are in compliance with the basic UAS qualification training requirements directed in Chairman of the Joint Chiefs of Staff instructions 3255.01.

To improve the training of our leaders, we have established an air cavalry leaders course, a UAS platoon leaders course, and UAS leaders course.

The Forces Command Commander has integrated UAS training into his training guidance and readiness reporting, and the Army places high priority now on UAS readiness and readiness reporting.

Our division commanders and aviation center are closely collaborating to assure integrated UAS home station training that encompasses the maneuver units they support, ranges, airspace, frequency management facilities and airstrips.

In short, we have done much to improve our state of UAS training and readiness since 2014, and I am optimistic that the improved readiness results will rapidly become apparent.

I look forward to working with this committee to address your concerns about Army UAS readiness and appreciate the opportunity to speak with you today. All of us in the Army appreciate the support that we get from each one of you in a collective body. Thank you very much.

[The prepared statement of General Perkins follows:]

PREPARED STATEMENT BY GENERAL DAVID G. PERKINS

Chairman Cotton, Ranking Member Manchin, and Members of the Subcommittee, I appreciate the opportunity to appear before you to discuss the doctrine, manning, and training of Army Unmanned Aircraft Systems (UAS) units.

## INTRODUCTION

Army UAS provide assured, forward based organic support to the maneuver commander from the platoon to division level. On September 11, 2001, the U.S. Army UAS force consisted of only three companies and less than 200 soldiers. Since then, the Army UAS force has grown to over 600 medium and large UAS, and over 6,500 small UAS operated by more than 7,000 soldiers. To address this rapid expansion and continued growing demand, the Army is executing a comprehensive strategy to ensure that UAS formations are capable of meeting the challenges now and in the future. Today, I will highlight current Army UAS doctrine, manning, and training, as well as how the Army intends to continue to improve the warfighting capability of its UAS formations.

## ARMY UNMANNED AIRCRAFT SYSTEMS (UAS)

The majority of today's Army UAS formations are designed and trained to operate at the brigade, division, and corps level. They primarily support Brigade Combat Teams at the operational and tactical level, and are fully integrated as a member of the combined arms team, executing joint combined arms maneuver and wide area security in support of the ground force commander. The remaining UAS formations provide strategic intelligence, surveillance, and reconnaissance (ISR), and precision strike in support of Global Force Management Allocation Plan (GFMAP) requirements for Army, Special Operations, and joint forces. Army UAS formations deploy to the theater and execute all aspects of their mission from within the area of operations of the supported units.

The Army divides UAS into two basic categories. The first category consists of the smaller, less complex systems operated by soldiers, independent of military occupational specialty (MOS), who are selected and trained at the small unit level. The second category encompasses the larger, more capable systems operated by professional UAS soldiers who are institutionally trained, formally qualified, and assigned to maintain and operate Army UAS in UAS specific units.

The Army's smaller UAS are rucksack portable, hand-launched air vehicles that provide reconnaissance capabilities to battalion and below. These UAS are categorized as Group 1 UAS, meaning they weigh less than 20 pounds, fly at lower altitudes, are highly automated, and operate within line-of-sight of the operator. They provide a tactical reconnaissance capability to small units on the ground, allowing units to see beyond terrain features and inter-visibility lines to provide information collection and security. Group 1 UAS include the RQ-11B Raven and the RQ-20A Puma, which stay aloft for 1-2 hours while delivering basic full-motion imagery to a soldier on the ground. Puma and Raven UAS operators can be any MOS and are trained by master trainers at the unit level. Group 1 master trainers are qualified instructors who are certified through a 140-hour Qualification Course at Fort Benning, Georgia. The Army possesses no Group 2 UAS systems.

The second category of UAS are the Army's larger, more capable systems (Group 3 and Group 4) that operate at higher altitudes and at distances typically beyond the line-of-sight of their launch and recovery locations. Because of the complexity of these systems and their associated missions, Group 3 and 4 are organized into specific UAS units. The Army's current Group 3 Tactical UAS is the RQ-7B Shadow, which supports brigade and below tactical requirements. The Army's Group 4 UAS, MQ-1C Gray Eagle, supports tactical, operational, and strategic requirements at the division and above level.

Group 3 and 4 UAS are fully integrated into Army intelligence, maneuver, aviation, mission command, and fires doctrine. Their purpose is to enable combined arms maneuver by increasing the maneuver force's mobility, lethality, survivability, and mission command. Today, over 4,500 Group 3 and 4 trained UAS soldiers and Warrant Officers are assigned to 75 Shadow platoons and 10 Gray Eagle companies across the Army. These numbers will grow as the Army increases to 94 Shadow platoons and 15 Gray Eagle companies by the end of fiscal year 2018.

## ARMY UAS FORCE STRUCTURE AND MISSIONS

There is currently two UAS-specific formations in the Army for the Group 3 UAS (Shadow) and two UAS-specific formations for the Group 4 UAS (Gray Eagle). Shadow UAS are organized into platoons and assigned to either a Brigade Combat Team, a Heavy Attack Reconnaissance Squadron within the Combat Aviation Brigade, or Special Operations Units. The Gray Eagle UAS are organized into two different company constructs and either assigned to the Combat Aviation Brigade in a Division or at Echelons Above Division (EAD).

The Shadow platoon is assigned to every Brigade Combat Team in both the Active Component and National Guard. These platoons are fully integrated into combined arms maneuver, and provide the commander with reconnaissance and surveillance capabilities to meet tactical maneuver and intelligence requirements. The Shadow platoon has 27 UAS soldiers and four air vehicles, providing 18–24 hours of continuous UAS coverage to the supported commander. Combat Aviation Brigades also have three Shadow platoons assigned to each Heavy Attack Reconnaissance Squadron. These platoons also have 27 UAS soldiers and four air vehicles that can provide 18–24 hours of coverage. These platoons are employed with the AH–64 Apaches to execute manned/unmanned teaming (MUM–T) for enhanced reconnaissance, security, and attack operations.

A divisional Gray Eagle Company is assigned to each of the active component Combat Aviation Brigades and provides tactical and operational commanders organic reconnaissance, surveillance, security, and attack capabilities. Gray Eagle Companies provide support to both the Aviation Brigade and divisional ground maneuver forces as a division-level capability. Organized to deploy as a unit and conduct operations from one or more locations within their division area of operations, the 127–Soldier Divisional Gray Eagle Company has 12 air vehicles and can provide up to four simultaneous 24-hour missions per day as a consolidated company, and three simultaneous 24-hour missions per day in a split-based configuration. Although designed to support Army division requirements, these formations have been recently deployed in support of combatant commanders separate from their divisions on a Request for Forces basis to fill GFMAP requirements for ISR.

The Army also possesses EAD Gray Eagle Companies, which are assigned to both the Intelligence and Security Command (INSCOM) and the Army Special Operations Aviation Command (ARSOAC). These companies are trained, equipped, and organized to conduct long-endurance, extended range, multidiscipline intelligence and precision strike operations to provide timely intelligence and destruction of high payoff targets in support to both Army and joint organizations. These Gray Eagle Companies also have 12 air vehicles, are larger than divisional companies, and are manned with a total of 165 soldiers. This additional manning enables the EAD Gray Eagle Companies to conduct more split-based operations and are more tailorable to meet GFMAP requirements. Currently, only one EAD Gray Eagle Company is fielded with three additional companies scheduled to be complete by fiscal year 2018.

#### ARMY UAS TRAINING

The centerpiece of the Army's UAS strategy is the soldier. Army enlisted soldiers and Noncommissioned Officers (NCOs), led by UAS Warrant Officers, operate and maintain our Group 3 and 4 UAS. UAS MOSs consist of 15W (UAS Operator) and 15E (UAS Maintainer) for enlisted personnel and NCOs, and 150U (UAS Operations Technician) for warrant officers. Soldiers who enter the UAS MOS must meet the highest standards, and achieve a surveillance and communications (SC) score of at least 105 on the Armed Services Vocational Aptitude Battery military entry exam. This score is the highest SC score for entry into any Army MOS. The U.S. Army Aviation Branch has been very successful with recruiting and enlisting highly qualified soldiers for these positions.

Upon entry into the service, UAS operator and maintenance MOSs have a 6-year active duty service obligation contract that ensures service longevity of these quality enlistees after completion of their highly technical and tactical training. Upon completion of their initial enlistment, UAS Operators are currently offered a reenlistment bonus of approximately \$11,000 for an additional 5-year reenlistment to enable the Army to build senior NCOs as the force continues to grow.

Acquiring our UAS Warrant Officer leaders from the senior NCOs within the 15W UAS Operator enlisted feeder population ensures that our most experienced and capable UAS operators progress into senior leadership positions. Additionally, due to the inactivation of the OH–58D Kiowa scout helicopter fleet, we have also been able to transition over 100 of our Warrant Officer OH–58D pilots to transition into the 150U UAS Operations Technician field, infusing high quality aviators and aero scouts into this growing field.

UAS soldiers and warrant officers attend a variety of Professional Military Education and functional training courses for qualification and further education. Aviation Branch Professional Military Education (PME) is continuously reviewed, and MOS qualification-critical tasks are continuously updated using lessons learned from both combat and training. Programs of Instruction in the UAS field, like the Warrant Officer Basic Course, the Warrant Officer Advanced Course, the UAS Maintainer Course, and the UAS Operator Course continue to evolve and improve

as we expand our knowledge, along with the missions and roles of our UAS formations.

To address recent lessons learned, the Aviation Branch also added a UAS Platoon Leader Course for newly appointed UAS Shadow Platoon Leaders, and the Air Cavalry Leaders Course to provide hands on training for UAS and AH-64 Apache helicopter operators and leaders to gain greater proficiency in the employment of UAS while teamed with Apaches.

To ensure that we continue to develop the most capable personnel for this growing force, our UAS Institutional Training Center at Fort Huachuca, Arizona is staffed with the most qualified soldiers, marines, Department of the Army civilians, and contractors. The Army UAS School at Fort Huachuca qualifies both UAS operators and maintainers, as well as U.S. Marine Corps and Australian Army Shadow operators, and serves as the center of institutional training efforts for initial qualification, advanced individual training courses.

The first phase of qualification training at Fort Huachuca consists of an 8-week common core course for all UAS operators. During this phase, UAS operators receive in-depth instruction on the fundamentals of aerodynamics, doctrine, risk management, mission planning, flight safety, and navigation. During the second phase of training, UAS operators conduct live and simulated flight training in either the Shadow or Gray Eagle UAS. Shadow operator training is a 10-week program of instruction, and the Gray Eagle operator training course is a 25-week program of instruction. Both courses are performance oriented and require operators to achieve mastery of their launch, pilotage, payload operation, mission, gunnery, and recovery skills prior to graduation. Army training standards are in compliance with the Basic UAS Qualification (BUQ) training requirements directed in Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3255.01. Because of the diversity of UAS designs and missions across DOD, CJCSI 3255.01 contains a broad range of applicable training certification requirements. Upon completion of the initial training courses at Fort Huachuca, soldiers are then assigned to Army units. Once integrated with their new unit, soldiers are incorporated into the unit commander's aircrew training program (ATP), which is designed to produce fully mission trained, combat-ready crewmembers. This training focuses on task proficiency at the individual, crew, and unit level to enable the execution of the collective mission essential tasks necessary to accomplish successful joint combined arms operations.

The ATP process in units consists of progressing through three readiness levels (RL). RL3 is refresher training, and focuses on training and demonstrating proficiency in basic UAS launch, recovery, and flight tasks. RL2 is mission training, and focuses on training and demonstrating proficiency in those tasks required to execute missions (reporting, air-ground operations, acquiring and engaging targets, conducting reconnaissance, MUM-T, etc.). The third progression level is RL1. RL1 is continuation training. Once designated RL1, the UAS crewmember is responsible for maintaining proficiency in base, mission, and special tasks assigned by the commander, and must complete semiannual and annual task iterations in all modes of flight, as well as meet semiannual flying hour minimums. RL1 crewmembers must also complete and pass an annual standardization flight evaluation, medical evaluation, and operator's written examination.

As UAS soldiers gain experience in their unit during home station training, combat training center rotations, and deployments, UAS operators are further evaluated and certified as aircraft commanders. UAS Aircraft Commanders serve as the unit's first level trainer, and are responsible for all operational and training aspects of a specific mission, as well as the safe operation of the UAS by the other crew members. The Aircraft Commander (AC) program is designed to ensure that the designated aircraft commander possesses the maturity, experience, and skill proficiency required to execute their duties.

After designation as an AC, the next step for a UAS operator is designation as a UAS Instructor Operator (IO). Prerequisites for a soldier to attend the IO course are 200 or more actual flight hours, as well as demonstrated maturity, judgment, and operator proficiency. As we continue to grow the UAS force, the IO course prerequisites serve as initial screening criteria for course attendance. To ensure the quality of the prospective IOs, candidates must also pass a proficiency flight exam and written test and receive a commander's recommendation for attendance. The soldier must then satisfactorily complete all course requirements for designation as an IO.

No waivers have ever been given for schoolhouse instructor pilots and the waivers for instructor operators in UAS units are limited. There are no waivers for RL progression or currency. The only two waivers still granted are for hours (200) and rank, and are directly coordinated with the battalion command sergeant major. The Army is trending down on waivers and grant them for fewer reasons, with accident

rates also decreasing. There were 56 waivers in fiscal year 2014, 40 in fiscal year 2015, and 16 so far in fiscal year 2016. Waivers are not given lightly.

Due to a recent OSD directed Resource Management Decision to grow additional UAS formations to meet global ISR requirements, the Army is expanding the capabilities of the UAS school to meet increased manning requirements. This has caused a temporary shortage in Gray Eagle UAS operators and maintainers. We are currently on track to close the gap in fiscal year 2017. Until then, some of our non-deployed Gray Eagle formations will be manned at lower levels to ensure deployed units are fully manned and trained to meet mission requirements.

#### READINESS

To measure readiness of the UAS force, the Army implemented multiple initiatives to improve readiness reporting. A recent FORSCOM message directed subordinates to establish UAS flight hour programs and to report monthly UAS flying hour execution to the FORSCOM Commander. The fiscal year 2016 FORSCOM Training Guidance directed Combat Aviation Brigade Commanders to provide aviation standardization, maintenance, and safety oversight to Shadow Platoons assigned to ground maneuver units. This is to ensure all UAS formations regardless of parent HQs are executing flying hours to sustain readiness and build proficiency. It also directed full execution of the UAS flying hour program to improve Shadow UAS platoon readiness, and to build the experience levels required for IO certification.

HQDA also updated the Defense Readiness Reporting System to better facilitate Army UAS crew readiness reporting to ensure standardization across the Army. These changes will be implemented in the next update to DA PAM 220-1 (Defense Readiness Reporting System—Army Procedures).

As we continue to gather lessons learned, and tactics, techniques, and procedures (TTPs), we are continually assessing manning and home station training through an Army-level holistic UAS review process. This will enable the Army to more rapidly refine TTPs and training as we employ new sensors, weapons, and formations. This review process, coupled with the increased rigor in our readiness and training processes, will maintain our positive trend of reduced accidents and mishaps in recent years.

#### CONCLUSION

Over the last 15 years, the US Army has rapidly grown our Unmanned Aircraft System fleet. Army UAS formations are embedded at the tactical-level within Brigade Combat Teams and Combat Aviation Brigades, at the operational level in Divisions, and at the strategic level in INSCOM and Special Operations units. Army UAS formations have played, and will continue to play, a critical role in our ability to maintain overmatch of our adversaries as we face an increasingly complex world. Although this technology has influenced the character of warfare, integration of this technology must always be underpinned by our most important weapons—highly trained professional soldiers and leaders able to fully exploit the capabilities that UAS bring to the battlefield.

Thank you for the opportunity to represent our soldiers and our Army. On behalf of the Army, thank you for your support to our soldiers, civilians, veterans, and their families.

Senator COTTON. Ms. Farrell?

#### **STATEMENT OF BRENDA S. FARRELL, DIRECTOR, DEFENSE CAPABILITIES AND MANAGEMENT, GOVERNMENT ACCOUNTABILITY OFFICE**

Ms. FARRELL. Thank you, Mr. Chairman.

Chairman Cotton, Ranking Member Manchin, and members of the subcommittee, thank you for the opportunity to be here today to discuss some of the unmanned aerial systems, or UAS, pilot challenges that DOD [Department of Defense] faces. Let me briefly summarize my statement.

The size, sophistication, and cost of DOD's UAS portfolio has grown considerably, as has the demand for trained pilots. In our prior work, we found that the Air Force has not provided a sufficient number of UAS pilots to meet requirements due to several

factors, including most notably the increase in demand for intelligence, surveillance, and reconnaissance. As a result, the UAS workload has been performed by fewer pilots working more hours to accomplish the Air Force mission.

My statement today is based primarily on reports we issued in April 2014 and May 2015. We made 10 recommendations to DOD to improve the Air Force management of UAS pilots, address Army pilot training challenges, and enhance DOD coordination of UAS training. For this statement, we followed up with DOD officials to determine what actions they had taken in response to our recommendations.

My statement is divided into three parts.

The first part addresses the actions that the Air Force has taken to strengthen management of its UAS pilots. We found the Air Force has undertaken a number of actions but has not fully addressed the issues related to identifying pilot requirements, recruiting and retention difficulties, evaluating the potential use of civilians as pilots, ensuring pilots complete the required training, moving pilots through the training pipeline and analyzing UAS pilot promotion rates.

For example, in our April 2014 report, we found that the Air Force had not accurately identified the number of UAS pilots required to accomplish its mission, nor had it established a minimum number of pilots needed. Indications are that it needs more pilots.

As of March 2016, the Air Force had not updated pilot requirements, and until it does, the Air Force will not know if it is assuming unacceptable levels of risk to accomplishing the mission and ensuring safety.

The second part of my statement addresses training challenges that the Army faces. In 2015, we found that the Army had challenges related to pilots completing their training, tracking training, and its use of less experienced instructors, which could affect training quality.

For example, we found that a 2015 Army review showed that pilots in most Army Shadow units did not complete training in fiscal year 2014. The study found that Army UAS pilots in 61 of 65 Shadow units that were not deployed in fiscal year 2014 have flown an annual unit average of 150 hours of training, which is about 200 hours less than the minimum amount required. We corroborated the Army's findings in focus groups, discussions with Army UAS pilots, and in responses to a questionnaire that UAS unit commanders also provided.

Finally, the third part of my statement addresses coordinating the training of UAS pilots within DOD. In 2015, we found that some coordination was occurring among the services with respect to UAS training, but potential benefits exist.

For example, we reported that coordinated training between services could help shorten the amount of time the services spend acclimating to each other once deployed and would allow an easier transition to working together during missions.

Also, a senior OSD [Office of the Secretary of Defense] official stated that the services may have valuable lessons to share with one another because the services fly similar UAS. He cited similarities between the Air Force's Predator and the Army's Gray Eagle.

However, we found that no DOD-wide training strategy existed, and we recommended that DOD issue a Department-wide UAS training strategy that addresses if and how the services should coordinate with one another to share information on training UAS pilots. Without such a strategy, the services will not be positioned to capitalize on training opportunities and may waste scarce resources.

In summary, Mr. Chairman, the Army and the Air Force have taken action to implement the recommendations that we made to address some of the workforce challenges. However, none of the recommendations have been fully implemented.

We look forward to working with the Air Force and the Army to continue to monitor the actions that they have taken in response to our recommendations.

Thank you, Mr. Chairman. That concludes my statement. I will be pleased to take questions when the subcommittee so desires.

[The prepared statement of Ms. Farrell follows:]



United States Government Accountability Office

Testimony  
Before the Airland Subcommittee,  
Armed Services Committee,  
U.S. Senate

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## UNMANNED AERIAL SYSTEMS

### Further Actions Needed to Fully Address Air Force and Army Pilot Workforce Challenges

Statement of Brenda S. Farrell, Director, Defense  
Capabilities and Management

## GAO Highlights

Highlights of GAO-16-527T, a testimony before Subcommittee on Airland, Committee on Armed Services, U.S. Senate

### Why GAO Did This Study

In recent years, the size, sophistication, and cost of the Department of Defense's (DOD) UAS portfolio has grown considerably, as has the demand for trained UAS pilots.

This testimony discusses, among other things, DOD's progress in (1) taking actions to strengthen the management of Air Force UAS pilots and (2) addressing challenges the Army faces to ensure that its UAS pilots complete their required training and receive high-quality training.

GAO's statement is based on information from its reports issued in April 2014 on the Air Force UAS pilots and May 2015 on Army and Air Force UAS pilot training. For those reports, GAO reviewed DOD guidance on training UAS pilots and other relevant documents, examined nongeneralizable training records of Air Force UAS units, conducted nongeneralizable focus groups with active duty UAS pilots who were selected to cover a range of ranks and other factors at 6 installations, and interviewed DOD and military services officials. GAO obtained updates from DOD and military services officials for this statement.

### What GAO Recommends

In April 2014 and May 2015, GAO made ten recommendations to DOD to improve the Air Force's management of UAS pilots, address Army UAS pilot training challenges, and enhance DOD coordination of UAS pilot training. DOD initiated action on most of these recommendations.

View GAO-16-527T. For more information, contact Brenda S. Farrell at (202) 512-3604 or farrellb@gao.gov.

March 16, 2016

## UNMANNED AERIAL SYSTEMS

### Further Actions Needed to Fully Address Air Force and Army Pilot Workforce Challenges

#### What GAO Found

In April 2014, GAO reported on several issues the Air Force faced in managing its UAS pilots, and while the Air Force has taken some actions since then, it has not fully implemented GAO's recommendations to strengthen its management.

- **Personnel Requirements:** GAO reported that the Air Force had not accurately identified the number of UAS pilots required to accomplish its mission nor had it established a minimum number of pilots needed. As of March 2016, the Air Force had not updated personnel requirements and until it does, the Air Force will not know if it is assuming unacceptable levels of risk to accomplishing the mission and ensuring pilot safety.
- **Recruiting and Retaining:** GAO reported that the Air Force had faced challenges recruiting UAS pilots and might also face retention challenges in the future. The Air Force has taken steps to recruit more UAS pilots and offers a monthly assignment incentive pay to help retain pilots, but issues related to recruiting UAS pilots may warrant the Air Force's attention.
- **Alternative Sources:** GAO reported that the Air Force had not evaluated the use of alternative personnel populations such as enlisted or civilian personnel to help it sustain required UAS pilot staffing levels. In 2015, the Air Force announced it would test using enlisted personnel but has not formally evaluated using DOD civilian personnel as UAS pilots and thus may lack information on potential options for meeting personnel requirements.
- **Training:** GAO reported that the Air Force had faced challenges training its UAS pilots due to UAS pilot shortages, which impacted its ability to produce new pilots. Fully implementing GAO's recommendations pertaining to management of UAS pilots would better position the Air Force to address its training challenges.
- **Promotions:** GAO reported that the Air Force monitors the promotion rates of UAS pilots but had not analyzed factors that may relate to their low promotion rates. Until the Air Force does this analysis, it is unclear whether its actions to raise promotion rates are appropriate.

The Army has initiated steps to address challenges related to UAS pilots completing their required training and its use of less experienced instructors, which could affect training quality. In May 2015, GAO found that Army unit status reports did not require UAS pilot training information, and thus the Army did not know the extent pilots had been trained and were ready to deploy. GAO recommended that the Army require unit status reports to include UAS pilot readiness information. In March 2016, officials stated that the Army had taken steps to implement the recommendation, but its efforts are ongoing and thus it is too early to know their impact. Also, the Army had waived course prerequisites for about 40 percent of the UAS pilots attending a course to become instructor pilots from the beginning of fiscal year 2013 through February 2015. As a result, Army UAS pilots may not have been receiving the highest caliber of training to prepare them for UAS missions. GAO recommended in May 2015 that the Army mitigate risks posed by waiving prerequisites for less experienced UAS pilots, and in March 2016, Army officials stated that they have addressed the underlying causes that led it to waive the prerequisites, but they did not provide information for GAO to be able to determine whether they were continuing to waive these prerequisites.

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required training and receive high-quality training, and (3) coordinating the training of UAS pilots within DOD.

My testimony is primarily based on reports we issued on UAS personnel issues in May 2015 and April 2014.<sup>6</sup> For those reports, we reviewed service guidance on training UAS pilots and other relevant documents, examined nongeneralizable training records of Air Force UAS units, conducted nongeneralizable focus groups at 6 installations with active duty UAS pilots from a range of ranks, and interviewed DOD and military services officials. We also followed up with OSD, Air Force and Army officials to determine what actions they had taken in response to the recommendations we have made. All work on which this testimony is based was performed in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

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**Air Force Has Made Efforts to Manage UAS Pilots But Further Actions are Needed**

The Air Force has made efforts to manage its UAS pilots but has not fully addressed issues related to: identifying personnel requirements, recruiting and retention difficulties, the potential use of DOD civilians as pilots, pilots completing their required training, moving pilots through the training pipeline, and analyzing pilot promotion rates.

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**Air Force Has Not Accurately Identified the Number of UAS Pilots Required to Accomplish Its Mission**

We found in April 2014 that the Air Force had not accurately identified optimum personnel requirements, or the crew ratio, for the number of UAS pilots it requires. As a result, Air Force UAS units may be operating at personnel levels that are too low, which may diminish the combat capability and flight safety of these units. The Air Force conducted a study in 2008 to determine the appropriate crew ratio for MQ-1 Predator squadrons but did not account for all of the flying and administrative tasks required of those squadrons due to the study's reporting timeframes. Based on the study, the Air Force concluded that the crew ratio for MQ-1

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<sup>6</sup>GAO-15-461 and GAO-14-316.

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Predator squadrons should be 10:1, which calls for 10 UAS pilots to support one near-continuous 24-hour flight presence of an Air Force UAS over a particular geographic location. Headquarters Air Force officials stated that, because of the omitted tasks, the study's recommended 10:1 crew ratio probably did not provide enough pilots to perform the work in an MQ-1 squadron. In addition, some UAS unit commanders and UAS pilots in some of the 10 focus groups we conducted at three Air Force bases said that the 10:1 crew ratio was too low.<sup>7</sup> High-performing organizations use complete and current data to inform their strategic human capital planning and remain open to reevaluating workforce planning efforts. Consequently, we recommended that the Air Force update crew ratios for UAS units to help ensure that the Air Force establishes a more-accurate understanding of the required number of UAS pilots in its units, and the Air Force concurred with our recommendation.

The Air Force has taken some actions in response to our recommendation, but Air Force officials told us that as of March 2016, the Air Force has not updated its UAS unit crew ratio. In our May 2015 report, we found that the Air Force had a three-phase personnel requirements study underway that was designed to update the UAS unit crew ratio. Air Force officials stated that the preliminary results of the study pointed to updating the UAS unit crew ratio and increasing the required number of pilots in UAS units. In May 2015, the officials also stated that they expected to update the UAS unit crew ratio later in 2015 but has not yet done so. Without an updated crew ratio, the Air Force lacks information needed to accurately identify the number of Air Force UAS pilots it requires and may need additional pilots.

As we also found in April 2014, Air Force documentation showed that crew ratios in UAS units had not met the 10:1 crew ratio identified in the 2008 study and instead fluctuated between 7:1 and 8.5:1, indicating that between 7 and fewer than 9 UAS pilots were used to sustain 24 hours of Predator operations rather than the 10 pilots recommended by the study. We found that the Air Force operated at these levels in order to provide a

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<sup>7</sup>We conducted 10 focus group meetings with active-duty RPA pilots during site visits to Beale, Cannon, and Creech Air Force Bases. We decided to visit these three bases because more RPA pilots are stationed at these bases than other Air Force bases. We use the term "some," as in "pilots in some focus groups," to report topics that were discussed by UAS pilots in two to four of our focus groups.

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higher number of CAPs to meet the requests made by combatant commanders. An Air Force instruction states that a crew ratio establishes the number of personnel required to support a unit mission and that if a ratio is too low, combat capability is diminished and flight safety suffers.<sup>8</sup> We recommended at that time that the Air Force establish a minimum crew ratio in Air Force policy below which UAS units cannot operate without unacceptable levels of risk to mission accomplishment and safety. The Air Force concurred with our recommendation and in comments on our report the Air Force stated that it anticipated that it would implement our recommendation by February 2015.

We reported in May 2015 that the three-phase personnel requirements study would also address the recommendation to establish a minimum crew ratio, but according to Air Force officials that study has not been finalized. In February 2016, the Air Force Deputy Chief of Staff of Operations directed that the Air Force use the 10:1 crew ratio as the minimum. However Air Force officials stated that due to personnel shortages, that ratio has not been enforced. As of February 2016, UAS units had been operating at a 9.4:1 crew ratio, meaning that between 9 and 10 UAS pilots were used to sustain 24 hours of Predator operations rather than the 10 pilots recommended by the study. Without a minimum crew ratio established in Air Force policy, the Air Force lacks information needed to determine when UAS units are operating at crew ratio levels that expose the Air Force to unacceptable levels of risk to accomplishing its mission and ensuring safety. In addition, UAS pilots may continue to experience a high pace of operations that limits their time for training and impacts their quality of life.

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<sup>8</sup>Air Force Instruction 65-503, *Authorized Aircrew Composition-Active Forces*, table A36-1 (Feb. 1, 2012).

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The Air Force Has Taken Steps to Recruit More UAS Pilots, but May Face Retention Challenges and Continues to Rely on Pilots Trained on Manned Aircraft to Meet Requirements

We found in April 2014 that the Air Force faced challenges recruiting UAS pilots and had not achieved its recruiting goals for UAS pilots in fiscal years 2012 and 2013. Air Force officials cited a number of reasons for missing the targets, including that potential UAS pilot recruits had a limited understanding of the UAS mission because the Air Force lacked recruiting officials with UAS experience. High-performing organizations tailor their strategies to the specific needs and challenges of the workforce to recruit high-quality personnel with critical skills, but the Air Force had not developed a strategy to address recruiting and retention of UAS pilots, including increasing the appeal of the UAS pilot career to potential recruits. As a result, the Air Force risked personnel shortages and continued reliance on manned-aircraft pilots to fill its personnel requirements. We recommended that the Air Force develop such a tailored strategy to recruiting and retaining UAS pilots to help ensure that the Air Force can meet and retain required staffing levels, and the Air Force concurred.

In 2015, Air Force senior leadership and headquarters officials stated that the Air Force was in the process of developing strategies to recruit UAS pilots. The Air Force has taken a number of actions that officials say have helped improve UAS pilot recruiting. For example, Air Force officials stated that Headquarters Air Force has efforts underway to educate potential recruits at the commissioning sources such as the Air Force Academy on the UAS mission. Officials told us that the Air Force is providing cadets information on the UAS pilot career and it is assigning UAS pilots to the Academy so that they can share their on-the-job experiences with cadets who may be interested in becoming a UAS pilot. In addition, the Air Force began requiring cadets to volunteer to serve in any of the four aviation-related careers rather than applying for one specific career. This process allows the Air Force to assign cadets to any of the four careers based on Air Force needs, among other factors. Air Force officials stated that the Air Force has also opened up eligibility for becoming a UAS pilot by removing age requirements and granting waivers for certain medical requirements.

In April 2014 we also found that the Air Force may face challenges retaining UAS pilots. Pilots in 7 of the 10 focus groups we conducted at three Air Force bases indicated that retention of UAS pilots is or will be a challenge and UAS unit commanders in one location we visited and other Air Force officials stated that they were concerned with future retention rates of UAS pilots. As mentioned above, we recommended that the Air Force develop a tailored strategy that addresses both recruiting and retention of UAS pilots and the Air Force concurred.

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To retain pilots, officials stated that the Air Force pays UAS pilots a monthly assignment incentive pay which is equivalent to the amount that manned pilots receive in aviation pay. Also, the National Defense Authorization Act for Fiscal Year 2016 granted the Air Force the authority to increase the annual amount that it pays UAS pilots in a retention bonus from \$25,000 to \$35,000. A Headquarters Air Force official told us in January 2016 that the Air Force has not used this authority to pay UAS pilots the increased amount of this retention bonus for two reasons. First, OSD has not yet issued related policy that the act required be issued before the Air Force could begin paying this increased amount. Second, the Air Force does not have enough data to determine what the retention patterns of this population will be because most of the pilots who specialize in flying UAS have not reached the end of their six-year service commitment. The official stated that the Air Force would like to determine if retention of this population is a concern before exercising the authority to offer these pilots the increased retention bonus amount.

Further, the Chief of Staff of the Air Force testified that the Air Force was not using the increased amount of the retention bonus. Specifically, he stated that the Air Force did not use that increased bonus for UAS pilots because the current amount was commensurate with that of other critically manned pilot categories. He further stated that the Air Force has other pilot categories that are even in more crisis than UAS at this point in time. We will be exploring further with the Air Force their plan to use this bonus and UAS pilot retention rates. The Air Force is pursuing initiatives to address shortages in the MQ-1 and MQ-9 pilot community that Air Force officials say will have a positive impact on retention. For example, the Air Force is supplementing its UAS pilot population with the Air Force Reserve and contractor support.

The Air Force has taken positive steps toward improving recruiting and, according to Air Force officials, has met or nearly met its UAS pilot recruiting goals for fiscal years 2014 and 2015, which shows progress toward resolving the recruiting challenges we found in 2014. At the same time, issues related to recruiting UAS pilots may warrant the Air Force's attention. In particular, the recruiting goals themselves may not be appropriate because, as previously discussed, the crew ratio has not yet been updated and the crew ratio is used to determine the total number of UAS pilots the Air Force requires. In addition, in April 2014, we also found that 42 percent of Air Force pilots flying UAS were manned-aircraft pilots and manned-aircraft pilot training graduates. Both of those groups are temporary UAS pilots who serve only one assignment in a UAS squadron. Air Force officials stated that as of March 2016, those groups represented

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around one-third of Air Force UAS pilots. They also stated they anticipate they will not need to use any manned-aircraft pilot training graduates in fiscal year 2016 based on the number new UAS pilots that the Air Force anticipates will join the Air Force in fiscal year 2016. However, if the Air Force updates the crew ratio and finds it needs to increase the number of UAS pilots it requires, the Air Force may need to continue relying on manned aircraft pilots, indicating the continued importance of a strategic approach to recruiting and retention that is tailored to the needs of the UAS pilot workforce.

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**The Air Force Is Planning to Use Enlisted Personnel to Operate the Global Hawk but has not Evaluated the Possible Use of DOD Civilians**

In April 2014, we found that the Air Force had not evaluated whether using alternative personnel populations such as enlisted or civilian personnel as UAS pilots is a viable option to help it meet and sustain required UAS pilot staffing levels. Headquarters Air Force officials had stated that they had, at times, considered the use of enlisted or civilian personnel but had not initiated formal efforts to evaluate the potential use of alternative personnel populations as UAS pilots. We recommended that the Air Force conduct such an evaluation to identify whether such alternative populations could help the Air Force meet and sustain required UAS pilots staffing levels. The Air Force partially concurred with our recommendation, stating that the Air Force had considered assigning enlisted personnel as UAS pilots but had decided that the responsibilities of piloting a UAS were commensurate with the rank of officers.

Subsequently, the Air Force has made progress toward implementing our recommendation. Even though the Air Force commented on our recommendation that the responsibilities of piloting a UAS were commensurate with the rank of officers, the Chief of Staff of the Air Force directed Headquarters Air Force staff to evaluate the potential of using enlisted personnel as UAS pilots in fall 2014. Further, the Air Force announced in December 2015 that it would integrate enlisted personnel into flying operations for the RQ-4 Global Hawk UAS. In December 2015, the Secretary of the Air Force and Chief of Staff of the Air Force stated that the goal of the initiative is to provide an additional avenue for capability growth and directed development of an implementation plan to use enlisted personnel to operate the Global Hawk by May of 2016. However, as of March 2016, Air Force officials stated that the Air Force has not formally evaluated using DOD civilian personnel as UAS pilots, as we recommended. Without also evaluating DOD civilian personnel, the Air Force may lack valuable information on whether additional options exist for meeting personnel requirements.

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**Air Force UAS Pilots Do Not Complete the Majority of Their Continuation Training**

In April 2014, we found that the high pace of operations limited the time the UAS pilot workforce could put toward training and development. In addition, in May 2015, we found that Air Force UAS pilots do not complete the majority of their continuation training because they spend most of their time conducting operational missions due to shortages of UAS pilots and high workloads. Continuation training includes all training that takes place once a servicemember reaches their operational unit and finishes the training required to be considered qualified to perform the unit's mission. A core characteristic of a strategic training framework is that agency leaders and managers consistently demonstrate that they support and value continuous learning. We found that a nongeneralizable sample of training records for seven Air Force UAS units showed that, on average, 35 percent of the pilots in these units completed the continuation training for all of their seven required missions in fiscal year 2014. In March 2016, Air Force officials stated that UAS units make efforts to dedicate time to continuation training but the majority of their time is still devoted to combat missions based on personnel shortages and high demand. However, as we noted in May 2015, fully implementing all four recommendations we made in our April 2014 report pertaining to management of Air Force UAS pilots should better position the Air Force to address the UAS pilot shortages that contribute to training challenges.

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**The Air Force Faces Challenges Moving UAS Pilots Through the Training Pipeline**

In April 2014 we found that the Air Force had reduced the capacity of its training units by moving instructor pilots to operational units to react to increasing demand for UAS capabilities. A core characteristic of a strategic training framework is that agencies should provide appropriate resources for its training programs. However, in May 2015, we found that the Air Force had staffed its UAS training squadrons at Holloman Air Force Base at 63 percent of their planned staffing levels due to shortages of UAS pilots across the Air Force, which Air Force officials stated in turn impacted the Air Force's ability to produce new pilots. We also reported actions the Air Force was taking to increase the number of instructor pilots, including studying the personnel requirements for the formal training unit. Air Force officials stated that as of February 2016, the Air Force had filled 84 percent of its instructor pilot positions at Holloman. These officials said that there is still a need to increase the number of instructor pilots, and the Air Force goal is to fill 100 percent of the instructor pilot slots by fiscal year 2017. Fully implementing our recommendations pertaining to management of UAS pilots should better position the Air Force to address the need to increase the number of instructor pilots.

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**The Air Force Monitors  
UAS Pilot Promotion  
Rates but Has Not  
Analyzed Factors Related  
to Those Rates**

In April 2014, we found that the Air Force monitors the promotion rates of UAS pilots but had not analyzed factors that may relate to their low promotion rates. The Air Force had found that UAS pilots were promoted below the average rate for active-duty line officers on 20 of 24 officer promotion boards between 2006 and 2012 and 2013, depending on rank. We also found that UAS pilots were promoted at the lowest rate of any career field on 9 of the 24 boards. Statistical principles call for researchers to account for potential key factors in analysis because when they omit key factors, the relationships between other factors may not be accurately estimated. The Air Force analyzed promotions across a group of officers—or the Line of the Air Force—including UAS pilots, and found factors that related to promotions in general. However, the Air Force had not analyzed the factors related to UAS pilots' promotions specifically and, as a result, it did not have the information to determine what factors may affect their promotions. We recommended that the Air Force include the career field effect of being a UAS pilot into its analysis to determine whether and how being a UAS pilot is related to promotions and determine whether the factors identified in the analysis of Line of the Air Force officers are also related to UAS pilot promotions.

The Air Force partially concurred with our recommendation, stating that because the UAS career field is a subsection of the Line of the Air Force, the factors identified in analysis of the Line of the Air Force are directly related to UAS pilot promotions, which we acknowledged in our report. As of January 2016, the Air Force had not taken any steps to implement our recommendation and when we sought additional information in March 2016, the Air Force did not respond in time for this statement. Without including the career field effect in its analysis, the Air Force may not be targeting actions it is taking to raise UAS pilots promotion rates at the appropriate factors, and information it has reported to Congress may not be accurate.

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**Army Has Not Fully Addressed Challenges Related to UAS Pilots Completing Required Training and the Use of Less Experienced Instructors**

The Army has not fully addressed challenges related to UAS pilots completing their required training and its use of less experienced instructors, which could affect training quality.

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**Army UAS Pilots in Shadow Units that are Not Deployed Are Not Completing Continuation Training**

In May 2015, we found that a 2015 Army review showed that pilots in most of the Army's Shadow units did not complete training in their units in fiscal year 2014.<sup>9</sup> We previously developed a set of core characteristics for assessing strategic training programs in the federal government.<sup>10</sup> One of these characteristics calls for agency leaders to demonstrate that they value continuous learning.<sup>11</sup> In January 2015, the Chief of Staff of the Army directed the Army Training and Doctrine Command to evaluate if unit training was a factor that caused UAS mishaps in combat. The Army reviewed this issue from January 2015 through March 2015 and found that UAS pilots in 61 of the 65 RQ-7B Shadow units that were not deployed in fiscal year 2014 had flown an annual unit average of 150 hours of training,<sup>12</sup> which is about 200 hours less than minimum amount of training flight hours that an Army unit is required to fly according to the review. In addition, the review included recommendations to increase emphasis on training in UAS units including that the Army should (1) issue guidance to unit commanders on UAS training; (2) ensure that UAS

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<sup>9</sup>Army Shadow units operate the RQ-7 Shadow UAS.

<sup>10</sup>GAO, *A Guide for Assessing Strategic Training and Development Efforts in the Federal Government*, GAO-04-546G (Washington, D.C.: Mar. 2004). To develop these characteristics, we consulted government officials and experts in the private sector, academia, and nonprofit organizations; examined laws and regulations related to training and development in the federal government; and reviewed literature on training and development issues, including previous GAO products on a range of human capital topics.

<sup>11</sup>GAO-04-546G.

<sup>12</sup>This measure shows an average of the total amount of training time that all pilots in each unit flew in fiscal year 2014.

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warrant officers are qualified on their UAS; (3) Increase the amount of home station training for UAS units; and (4) establish a system to report UAS training readiness on unit status reports.

We corroborated the Army's findings in focus groups discussions<sup>13</sup> with Army UAS pilots and in responses to a questionnaire that UAS unit commanders provided. Specifically, we found that pilots in all eight of the focus groups we conducted with Army UAS pilots stated that they cannot complete training in their units. For example, a pilot in one of 8 focus groups stated that during his 3 years as a UAS pilot, he had been regularly tasked to complete non-training-related activities, and as a result he completed a total of 36 training flight hours even though the requirement is that he should have completed 72 flight hours during those three years. Further, Army UAS pilots in each of the 8 focus groups we conducted stated that they had difficulty completing UAS pilot training in units because they spend a significant amount of time performing additional duties such as lawn care, janitorial services, and guard duty. Additionally, five of the six Army UAS units that responded to a questionnaire we administered indicated that their units faced challenges completing training in their units.

At the time, we did not make any recommendations on this issue. We noted that while the Army review and our analysis showed that most Army UAS pilots were not completing training in their units, the Army's training shortfalls might be addressed by the high-level interest expressed by the Chief of Staff of the Army and the recommendations in the Training and Doctrine Command review, if implemented. We asked the Army to provide information to update our May 2015 report to show (1) the amount of unit training that UAS pilots completed in fiscal year 2015, and (2) actions the Army had taken in response to its internal recommendations to increase emphasis on unit training. Finally, the Army

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<sup>13</sup>We conducted 8 focus groups with Army UAS pilots at Ft. Huachuca, AZ and Ft. Hood, TX. We selected these locations on the basis of several factors including the type and size of UAS flown in the unit; missions of the unit; whether or not the unit is deployed (we did not meet with units who were deployed); number of UAS pilots in the unit; the major command of the unit; and location of the unit. We conducted focus groups with active-duty UAS pilots at these locations to gain their perspectives on the Army's UAS training efforts. To select specific UAS pilots to participate in our focus groups, we worked with officials at each of the installations to develop a diverse group of active-duty UAS pilots. To obtain a variety of perspectives, we selected UAS pilots with varying amounts of experience flying UASs and additional duties in their units. The opinions of UAS pilots we obtained during our focus groups are not generalizable to the populations of all UAS pilots in the Army.

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did not respond to our request to provide updated information on these topics for this statement.

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**Army Does Not Have Visibility over the Amount of Training that Pilots in Some UAS Units Have Completed**

In May 2015, we also found that the Army does not have visibility over the amount of training that pilots in some Army UAS units have completed. Another core characteristic of a strategic training framework highlights the importance of quality data regarding training.<sup>14</sup> However, we found that Army does not have access to data that would allow it to measure the amount of training that UAS pilots have completed in Army UAS units. Army Forces Command officials stated that they need information about the readiness level of pilots in UAS units to determine if a unit is ready to deploy and perform its mission. These officials stated that they review Army unit status reports to determine if a unit is prepared to deploy. However, officials from Army Headquarters, Army Forces Command and the Army Aviation Center of Excellence both stated that these reports do not provide any information on the readiness levels of the UAS pilots in UAS units because the reports are not required to include this information. Officials at Forces Command stated that, using these reports, they have designated units as available for deployment and later learned that a significant portion of the pilots in those units had not completed their readiness level training. Without requiring information on the readiness level of pilots in UAS units as part of unit status reports, Army Forces Command will continue to lack visibility over the amount of training that UAS pilots have completed in units. To provide greater visibility over the extent to which Army UAS units have completed required training to leaders responsible for deployment decisions, we recommended that the Army require unit status reports to include information on the readiness levels of UAS pilots in UAS units and the Army concurred.

Since we issued our report in May 2015, Army Headquarters officials stated that the Army had drafted an update to Department of the Army Pamphlet 220-1 that would require UAS units to report the readiness levels of the UAS pilots in UAS units.<sup>15</sup> In addition, these officials stated that the Army was working on updating the unit status reporting software

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<sup>14</sup> GAO-04-546G.

<sup>15</sup> Army Pamphlet 220-1, *Defense Readiness Reporting System-Army Procedures*, (November 16, 2011).

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to enable units to comply with the planned update to the Army pamphlet. While the steps that Army has taken to date should address our recommendation, its efforts are ongoing and thus it is too early to know their impact.

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**The Army Has Taken Action to Increase the Number of Instructors, but Its Use of Less Experienced Instructors Could Affect the Quality of UAS Pilot Training**

In May 2015, we found that the Army had taken actions to increase the number of UAS instructors, but it had not fully addressed the risks associated with using less experienced instructors. In order to increase the number of its instructors in response to an increase in the number of UAS units, the Army waived course prerequisites for about 40 percent of the UAS pilots attending the course to become instructor pilots from the beginning of fiscal year 2013 through February 2015. These prerequisites—such as a minimum number of flight hours—are important because they help ensure that UAS pilots volunteering to become instructors to help ensure that instructors are fully trained and ready to instruct UAS pilots.

In May 2015, we found that the Army had taken steps to mitigate the risks of using less proficient UAS instructors. For example, in fiscal year 2015, the Army stopped waiving course prerequisites related to proficiency, according to Army Aviation Center of Excellence officials. However, the Army could continue to waive prerequisites related to experience. As a result, we found that Army UAS pilots may not have been receiving the highest caliber of training needed to prepare them to successfully perform UAS missions. To help ensure that Army UAS pilots receive the highest caliber of training, we recommended, in May 2015, that the Army take additional steps to mitigate potential risks posed by waiving course prerequisites for less experienced UAS pilots attending the course to become instructors and the Army concurred.

In February 2016, Army Headquarters officials stated that the Army has taken additional steps to mitigate potential risks posed by waiving course prerequisites for less experienced UAS pilots attending the course to become instructors. However, the Army did not respond to requests we made in March 2016 for it to explain these additional steps; nor did the Army respond to requests we made for it to provide updated statistics to determine if the Army was continuing to waive these prerequisites. In addition, an Army official from Training and Doctrine Command stated that the Army had not provided additional training or preparation for instructors who previously received a waiver of one of the course prerequisites to attend the instructor course as we had recommended.

## DOD is Coordinating on Some Aspects of UAS Pilot Training But Still Lacks a Department-Wide Strategy

Some coordination is occurring among the services with respect to UAS pilot training but DOD has not yet developed a department-wide UAS training strategy. In May 2015, we found that the actions that the services had taken were either partially consistent or inconsistent with the key practices to enhance and sustain agency coordination.<sup>16</sup> We previously reported that agencies face a range of barriers when they attempt to collaborate with other agencies. To help agencies overcome these barriers, we developed a set of key practices that can help enhance and sustain federal agency collaboration.<sup>17</sup> According to these key practices, federal agencies can enhance and sustain their coordination if they take a number of actions including the following.<sup>18</sup>

- Agencies should identify the human, information technology, physical, and financial resources needed to initiate or sustain their coordinated effort. In May 2015, we found that DOD actions were partially consistent with this principle. For instance, the Air Force and the Army provide resources to train all Marine Corps UAS pilots. However, as we found in May 2015, both the Army and the Air Force are working on addressing UAS personnel shortages and such shortages may negatively affect their ability to continue to train Marine Corps UAS pilots.
- Agencies should agree on their roles and responsibilities, including how the coordinated effort will be led. In May 2015, we found the Office of the Deputy Assistant Secretary of Defense (Readiness) and the services have not agreed on roles or responsibilities for any of the services for coordinating on UAS pilot training. The Office of the

<sup>16</sup>GAO-15-461

<sup>17</sup>We reported these key practices in *Results-Oriented Government: Practices That Can Help Enhance and Sustain Collaboration among Federal Agencies*, GAO-06-15 (Washington, D.C.: Oct. 21, 2005). For our 2005 report, we derived these practices by reviewing academic literature and prior GAO and Congressional Research Service reports; and interviewing experts in coordination, collaboration, partnerships, and networks from the National Academy of Public Administration, the IBM Center for The Business of Government, and the University of California, Berkeley.

<sup>18</sup>While these practices address interagency collaboration, we believe these practices apply to intra-agency coordination in DOD because multiple departments within DOD are responsible for UAS pilot training programs. Further, we reviewed these practices with officials from the Office of the Assistant Secretary of Defense for Readiness and these officials agreed that the practices applied in the context of our review. In addition, we confirmed these practices and reported on mechanisms for implementing collaborative efforts in *Managing For Results: Key Considerations for Implementing Interagency Collaborative Mechanisms*, GAO-12-1022 (Washington, D.C.: Sept. 27, 2012).

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Under Secretary of Defense for Acquisitions, Technology, and Logistics established a UAS Task Force in 2007, and its charter states that its mission is to coordinate critical DOD UAS issues. However, a task force official stated that the task force does not play a role in coordinating UAS pilot training among the services.

- Agencies should define a clear and compelling rationale for coordination. In March 2010, we found that DOD had begun to address UAS training challenges, but had not developed a strategy to prioritize and synchronize these efforts. We recommended that DOD establish a DOD-wide UAS training strategy to resolve challenges that affect the ability of the Air Force and the Army to train personnel for UAS operations and DOD concurred with that recommendation.<sup>19</sup> The Office of the Deputy Assistant Secretary of Defense (Readiness) tasked the RAND Corporation to draft a DOD-wide UAS training strategy and provided RAND with guidelines about the content and purpose of the strategy.<sup>20</sup> However, these guidelines did not discuss if or how the services should coordinate on UAS pilot training. In September 2014, RAND provided a draft of a UAS training strategy to the Office of the Deputy Assistant Secretary of Defense (Readiness), but the draft did not define a rationale for the services to coordinate on training UAS pilots nor did it more generally discuss service coordination on training UAS pilots.

In our May 2015 report we noted that the Acting Deputy Assistant Secretary of Defense (Readiness) had stated, in January 2015, that the services should coordinate their efforts to train UAS pilots and that the services may have valuable training lessons to share with one another because the services fly similar UAS. He cited similarities between the Air Force's Predator and the Army's Gray Eagle and between the Air Force's Global Hawk and the Navy's Triton. He stated that if the services coordinated on training their UAS pilots the department as a whole may be able to train its UAS pilots more effectively and efficiently. However, as

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<sup>19</sup>GAO, *Unmanned Aircraft Systems: Comprehensive Planning and a Results-Oriented Training Strategy Are Needed to Support Growing Inventories*, GAO-10-331 (Washington, D.C.: Mar. 26, 2010).

<sup>20</sup>In 2010, we found that DOD had commenced initiatives to address training challenges, but had not developed a results-oriented strategy to prioritize and synchronize these efforts. We recommended that DOD establish a UAS training strategy to comprehensively resolve challenges that affect the ability of the Air Force and the Army to train personnel for UAS operations and DOD concurred with our recommendation. See *Unmanned Aircraft Systems: Comprehensive Planning and a Results-Oriented Training Strategy Are Needed to Support Growing Inventories*, GAO-10-331 (Washington, D.C.: Mar. 26, 2010).

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we found in May 2015, without a DOD-wide UAS training strategy that addresses if and how the services should coordinate with one another on training UAS pilots, the services may miss opportunities to improve the effectiveness and efficiency of this training and may waste scarce funds on training UAS pilots. We therefore recommended that the Office of the Under Secretary of Defense for Personnel and Readiness address how the services should coordinate with one another in the DOD-wide UAS training strategy the office was drafting at the time we issued our report, and DOD concurred with this recommendation.

In March 2016, the Director of Force Training in the Office of the Assistant Secretary of Defense (Readiness) stated that DOD had not yet published the DOD-wide UAS training strategy but the strategy was in the final drafting phase. He stated that his office held a summit in October 2015 with each of the services and during this summit representatives from each of the services discussed the draft strategy and how to incorporate our recommendation into the strategy. He stated that his office was collecting the services' comments on the draft strategy and would provide them to RAND and that RAND is currently revising the strategy. The Director stated that the current version of the strategy addresses our recommendation and provides detail on how the services could coordinate with one another during sustainment and mission readiness training. However, as of March 2016, the Office of the Assistant Secretary of Defense (Readiness) has not yet issued the DOD-wide UAS training strategy.

In summary, the Air Force and the Army have taken actions to implement the recommendations that we made to address some of the UAS workforce challenges we identified in 2014 and 2015. However, none of the recommendations that we have discussed today have been fully implemented. As you know, in June 2014 the Senate Armed Services Committee directed the Air Force to implement three of our recommendations—which address the UAS unit crew ratio, recruiting, and retention—that we discussed today. In addition, the Committee Chair and Ranking Member have urged the Secretary of Defense to focus senior leaders in the department on the UAS pilot training shortfalls in the Army and Air Force that we also discussed today. Fully implementing our recommendations would set the Air Force on a positive course toward helping ensure the high-demand UAS pilot workforce has sufficient numbers and is well trained. Similarly, as we recommended, greater visibility over the extent to which Army UAS units have completed required training and additional training for instructors who previously received a waiver of one of the course prerequisites would help ensure a

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highly skilled future Army UAS workforce. However, without addressing if and how the services can enhance their coordination efforts on training UAS pilots in DOD's forthcoming training strategy, the services may not be able to achieve additional benefits to the efficiency and effectiveness of UAS pilot training across the department.

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Chairman Cotton, Ranking Member Manchin, and Members of the Subcommittee, this concludes my prepared testimony. I look forward to answering any questions.

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**GAO Contact and  
Staff  
Acknowledgments**

If you or your staff have any questions about this testimony, please contact Brenda S. Farrell, Director, Defense Capabilities and Management at (202) 512-3604 or FarrellB@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. GAO staff who made key contributions to this testimony are Lori Atkinson, (Assistant Director), James P. Klein, Kelly Liptan, Felicia Lopez, Mike Silver, and Erik Wilkins-McKee.

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Senator COTTON. Thank you all.

General Carlisle, as I mentioned in the opening statement—and you touched on some of the same points in your written statement—the Air Force has faced some challenges normalizing the integration of unmanned aircraft into institutional processes. Now, perhaps platforms like the MQ-1 and MQ-9 were viewed as emergency urgent fixes during the early phases of the war on terror or something that might decline as combat operations declined in their OPTEMPO [Operation Tempo]. Certainly the Air Force, like all services, have been underfunded in recent years, which puts you

on the horns of a dilemma trying to meet all of your increasing requirements while also meeting the warfighting demands.

That said, unmanned aerial vehicles are an increasingly potent resource on the battlefield and much of the next chapter of the Endeavor war is going to be written by them.

The Air Force has a history and a culture that is deeply rooted in fighter operations over the skies of Europe. Do you think there is some kind of cultural aversion within the Air Force that has hindered it from fully integrating unmanned systems into its doctrine and its operations?

General CARLISLE. Chairman, thanks for the question.

I do not. I will tell you that what our RPA crews do—and it is across the spectrum, obviously, MQ-1/9, RQ-170, the RQ-4 and what is going to be MQX and RQX in the follow-ons. The use of those systems, the employment of those, the weapons school and how they stand up and integrate in all of our exercises into the training between the Army and the Air Force at both Green Flags and Army warfighter assessments—we spend a lot of time making sure that we get this right and we do that integration.

I will tell you I do not think, if you talk to anybody in the United States Air Force, they would tell you that RPAs are not part of our future. They are a huge part of our future. Today it is the largest mission design series in the United States Air Force on the MQ-1/MQ-9 side, and they will continue to grow.

The challenge that we faced—and again, I truly believe, Mr. Chairman, that it was not cultural. It was the demand signal accelerated so rapidly and we were trying to meet the demands of the warfighter, which we had to do to win the Nation's wars today that we are fighting. We just started this ramp of increasing those combat lines, or combat air patrols, per day, and we did not have time to build what is a normal process to develop and take care of that enterprise.

An example of it. Between the MQ-1 and 9, we have flown 3 million hours—over 3 million hours—in those two weapon systems. Over 2.8 million hours of that time has been combat, which means the formal training unit, the test and the continuation training are a mere fraction of the amount of time we have flown, and it is because of the demand signal.

The purpose of the “get well” plan and the culture and process improvement program is to step back—and we have done that. The GAO report was fantastic in helping us do this—look at what we need to do to get this right, determine those numbers, fix the training pipeline, and then put the right amount of force and the right amount of work into the RPA enterprise because it is going to be with us, we see it, indefinitely. It is a huge part of our future. We are working hard to normalize that. It is not the cultural part. It is the training and to try to meet the demand of the combatant commanders and the warfighters.

Senator COTTON. Why do you think there is such an unmet demand signal? When I meet with combatant commands, theater commands, whether here in Washington or downrange, one consistent theme I hear—I suspect the members of this committee will hear the same thing—is we cannot get enough unmanned aerial coverage in our theater.

General CARLISLE. Sir, I think the demand signal is incredible. Clearly what the RPAs provide with respect to all the way from situational awareness and intelligence, surveillance, and reconnaissance—another part of that that is behind the scenes that they do not necessarily see but is a big part of that is the processing, exploitation, and dissemination of that information that is done via both Air Force and Army DCGS, or distributed common ground system.

It is a demand for ISR. It is the desire for that unblinking eye in their entire theater so they know what is going on 100 percent of the time everywhere. That is the demand signal.

We have to get better at how we do this. We have to be more predictive in our intelligence. We have to machine to machine. We have to get learning systems that can think ahead of the adversary and try to address that in more modern and technologically advanced ways, which goes to Secretary Carter's third offset, is how do you get inside of that information. The demand signal is totally understandable because they are the ones—the combatant commanders are the ones that are given the job to execute the war plans, if required to, and they need that information. We are trying to meet it.

But there is also across all the services—and again, Chairman, you know this. There is still demand in bombers. There is still demand in airlift. There is still demand in fighters. There is strike capability. There is still a demand in space and cyber and nuclear deterrent capability. It is the balance act that you referenced in your opening statement.

Senator COTTON. Let us assume that the demand signal from downrange is accurate and needed. Let us just assume that. What is the biggest bottleneck in meeting that demand? Can you not turn out the pilots quickly enough? Can you not retain them? Can industry not make the aircraft enough? Are we not providing enough money to do any of that? Do you not have enough analysts on the backend? What is the main bottleneck in this process?

General CARLISLE. Everything. Seriously, sir, I think the first thing that we had to address was training pipeline and the FTU [formal training unit] at Holloman and the money and resources we are putting into that to expand that is a big part of it. Then the manpower and the resources to do it. We have to grow the enterprise to continue to try to meet the demands.

I do believe there is technology that can help us to meet some of that demand across the entire ISR enterprise so we can get better at that.

But we started with the training enterprise and the fact that the pipeline was not big enough or doing enough to produce the capability we needed. Then the resourcing challenge of balancing that demand signal with all the other demand signals—clearly, BCA [Budget Control Act of 2011] did hurt us significantly with respect to manpower and resources to do things. But we are addressing those. We are trying to work on those.

I think the idea that we could—you know, I mean, there are other ways to do this—not other ways. There are ways to take advantage of the RPAs, other forms of intelligence, predictive capability, on-orbit capability, other systems that are coming on. Even

within the MQ-9, there are new systems on the sensor side that give us ultimately more capability like Gorgon Stare, which is a great capability. We are deploying in that. Downrange it is doing fantastic, but the back end of that is the processing, exploitation, and dissemination to take all that information and get it out. Is there machine-to-machine ways that we can do that better? Is there learning algorithms that we can do to take advantage of that? Chairman, we are working on all of that right now.

Senator COTTON. Thank you, General.

Senator Manchin?

Senator MANCHIN. Thank you, Mr. Chairman.

I thank all three of you for your service and for being here today.

General Perkins, if I may ask you. You rely almost exclusively on enlisted UAV operators. Correct?

General PERKINS. That is correct, sir.

Senator MANCHIN. Are you having a problem or the same problem that the Air Force is having? I am just trying to find out if there is a way we can help each other.

General PERKINS. Sir, I understand.

We man our unmanned aerial systems very similarly to the way we man all our other systems in the Army, whether it is a tank or an artillery piece or mechanized infantry carrier. That is part of a formation. Most of our weapon systems are operated and manned by non-commissioned officers and soldiers, and then they are commanded by officers. The way we operate our unmanned aerial systems is a similar way. They are organic to a brigade. They are organic to a division. They are part of that formation. Therefore, the majority of them are operated and manned by our sergeants and soldiers, and they are overseen by our warrant officers and officers.

Right now, our biggest challenge, based on our force structure, is not the manning of those. It is, as the GAO report stated, what I would call our home station training as we are building up that capability.

Senator MANCHIN. General Carlisle, it seems like you all are only looking at the enlisted operators for the Global Hawk fleet, when the severe shortage of operators are with the Predator and the Reaper.

General CARLISLE. Sir, the shortage of operators in Predator and Reaper was not because we did not have the people coming into it. We did not have the training pipeline to put them through as that demand signal grew. When we went from seven CAPs to 65 CAPs, we did not, at the time, expand the training capacity, open the undergraduate RPA training and the MQ-1/9 training fast enough to generate the amount of people that the demand signal—

Senator MANCHIN. The platforms, General Carlisle, that you are working versus maybe General Perkins—do you all have the same type of equipment? Are you using different equipment? Is it more sophisticated what the Air Force might be needing for the training that they have to have?

General CARLISLE. Sir, there are two parts to the training. There is undergraduate RPA training, which is the basic, how do you fly RPAs. We have marines going through our URT right now and that is similar.

The MQ-1C, the Gray Eagle, and the MQ-9 Predator are totally different systems. The tactics, techniques, and procedures doctrine would be similar, but the actual training on the system between the MQ-9 and the MQ-1C are significantly different. The MQ-1C is much closer to a Predator, an MQ-1, which the Air Force—

Senator MANCHIN. I think Senator Cotton had asked—basically I think you are having more of a licensed pilot, basically a trained pilot, on some of these platforms. Do you all use trained pilots, General Perkins?

General PERKINS. Sir, what we do with our unmanned aerial system operators is—as General Carlisle said, there is a significant difference in the technology and how they are operated. It is point and click from the ground station. There is not a stick and rudder. They are not flying them. They are automatic takeoff and landings. Those are very difficult skill sets to train somebody with. Ours is automated from that point of view.

As we train our operators, what we do is they all go through a basic initial 8-week course, and they take the FAA [Federal Aviation Administration] written exam kind of the ground week, but then they do not actually have to take what would necessarily be considered flying pilot training because they are not actually flying it. The basic part—it is the same as what you might call ground week and they are FAA-certified for their ground week portion. They just do not have the air time because they are not pilots.

Senator MANCHIN. General Carlisle, despite the fact that Congress provided the Air Force authority to provide higher bonuses to the RPA pilots up to \$35,000, you have chosen to provide only the bonus level that is authorized for all Air Force pilots of \$25,000. Knowing that you have this shortage, why did you all make that decision?

General CARLISLE. Yes, sir. We appreciate—and again, we appreciate certainly the Senate and this committee's support for that.

The sister services in the Department of Defense, the Office of the Secretary of Defense have to have an implementing guidance as part of the fiscal year 2016 NDAA. We are still waiting on that.

Senator MANCHIN. What I am saying is it was not by accident that happened. We knew you were having some challenges there and we thought we would give you the tools to close that gap. But then you all have not decided to use it.

General CARLISLE. Again, we truly appreciate the support on that.

A couple of factors that I would throw in that. We truly appreciated it and as we get that implementing guidance—as a matter of fact as we come back in fiscal year 2017, we are going to ask—we brought back some economic data and some information to the Senate for support. We would like that authority across all of our rated career fields.

Senator MANCHIN. I am sure you would. I am sure of that, sir. [Laughter.]

General CARLISLE. But, sir, I am 511 fighter pilots short today. Our whole entire rated career field is being challenged.

Senator MANCHIN. I am running out of time here, but on your fighter pilot, their pay scale is much different than the person that you might be training for this and a bonus to get into the system.

General CARLISLE. No, sir. There is no hiring bonus to come in and fly airplanes. We have done some changes.

Senator MANCHIN. Well, you have the \$25,000 ones.

General CARLISLE. Once they reach the end of their training commitment.

Senator MANCHIN. Right, to keep them.

General CARLISLE. Now we are going to give that to our RPA pilots as well. We would like all of those to be raised, and we are asking for that in the fiscal year 2017.

Senator MANCHIN. You are saying \$25,000 will not do the job.

General CARLISLE. Sir, it is not competitive. We have some studies. RAND did a study about what it takes. The bonus and the flight pay has not changed since 1999. It is 17 years old. The draw from the airline hiring has reignited at a phenomenal level. Our ability to keep our entire rated force in is one that we believe that we need a higher bonus capability to keep those folks in the Air Force, across all of them, RPAs as well as the rest of the rated career fields.

Senator MANCHIN. Thank you, General.

Senator COTTON. Senator Rounds?

Senator ROUNDS. Thank you, Mr. Chairman.

General Carlisle, how many pilots are you short right now with regard to the unmanned aerial vehicles, UAVs?

General CARLISLE. Sir, we are currently about 83 percent manned in the RPAs.

Senator ROUNDS. Eighty-three percent manned?

General CARLISLE. At the 10-to-1 for the current system. Let me expand a little bit on that in accordance with the GAO. Ms. Farrell pointed out these points, and we have taken them to heart and we are working on them.

The first thing we did was the 10-to-1 crew-to-CAP ratio. We are not there yet because of the continual surge, nine surges in 8 years, and the rapid increase in the number of combat air patrols. We got down as low as 7-to-1, and that was way too low. The first thing we have to do is get back to the 10-to-1 crew per combat line, or CAP.

But the next thing we have to do is—and I kind of alluded to in the statement about the 3 million hours versus 2.8 million hours during combat. We have no dwell in the RPA enterprise. Every mission they fly from the day they come out of training and they show up at their unit is combat. That is unsustainable. We have to build more capacity into the RPA enterprise so that a portion of the force can do continuation training, can do other things, can improve the system, can take some non-combat time during a tour. The 83 percent is reference 100 percent combat and no dwell.

Senator ROUNDS. I am just going to go back to what the GAO finding was, and that was that at the time, if I understand it correctly, you could not tell them how many pilots you needed. What is the total pilot count that you need to do the mission today?

General CARLISLE. Sir, if you said stay at 60 CAPs—

Senator ROUNDS. What you would need today.

General CARLISLE. That part of the discussion on that, Senator, is the demand signal. I think the reason we were unable to tell

them is we really did not know what the end result of the demand signal was.

The total number of pilots we need across the whole enterprise is about 1,000, and we are about 83 percent manned. But that is only to do 100 percent combat. What we are trying to build to is about a third to a fourth of the force in dwell. If there is a 1,000 requirement today—and I think that may be under by a little bit. Sir, I will get back to you with the exact numbers. Maybe 1,084 or something to that effect. Then I would probably need another 300 so that I could have a third—

Senator ROUNDS. You need 1,400, in that neighborhood.

General CARLISLE. Yes, sir.

Senator ROUNDS. Really you are probably closer to about maybe 70 percent of what you really need right now?

General CARLISLE. Yes, sir.

Senator ROUNDS. Can you share with me—and General Perkins, I would like your thought on this as well—the difference between the mission that a pilot operating one of these aircraft—tell me if there is a difference in the mission between that, which is a mission flown by a United States Air Force officer, and a warrant officer flying a mission for an Army mission. Could you tell me the differences between them?

General CARLISLE. Yes, sir. Sir, from the Air Force perspective, it is a theater asset doing theater-level air power. When he takes off, he probably takes off with a pre-designated mission. It is launched. He is probably doing it remote split op. He is doing it from either Ellsworth or Whiteman or Creech or Holloman where some of the many Air National Guard units are doing fantastic work for us. He will probably fly that mission. He could well do an entire different set of mission sets across that time. He could do close air support. He could do solely ISR. He could do strike. He could do personnel recovery. He could do interdiction. He could do interdiction and targets in the deep fight.

The missions that our RPAs fly—it is a theater-level asset given to the joint force commander for his allocation to meet the theater-level missions that he is trying to do. It is in coordination with either the land component or the maritime component, if it happens to be a maritime mission like in the Arabian Gulf. It is in coordination with them, but it is under the control of the joint force commander and the Air Force—

Senator ROUNDS. General Perkins, you have heard that explanation. How would a mission flown by one of your pilots differ?

General PERKINS. Sir, I will compare it to our helicopter pilots in the Army, both our warrant officers and commissioned officers. Really two parts to it. One is the actual process of flying the aircraft and the flight dynamics. Obviously, with our Apaches, Black Hawks, and Chinooks, the pilots, the warrant officers, the commissioned officers are actually flying them dealing with the dynamics, as they say, stick and rudder and all of that, and so there is great skill involved with that, from that portion of it.

With our unmanned aerial systems, they are completely automated. It is automatic takeoff, automatic landing, and then they just point and click in the ground station. That is why we referred to our unmanned aerial systems are really being operated by our

sergeants, soldiers, and warrant officers doing a great job. But the actual physical activity is significantly different.

With regard to the mission profile itself and how it reacts to the formation, our unmanned aerial systems—the great majority of them are organic to our maneuver brigade combat teams. They are working, generally speaking, for a battalion commander or brigade commander, of which they are organic to that organization.

With our aviation assets, our Apaches or even Black Hawks, they are not organic to a maneuver brigade. They are generally out of a combat aviation brigade, are supporting the entire division. The level of supervision is not the same as well because they are not organic to the maneuver force.

I think both the way that they are organized within the maneuver force, as well as the requirements to actually operate it, there are some significant differences.

Senator ROUNDS. Thank you.

My time has expired. Thank you, Mr. Chairman.

Senator COTTON. Senator Heinrich?

Senator HEINRICH. Thank you, Chairman. I want to thank you for holding this hearing.

General Carlisle, as you know, Holloman Air Force Base in New Mexico serves as our Nation's premier formal training unit for the RPA enterprise. I am very proud, and I know you are proud of the work that they do to help give our airmen the skills and training to go on and carry out what we have heard repeatedly is a critical and growing mission set.

I have long called for actions to alleviate the stress on this force, to rectify personnel shortfalls, and to improve the quality of life for our airmen. I specifically want to thank you for the outreach that you conducted last year and the important announcements that you made in December as a result of that.

In your testimony, you said that the sustained high tempo and high levels of stress is, quote, robbing, unquote, our airmen of quality of life. You have mentioned the RPA pilots simply want time, time to spend with their family or go to school, to train, to take a vacation, et cetera. These are important to anyone's quality of life in their career. Airmen throughout the Air Force are obviously busy, of course, but the service seems to have done a better job of balancing and, for that matter, creating sustainable schedules in other career fields.

Can you talk a little bit about—describe for the committee why an RPA pilot's daily duties and schedule are so different from other Air Force career fields.

General CARLISLE. Yes, sir. I think it probably stems from born in combat and then the pace at which the demand increased. The RPA pilots, central operators—and actually it is a crew because it is the pilots, central operators. It is a communication specialist that has to make sure the remote split ops is working properly and the ground control station is adequately connected to the forward capability of the airplane flying forward. It is in-garrison combat ops.

What our RPAs are doing is 24/7/365. When we say 60 CAPs, that means 24/7/365 days a year that all of those CAPs are flying. Today that is 100 percent of our force. There is no other part of the Air Force that does that. There is no other part of the Air Force

that has 100 percent of their capability engaged 100 percent of the time without any continuation training.

Senator HEINRICH. Obviously, we have got to grow the pipeline in terms of training. But what are we going to do to adjust those schedules so that that is sustainable in the long term and we can keep these folks within that career field?

General CARLISLE. Yes, sir. That is exactly what Senator Rounds asked, and that is we need to build capacity within the RPA enterprise so that we have some that are what we would call dwell, just like we have deploy-to-dwell for our soldiers, sailors, airmen, and marines that go downrange. Something we have to come to grips with is in-garrison combat operations. Folks that are doing the combat mission, in the case at Creech and Ellsworth and Whiteman and many of our Guard units, where every day they go to work, they brief up the mission, they fly a combat mission and non-stop, and then they come home. Their schedules change from they are doing the days, the mids, the swings. They are doing different schedules usually they are there 10 to 12 hours. They are there most of the day, middle of the day to the middle of the night, or all night in that schedule.

That is something that I think as a military and certainly as an Air Force, in-garrison combat operations—we need to build that dwell time in, which we have not done. That is the 25 to 30 percent increase in the size of our RPA capability. Some portion of that force is working a day schedule, is doing continuation training, is going to weapons school, is taking vacation, going to school and relief from the continuous combat operations.

Senator HEINRICH. You mentioned that ACC is examining the possible expansion of the RPA community to a number of potential new bases or even overseas locations.

I wanted to bring up the fact that given—you know, I know at Holloman, for example, we have what used to be the Force Space Control Squadron that is 64,000 feet of prime real estate that is secure and currently not being used for anything. Before we create new capacity, I think it is going to be important to look around the Air Force and make sure that we inventory those places where this could be just a natural growth with facilities that are sort of ready and waiting.

General CARLISLE. Sir, most definitely. When we look at those new bases, we will follow the strategic basing process that the Air Force utilizes. I will tell you I truly believe that Holloman will be very competitive in that. We will see what the basing process comes up with.

Senator HEINRICH. Mr. Chair, thanks again for holding this hearing.

Senator COTTON. Senator Ernst?

Senator ERNST. Does anybody have any questions while I am getting my stuff together?

Senator COTTON. Senator Sullivan?

Senator ERNST. Thank you.

Senator SULLIVAN. Thank you, Mr. Chair.

General Carlisle and General Perkins, I want to ask a little bit about the issue of—you know, one of the things that we have seen with regard to the combatant commanders and different executive

agencies is almost an insatiable appetite for the ISR capability. To me, that kind of poses two questions at that theater level, which is where the Air Force is very focused on that, what support or other capabilities, General Carlisle, do you see that you need to meet that demand, which is very, very large, as you know.

Then, General Perkins, has the Army looked at expanding the role of its platforms beyond the organic maneuver sphere to help in some ways meet the broader theater-wide demand that I think all of us see as so highly needed and requested?

General CARLISLE. Sir, from the Air Force standpoint, I believe that if you look at the American way of war and what we are doing today, that information, situational awareness, intelligence, surveillance, and reconnaissance, I totally agree with, understand. When I was an air component in the Pacific, I wanted all the information all the time. We do.

In trying to meet that, I do believe that it is a question of how do you do that and what can you do with respect to the whole ISR enterprise, whether it is on-orbit capability, whether it is other platforms that we are modernizing, it is RQX, whatever that is, MQX, whatever that is. I think the RPA enterprise has come so far. I think we need to elevate it to that capability in predictive intelligence and some of those things that we can do in a cooperative environment between all the services and all their ISR capability.

I will tell you that we have great interaction with our Army counterparts, for example, in the distributed common ground system. The Army and the Air Force—we do a lot of time cross-talk on how we process that information. I think the demand signal is appropriate, given what we are asking the combatant commanders to do. We as the organize, train, and equip folks in support of those joint warfights and being a force provider—I have to figure out better ways to do that using technology as well as the innovative spirit of our soldiers, sailors, airmen, and marines.

Senator SULLIVAN. General Perkins, are you looking outside that organic maneuver mission in terms of supporting the broader theater demand?

General PERKINS. Senator, exactly. As I had said, most our assets are organically organized within the brigade or the division. But we have—based on this requirement, on this very large demand kind of at the enterprise level, the Army is now being funded for and fielding four additional echelon-above-division Gray Eagle units. Those are our most capable ones.

Our most recent one just stood up last month at Fort Wainwright and is going in and will have its first flight next month.

We are in the process of bringing on four additional Gray Eagle companies to help with this enterprise demand from the combatant commanders. They will actually be a little bit larger than the ones that are organic to the division so that organic platoons can operate in a split-base manner so that we can provide, again, a better product because our demand tends to not be in one place but dispersed around the world. What we are doing now is, as we are growing those additional Gray Eagle companies, putting them in between divisions so we kind of balance, providing an organic—the one going in at Wainwright is a division asset, but we have one echelon-above-division, one already in that has already deployed be-

cause it is kind of like General Carlisle says, as soon as we build it, we want it. We have three more others that we are building right now.

Senator SULLIVAN. Let me ask kind of a follow-up. You mentioned the Gray Eagles coming to Fort Wainwright. General Carlisle, you have a lot experience serving up in Alaska. The joint training opportunities at JPARC, particularly given our kind of hub of air combat power that is happening—every platform in the Air Force is up there but also the Gray Eagles and the two brigade combat teams that we have at Wainwright and JBER. Do you view JPARC as a premier place in the Nation to help with some of not only the training that the Air Force does but also the joint training that could be very, very useful, particularly as the Army is looking to move these more kind of strategic-focused Gray Eagle units?

General CARLISLE. Sir, I would defer a little bit to General Robinson and General Brooks, who are the component commanders for the Pacific, as they operate out of there.

But I will tell you that JPARC to me is a national asset. We had the Chief of Staff of the Republic of Korea Air Force with us up in Alaska, and we showed him the JPARC. We overlaid the Korean peninsula, and JPARC is twice as large as the entire Korean peninsula.

Senator ERNST. Mr. Chairman, we are used to those kind of large comparisons in Alaska.

General CARLISLE. But the airspace, the lack of encroachment problems, the ability to operate with our Army brethren, and the strategic assets we have up there with the F-35's coming before too long, combined with the F-22's, command and control with the AWACS [Airborne Warning and Control System], bringing our partners over—I will tell you the one thing that I am pushing for—and General Robinson and I have spent a lot of time talking about this.

In the past, we have kind of used Red Flag Alaska predominantly to train our Pacific partners. I think that is shortsighted. I would like the Europeans to train with us I think in the future. I think for partners they need to train at both Red Flag Nellis and Red Flag Alaska. I think they need to do both because both of them offer incredible experiences, incredible capability and different. For the joint warfight and the coalition warfight, it is important. JPARC is—two assignments in Alaska, and I will tell you it is some of the greatest airspace you can imagine. It is very valuable, sir.

Senator SULLIVAN. Thank you, Mr. Chairman.

Senator COTTON. Senator Ernst?

Senator ERNST. Thank you, Mr. Chair.

Thank you very much for being here today, Ms. Farrell and General Perkins. Thank you.

General Carlisle, I have lots of questions for you, sir.

As you are probably aware, as RPA units were moved into the Air National Guard, there is an issue surrounding whether or not the RPA mission is an aeronautical mission in nature, as defined by the Federal Aviation Administration. This lack of defining RPAs as an aeronautical mission is causing risk to airports' grant assur-

ances across the country, not just in Iowa. I know that the chairman has a similar situation existing in Arkansas as well.

Late last year, our Governor wrote to the two Departments to intervene on behalf of the 132nd Fighter Wing to help resolve the long-simmering issue of the FAA's threat to withhold the Des Moines International Airport's grant assurances.

What specific steps has the Air Force taken to resolve this issue or when will it be resolved?

General CARLISLE. Ma'am, we are working very closely with the FAA. I think the 'see and avoid' capability of the RPAs and the technology that we are putting into the RPAs for that 'see and avoid'—obviously, being a pilot, having spent a lot of hours flying an airplane, you cannot always see it in an airplane either. There are instrument meteorological conditions.

We are working closely with FAA for them to fully understand how the RPAs are utilized, what the safety factors are, how they operate in airspace. I think we have the Air Force moving out. I think we also have the academia world spend a lot of time on the things that we are doing with respect to technology and how we operate these airplanes within airspace.

Currently, what we are doing in stateside and flying within CONUS [Contiguous United States] is we generate memorandums of agreement corridors for how we can use our RPAs in the safest manner possible and not send any jeopardy to the manned flights or any other flight or aviation that is going on. I believe that we will continue to advance both the technology and the platforms and our ability to ensure safe flight between both manned and unmanned.

I will tell you, ma'am, my biggest concern is the rampant commercial market and what is going on and how we control things that have happened with RPAs that are not regulated by either the Army or the Air Force that are causing what I think is the biggest hazards. I believe that is where the FAA's concern is predominantly resting with is that commercial enterprise and sportsmen enterprise with respect to RPAs.

Senator ERNST. Well, certainly there is a lot of division in this issue.

Because we have a new mission, we do not have F-16's based out of our Des Moines International Airport any longer. This has created quite a rift in determining what is an aeronautical mission and what is not—what is, what is not. The Air Guard is in a difficult position right now. The Des Moines Airport is in a very difficult position, and it has created a rift between the two different groups and within our community because we do not have an answer from the FAA or the Air Force on this issue. It grows daily.

General CARLISLE. Ma'am, we are working it. We fully understand that. We have examples in other States where we have worked with the FAA and resolved the issues. I truly believe we will do the same thing in Des Moines in the fact that we—we have done it yet. You are right. We should have been ahead of this by a bit, I would say, that we have not done. But we are working hard to have those dialogues and come to those agreements so we can resolve this issue. Ma'am, I believe we will get there. I truly do.

Senator ERNST. I do hope so, General. If you can communicate that as well, I would certainly appreciate it. It is an issue that we will continue to work on, and if we do not see resolution coming from the Air Force or the FAA, this is something that we will act on legislatively, which is not what I would like to do.

General CARLISLE. Ma'am, we will attack it.

Senator ERNST. Thank you.

General CARLISLE. Yes, ma'am.

Senator ERNST. General Carlisle, from 1941 to 2013, the 132nd air wing of the Iowa Air National Guard flew manned aircraft, as I stated. We had F-16's. In 2013, after 72 years of manned flight, this unit transitioned to an RPA unit, and the pilots learned how to fly aircraft remotely.

I understand you have discussed already the fighter pilot shortage. It is around 500. I think you might have stated 511 fighter pilots you are short.

General CARLISLE. Yes, ma'am.

Senator ERNST. Are some of these shortages brought by transitioning those fighter pilots into those RPA units?

General CARLISLE. Ma'am, I think you bring up a great point, and that is we got to utilize the assets we have and the capabilities and the trained folks we have.

The reason the transition occurred was because of the drawdown in the force. We lost the airplanes. It was the mission which we could take advantage of those aviators. The challenge with the fighter pilot shortage is we do not have enough airplanes to absorb young pilots and train them. The reason that Des Moines transitioned is because we retired at one point 250 airplanes in 1 year, 250 fighters in 1 year. That reduction in the size of the force is what has led to this problem with respect to the 11F shortage.

I do believe there is capability as we move into the future in the size of the force that taking advantage of those folks that had previously flown fighters is one that we are looking to keep the 11F experience within the Air Force and take advantage of it.

Senator ERNST. We had a panel the other day. General Holmes was here, a number of others. They stated that they are short pilots, they need more pilots, and they were thinking of moving some of these assets to the Air Guard and Air Force Reserve. My thought was, well, why did we transition these folks into RPA units then.

But I do not know whether that was shortsightedness on the part of the Air Force to underestimate what they needed as far as fighter capabilities.

General CARLISLE. Ma'am, it was a balance. You know, it is what we talked about earlier. The RPA enterprise was growing at a phenomenal rate, so we needed the RPA capability. The drawdown in the fighters was driven by a variety of factors, including balancing with other portfolios, whether it was the space portfolio or the bombers or ISR and other realms in the big wing ISR. I believe that it is that balance that we have talked about. How do we balance the force and provide all the capabilities that the combatant commanders want? The RPA enterprise is one that is in high demand. We are in high demand for fighters as well. The tradeoff between those two—we do not have enough of either.

Senator ERNST. No doubt. I do appreciate the fact that we have that ISR capability and that we do have the RPA unit now in Des Moines replacing the F-16's. But it seems to be such a waste of taxpayer dollars maybe to have transitioned fighters out, replace it with an RPA unit. Now we are saying we do not have enough of those fighter capabilities.

We had a lot of pilots that left Iowa because they were seeking opportunities to fly and not fly an RPA. I do think it was a bit shortsighted, but I do not know who is at fault there.

But I do appreciate your answers today and want to thank you for being here. General Perkins, Ms. Farrell, thank you very much.

Thank you, Mr. Chair.

Senator COTTON. We have at least one more Senator en route. Fortunately, I have several questions to fill the time until that Senator arrives or more Senators.

In particular, Ms. Farrell, we have not yet heard from you. You have been involved in many studies and assignments. You have extensive experience in this field. Can you please just give a high-level summary for the committee of the most important challenges you see in the UAS/RPA enterprise, the recommendations GAO has made to the Department, and the progress the Department is making in implementing these solutions?

Ms. FARRELL. Certainly.

Our report had 10 recommendations that I mentioned. Seven were to the Air Force. Two were to the Army, and one to OSD.

Of the ones to the Air Force, there were four that focus on improved management of the UAS pilot community. Those dealt with requirements, setting the optimum crew ratios, setting the minimum crew ratio, exploring alternatives for pilots such as enlisted or civilians, and then developing a tailored recruiting and retention strategy for the UAS pilots.

The key recommendation is truly about the crew ratio. It keeps coming up. These shortages that are related to instructors or the training pipeline, quality of life, people overworking—it always goes back to do you have enough pilots.

The 10-to-1 crew ratio was developed very quickly in 2008 by the Air Force Manpower Agency. When we looked at that ratio, the Manpower Agency agreed with us that it was missing some key elements that we touched upon earlier, that being launch and recovery, as well as some other key administrative tasks such as evaluating flight safety.

When we looked at Air Force documentation of, well, what are they actually flying, we found it was even less than the 10-to-1 ratio. We found ranges in documentation from 7-to-1 to 8.5-to-1, meaning seven pilots flying for a near continuous 24-hour presence in a particular geographic area. When we talked with Air Force officials about, well, what happens when you do go below the 10-to-1, since you already know that 10-to-1 is probably low, there were times that they denied requests for the UAS support, but sometimes those denials were overturned by Joint Staff because they needed them to perform the mission. We were told that at times the ratio was as low as 6-to-1.

Determining what that ratio truly is under optimum conditions, as well as a minimum acceptable level, is key to the Air Force de-

termining how they go about recruiting the right numbers and thus retaining the right numbers. Then it spills over to the training pipeline.

We would encourage them to be very aggressive with that crew ratio. We know they are working on it, but we think that they should be very aggressive in that area.

For the Army, the Army has taken actions also on our recommendations. A key one was the waivers for prerequisites for training instructors. We have heard that the Army is working on mitigating those risks to waiving certain prerequisites such as the number of flying hours, and we think that that is a good step to look at how they can best mitigate those circumstances. The key is also going back and providing training for those instructors that did not meet all the requirements to become instructors and making sure that in some way they are prepared to continue.

Senator COTTON. Thank you.

General Carlisle, any thoughts on Ms. Farrell's observations?

General CARLISLE. No. Mr. Chairman, the GAO report was really well done. Ms. Farrell's points are exactly right.

In cases where the demand signal went up and our crew ratio was dropping, the term was 'surge.' We needed to surge. We ended up doing nine surges in 8 years, which forced us into some of those crew ratios that were down in that seven. I do remember going below seven. I am not sure we ever got to six, but it was bad.

The point that we are making—I think the first study came out with reference to the crew ratio and it was 9-to-1. We relooked at it and said 10-to-1.

There are two things additionally that we have done that I think would go to what the GAO is talking about. One is we believe that the LR squadrons, launch and recovery, need to be separate squadrons and not embedded in the crew ratio for the mission control elements. We have already done one of those squadrons that we have broken out that have unit tasking codes to go downrange. When you break out LRU [Launch Recovery Units], that frees up in the current status about 32 crews, which gives you a crew ratio—the 10-to-1 is a more truly 10-to-1 because you do not have to break out the launch and recovery. That is one thing that we are doing, again, to speak to the comments that GAO made.

Then the second thing is the dwell time. So 10-to-1 is based on combat, 60 combat lines per day, or CAPs. If we continue to grow this force, which we are trying to do, and we have some in dwell, then the combat crew ratio is 10-to-1, but the actual crew ratio for the overall enterprise will give us that much more, which allows us to do all those things that she talks about, the administrative tasks, the time off, the schools, the continuation training, and all those things that every unit has to do as part of their unit organization and what they do to accomplish the mission.

Again, I truly agree with what Ms. Farrell said. Then we have taken it to heart. We have looked hard at it, and we are sharing that as we build that manpower so that we reach a crew ratio that is executable, sustainable, and supportable.

Senator COTTON. Senator Manchin?

Senator MANCHIN. I just have one question and it could be for both of you.

The Federal Aviation Administration has been very conservative in deciding how to manage routine operations of government-owned UAVs in the national airspace system. Until roughly 5 years ago, each flight of a DOD-owned UAV in the national airspace system had to go through an extraordinary approval process that could take several months for DOD to receive clearance.

Periodically we have received reports on the rate of progress in integrating unmanned aircraft systems into the national airspace. While there has been progress, I am told it has been very slow.

For the flights with the DOD-managed airspace over DOD-controlled real estate, we understand there is not a big issue at all. We understand that. However, with the Global Hawk and the Predator/Reaper aircraft having intercontinental range and with Army or Marine Corps' ground forces not collocated with the Air Force RPA aircraft, I basically suspect the Air Force will have to routinely fly RPAs in the national airspace system.

I guess I would ask both of you, maybe General Carlisle, General Perkins, are you all experiencing difficulty in operating, General Carlisle, the Predator/Reaper or Global Hawks in the national airspace system?

General CARLISLE. Yes, sir, we do. It is a challenge for our training for crews that are stateside. For both our launch and recovery crews, we in most cases were able to either—we were fortunate enough in the case of places like Holloman where we do a predominant amount of our formal training—is it sits inside of government-controlled airspace. It becomes less of a challenge for training.

But in places where that does not occur, then we work with the FAA. In many cases we will spiral an airplane up inside of the airspace that we control, usually the TFR [Temporary Flight Restriction] that exists over the airfield, and then we will build a corridor we can come in agreement with the FAA to fly the aircraft to the training airspace.

I think total use of the national airspace system by RPAs is some period of time off. I think the FAA has issues with it. I think they are probably more confident in government and certainly the military's procedures on how we do things. I think what concerns the FAA most is the commercial enterprise or sportsmen or uncontrolled RPAs that are less governed by the regulations and rules that we use in the United States Air Force and the United States Army.

It is a challenge. We are working very closely with them. We spend a lot of time. We have FAA representatives in many of our bases. We have one at Holloman that works with them all the time. We have one in Arizona that works—

Senator ERNST. General Perkins, how is it with you?

General PERKINS. Sir, you are correct. This has been a difficult challenge that we have faced I think mainly because as it came on, new technology was not something that our system was necessarily set up to deal with.

We have had to deal with it very similar to as General Carlisle has highlighted. First of all, we had to work very closely with FAA. You have to gain, I think, a level of understanding on both sides what their safety parameter is and what our capabilities are.

What we started doing is exactly as he said. We would establish a corridor, have a memorandum of agreement. These are the corridors we use, say, between training areas, et cetera. We would set times that we would use it to de-conflict from the civilian air. Then because these are by definition unmanned, just as we spoke earlier in the hearing, we would have to use—we started using a chase aircraft. You would have to follow the unmanned aerial system with a Black Hawk or an Apache to provide that visual if something were to go on. Of course, that is doubling or tripling your overhead to operate.

We are now, as the Air Force is, going down and procuring and working with sense and avoid radar. If we have areas that we want to operate in the national airspace, we can set up a sense and avoid radar, which precludes us from now having to put twice as many aircraft in the air to trace it down.

I think we are making progress, but this will not be solved easily because, as we have said also, the proliferation of the privately owned ones there, I think concern is going up rather than going down. But we have made dramatic progress from when I was first involved in this, but we have a long ways to go.

Senator MANCHIN. Thank you.

Senator COTTON. Senator Lee?

Senator LEE. Thank you, Mr. Chairman.

In early December, I sent a letter to Secretary Carter regarding the process that drone operators, commanders, and ultimately the White House use to initiate drone strikes. Specifically, I was interested and remain interested still in certain aspects of the process.

According to the U.S. policy standards and procedures for the use of force put out by the White House, the United States will use lethal force only against a target that poses a continuing imminent threat to U.S. persons.

Yet, media reports, based off of leaked documents, seem to suggest that the amount of time between when a target is identified, the President authorizes the use of lethal force on a target, and the execution of that strike can take a lot of time, a lot of time that we do not commonly associate with the word “imminent.” In fact, it can take several months.

General Perkins and General Carlisle, can you confirm the accuracy of these reports about the length of time between the identification of the target and the execution of the order?

General PERKINS. Sir, I will discuss it from my experience and how we operate.

Again, Army unmanned aerial systems are generally organic assets to a tactical formation, and having commanded an infantry division in Iraq where I had these assets, as long as I was operating underneath my rules of engagement, it was somewhat instantaneous.

Now, you may be referring to some strategic targets that have different planning parameters, which I am not involved in that process. I would not comment.

But I will tell you at the tactical level, it was not an issue once the rules of engagement were established that I had to struggle with.

Senator LEE. General Carlisle?

General CARLISLE. Yes, sir. Thank you very much for the question.

I would offer that if you would like at some point in the future in a classified environment, we could take this discussion probably to a different level. To get more probably to the question you are really asking but in an open forum, there are some things that we probably should not discuss here.

But having said that, I think there are a couple of things. One is custody of a potential target, and how you do that in time, again that would go under the classified piece. Then both the ID and continuous ID is part of that custody, as well as collateral damage estimates and how you deal with those. Again, those are things that when you talk about strategic targets and the things you are talking about, at a higher classification level, we could go into a deeper discussion about what we provide and what the Air Force does in accordance with how we do that.

I do believe truly that with respect to rules of engagement and rules and laws, that we in the United States Air Force follow all of the rules of engagement and follow all of the laws in accordance with the law of armed conflict and the appropriate laws that pertain to that, sir.

Senator LEE. Thank you.

A number of members of this committee are concerned about cybersecurity issues across the Department of Defense, as state and non-state actors alike seem to be increasing their threat capability in this area.

Drones rely completely on wireless technology, of course. That is what makes them valuable. It is what enables them to do what they do, the use of wireless technology to be connected with their operators in other parts of the world. This creates an obvious area of security concern.

I would like to know how is the Department of Defense working to protect the operational security of unmanned vehicles from crippling cyber attacks and potentially a cyber hacking incident that could compromise their security here.

General PERKINS. Sir, that is a major concern across that whole domain. I will address it initially with our unmanned aerial systems. Right now, without getting into too many details in this forum, our number one modernization issue, specifically with our Shadow and the Gray Eagles as they come out, is encrypting and protecting that communications link I guess is the best way to say it and the data protection. That is our number one modernization issue right now with our Shadows is to protect it from the type of threat that you talked about.

General CARLISLE. Yes, sir, Senator. Again, same thing. We are looking hard at all the different ways, and there is cyber protection and there is the way that you make it more difficult for them to get into those nodes via encryption, via directional, via the type of waveform, and the capability you are using with respect to directional data links and things like that. But there is, again, a level, if you would like in a future environment, we can come and spend time at a classified level talking about the things we are doing for cyber protection.

But I think in general for the United States Air Force in particular is we all know that everything, almost to an item, that we employ has cyber challenges and vulnerabilities that we have to protect. We are looking hard at what cyber operations in the future and cyber protection of all systems in the future look like and how we are doing that. That is one of the big areas that we are moving forward on in the Air Force as part of our cyber defense.

Senator LEE. Mr. Chairman, I have got one more follow-up with General Carlisle if that is all right.

On January 20th, the "Washington Post" reported that the Air Force RPA force has been experiencing an increase in electrical and in mechanical failures, causing the destruction or sustained damage to 20 large drones last year. This includes 10 MQ-9 Reapers which, when fully equipped, cost \$14 million to replace.

General, can you tell us what the Air Force is doing to investigate the common causes of these types of accidents and how you are working to make the RPA fleet more sustainable?

General CARLISLE. Yes, sir. It has generally been centralized on the starter generator, which is the problem in the MQ-9 community. The new MQ-9's and the block 5 MQ-9's that we are producing now have a different electrical system. It does not have the same starter generator. It does not have the same problem.

With the older block 1 MQ-9's, the starter generator is a problem. We have worked with the manufacturer. We found some quality control issues. We really have not found the root cause in that, though. But we have put in and we are modifying the current block 1 MQ-9's with a thing called ESIP, electrical safety improvement program. Basically we put a direct-drive, brushless alternator that allows 10 hours of flight capability if you lose a starter generator, which has caused those accidents that you referenced, Senator. Just since last April, we have recovered 17 MQ-9's using this direct-drive, brushless alternator. That gives us the capability with the older MQ-9's, the block 1's. The block 5's—it is not a factor, sir.

Senator LEE. Thank you very much.

Senator COTTON. Senator Gillibrand?

Senator GILLIBRAND. Thank you, Mr. Chairman.

General Carlisle, the Air Force is offering retention bonuses for the RPA pilots for the first time in fiscal year 2016. How significant is your shortage of pilots? Since the bonuses have been implemented, have you seen significant interest? To what degree is the Air Force encouraging RPA pilots who want to leave active duty to stay in Reserves or National Guard, and how is this shortage impacting your ability to meet strategic needs?

General CARLISLE. Yes, ma'am. We did a career incentive retention pay of \$25,000. In fiscal year 2016 and 2017, that only applies to 29 folks in the RPA enterprise. To date, we have seen that we do not have the final number on take rate based on this year yet because, obviously, we are still in the middle of the year. But we have a fairly positive response from the RPA community with respect to the retention bonus.

We are short. We are very much encouraging folks to stay with the Air Force in another component, either the Air National Guard or the Air Force Reserve.

We actually have a rated problem across our Air Force. We are working with Congress in fiscal year 2017 to raise that to \$35,000, if at all possible, across the entire rated force to try to maintain the level of folks we need within the Air Force and increase the take rate so we can keep that experience capability and those incredible airmen doing the job we are asking them to do, ma'am.

Senator GILLIBRAND. Do you think pay is fundamentally the reason why you do not have the force you need?

General CARLISLE. Ma'am, I think it is a combination. There is kind of three components. I think it is quality of life and the family. I think it is job satisfaction with the job they are doing. Then I think it is compensation. I think every airman takes all three of those into account. We know that we cannot compete with General Atomics if they want to hire and pay somebody to be a contractor RPA pilot. We cannot compete with the airlines that want to hire our pilots. But if we can increase the compensation somewhat and we can improve their quality of life, we know that the job satisfaction of both the RPAs and the manned pilots—they find great job satisfaction. Frankly, it is higher than it is in the civilian community.

It is a combination of all three of those. We have to improve their quality of life. If we could increase their compensation, combined with their job satisfaction, I believe we can keep the right folks in our Air Force.

Senator GILLIBRAND. Have you thought about utilizing Guard and Reserve as a backup?

General CARLISLE. Ma'am, our Guard and Reserve is hugely engaged in the RPA enterprise. As a matter of fact, they are mobilizing and volunteering to pick up three additional lines to allow us to get healthier. The Guard and Reserve are phenomenal in what they do in supporting the joint fight. It is one Air Force. Doing the mission, you cannot tell the difference between a guardsman or a reservist or an active duty member, ma'am.

Senator GILLIBRAND. Thank you.

Ms. Farrell, I went to Africa recently on a CODEL [Congressional Delegation], an anti-terrorism CODEL. One of the concerns that was raised was the limited amount of ISR capabilities that AFRICOM [United States African Command] shares with EUCOM [United States European Command]. What is your assessment our ISR capabilities versus our needs?

Ms. FARRELL. Senator, that really would be better addressed by one of the generals. Our focus was really on the human capital management aspect and the shortages, but not a particular geographic area.

Senator GILLIBRAND. General Perkins?

General PERKINS. Senator, the demand on unmanned aerial systems, like almost every other asset that we have, is somewhat insatiable. I can understand that. Having commanded in combat a number of times, I created insatiable demands. You can always use more infantrymen. You can always use more intelligence, surveillance, reconnaissance systems. I am sure they have a very high demand.

As we are growing demand from 200 systems to over 7,000, we have to grow it as a system. It is growing the operators, growing

the training base, growing the actual systems themselves, and then the force structure. I think we have got about the right balance, and then it is just deciding where to use that for the biggest return on investment.

Senator GILLIBRAND. Thank you.

Thank you, Mr. Chairman.

Senator COTTON. Ms. Farrell, I want to discuss something related to what Senator Gillibrand was raising. She was talking primarily about compensation and the bonus pay. I want to talk about quality of life and job satisfaction.

I know you and your team have spent quite a bit of time around the units and the operators and pilots in both the RPA and the UAS community, as have members of this committee and some of our very capable professional staff. Could you provide your perspective on those quality of life and job satisfaction issues, things like the amount of hours worked, availability of child care, availability of housing, the pride in the work done, and the morale of those personnel?

Ms. FARRELL. Yes, sir. We did visit 10 sites in total between the two reports issued in 2014 and 2015 for the Army and the Air Force and one Marine Corps location. We did conduct focus groups. The focus groups are nongeneralizable. We do analyze the information we get from those groups to see if we are looking at themes and we did. For the Army, we administered also a questionnaire to six units, RPA units, to gather information.

As for the morale for the Air Force—and again, this was in 2014—in all 10 of the focus groups that we met with, the morale was reported to be low. Another factor that I think enters is about in 4 of 10 of those focus groups, members reported that they believed the stigma was attached to being an RPA pilot in a negative way, and that some, including some commanders, even thought that perhaps the Air Force had missed their recruiting goals in 2011 and 2012 because of the stigma associated. You know, those are perceptions. GAO likes data.

We did look at promotion rates, and we found that in 20 of 24 promotion boards over a certain period of time, RPA pilots were promoted at a much lower rate than the line of the Air Force. We also found that for 9 of those 24 boards, that RPA career field fell at the bottom as well.

As far as other comments about training or sense of worth, we would hear in the focus groups that this was a valuable mission. We heard repeatedly, though, with Army focus groups—there were eight—that they wished they could get the training. It seems like with the Air Force, the problem was they wanted more training, and they wanted improved training. For the Army, they were wanting the training. We heard repeatedly in all the focus groups and in five out of six of unit questionnaires that were provided back to us that they had difficulty doing the training.

For example, one person noted that over a 3-year period, they had only done about half of the required training. He and others reported to us that they were pulled for non-training activities. Units reported that this happened often because of resource constraints, broken equipment. It was a variety of reasons that that was reported.

For the quality of life, as you have heard, the Air Force and the Army are structured very differently. There could be a huge advantage for the Air Force RPA community being structured the way they are, being deployed at station once they can get their shortages fixed because currently, as you know, that quality of life is impacting. We hear over and over in all the focus groups that they would almost rather be deployed for 6 months overseas than at their home station for 3 years because they do not know when the end is going to happen. It is so difficult for them to do the mission, and then after the mission is over, all those other things that happened when they are stationed in the States. Then some of them have families. There is a number of issues that need to be addressed.

But, again, I go back to setting the pilot requirement is imperative because it spills over to all these other issues of making sure that you have got a enough so that somebody is not working 23 hours a day.

Senator COTTON. You mentioned stigma they felt. You said that was a perception. Could you elaborate a little bit on the perception as you heard it from members of the community?

Ms. FARRELL. Yes. We heard from about 4 out of 10 focus groups that there was a negative perception because with an RPA—again, this was the Air Force focus groups—they are not actually in the cockpit. That then would be interpreted as of less value.

We heard from both Air Force and Army that there is just not enough known about that RPA or UAS community, that there needs to be more education going up the chain. We have seen the Chief of Staff for the Army, for example, directing reviews to understand more about what is going on with UAS training. It appears that perhaps you have got some of the senior leadership paying attention and the RPA pilots are trying to decide if they want to stay. But in between, there needs to be an awful lot of education about what this community brings.

Senator COTTON. That is stigma inside the service primarily or in society, or both?

Ms. FARRELL. Both. The stigma specifically inside the Air Force in terms of perhaps impacting on their promotions—that is the reason we did look at the promotion rates—but also in recruiting, that they do not have enough pilots with the experience to go be recruiters to also help overcome any stigma that might be associated with bringing them into the Air Force.

Senator COTTON. General Perkins, how many times did you serve in Iraq?

General PERKINS. Sir, I have had—

[Audio disruption.]

General PERKINS. The best offense is generally a good way to go about this.

Senator COTTON. General Carlisle, do you think there are many people who are contributing more to the mission of killing ISIS [the Islamic State of Iraq and Syria] terrorists than your RPA pilots?

General CARLISLE. No, sir. I think the RPAs are at the head of that mission. They are doing phenomenal work.

Senator COTTON. Maybe our society should pay them the respect they deserve then and honor their service and not attach any stig-

ma to what they do since they are keeping us safe in our beds at night.

Senator Gillibrand, a second round of questions?

Senator GILLIBRAND. I have no further questions.

Senator COTTON. I still have a few more. You are all excited to hear that.

Senator Manchin, any second-round questions?

Senator MANCHIN. No.

Senator COTTON. General Carlisle, a lot of the questions here today, obviously, are focused on the use of officers versus enlisted personnel to fly remotely piloted aircraft. In 2014, a GAO report recommended the Air Force consider the use of enlisted pilots on MQ-1's/MQ-9's. The Air Force declined that recommendation, and it said, quote, it considered assigning enlisted personnel as RPA pilots, but it decided that the responsibilities of piloting an RPA were commensurate with the rank of officer instead. End quote. Yet, just in January, the Air Force has seemed to reverse its position by announcing that enlisted personnel will begin flying the RQ-4 Global Hawk.

One, was there new information or a policy change that led to this position in January, and two, could we just get your bottom line answer on whether you think it will ever be the right course of action for the Air Force to use enlisted personnel to fly its RPAs?

General CARLISLE. Yes, sir. We did announce that we are going to have enlisted pilots fly the RQ-4. It is closer to the Army system, reference, point, and click. It is a singular ISR mission that they do. We have all the confidence in the world that they are going to do a phenomenal job.

With respect to the MQ-1/9, our challenge, as I mentioned earlier, was we did not grow enough training. Whether we put officers through that training or enlisted members through that training, we did not have a large enough training enterprise.

The second challenge that we faced as we moved forward in the MQ-1/9 world was the rate at which the demand increased. If you took a person that was already pilot-qualified, that training was shorter and quicker so you could get them into an actual RPA mission sooner, which given again the demand, that was of value. That is why we did not start back with enlisted members in the RPA community.

We are going to very deliberately implement the RQ-4 enlisted operators. I will brief the Secretary probably in May. I imagine that sometime in late 2016/early 2017, we will have enlisted members flying the RQ-4.

As we learn from that, we will look at the MQ-1/9 enterprise, and there may be—we may, in fact, do that. We do not know the answer to that right now, Mr. Chairman. I do believe that the difference between Dave and I that we have talked about between the employment, the way the Air Force employs the MQ-1/9 in particular in theater-level air power across multiple mission sets in a very dynamic environment is a different CONOPs [Concept of Operations] or an employment concept than an organic RPA to a ground commander in a ground unit. But that does not indicate in any way that we are not going to continue to look at it, and that

may, in fact, be the right answer. It will take us a bit of time as we look at that, sir.

Senator COTTON. The answer to the question right now, will the Air Force use enlisted personnel to fly the MQ-1/MQ-9, is maybe.

General CARLISLE. Yes, sir. We do not know. We are going to start with the RQ-4.

Senator COTTON. You are going to start with the RQ-4 and evaluate both the results of that initiative and how you might transfer those lessons to the MQ-1, MQ-9.

General CARLISLE. Exactly, sir.

Senator COTTON. What is a timeline for a yes or no answer to the question as opposed to a maybe?

General CARLISLE. Sir, I think as we start the implementation and getting the enlisted and operators trained on the RQ-4 and then flying the RQ-4, we probably will probably not even be able to implement that prior to late 2016/early 2017. I would guess it would probably be in 18 months from now when we would have a significant amount of information and data and understanding of how that went before we would relook at the MQ-1/9 discussion.

Senator COTTON. I want to return to an exchange you had with Senator Rounds as well, and I apologize if I did not catch this. Could I get the bottom line answer for how many pilots you need today to meet demand?

General CARLISLE. Sir, we are about 83 percent manned right now, and that is of about 1,100 required to do the entire enterprise at a 10-to-1 crew-to-combat lines ratio. We need an additional probably 300 to get some dwell capability so that we have part of the force that is not doing combat and is doing continuation training. I think the total number—and I will come back with the exact number, but I think the number that we are looking at is around 1,400, sir.

Senator COTTON. You need 1,100 to do the mission. You need 300 to build up enough dwell time, for a total of 1,400.

General CARLISLE. Yes, sir.

Senator COTTON. At 1,100 needed for the mission—are you saying 83 percent of 1,100?

General CARLISLE. Yes, sir, something in that vicinity as we grow.

Senator COTTON. I am not great at math, but that sounds like you have about 900?

General CARLISLE. Yes, sir. That is about right, 900 and something.

Senator COTTON. You have 900 today. You need 1,100 to meet mission requirements. You need 1,400 to meet mission requirements and provide appropriate dwell time.

General CARLISLE. Yes, sir. Right now, we have 981 for a requirement of 1,180.

Senator MANCHIN. My only thing just for clarification was along those same lines here. Did I understand you earlier saying, General Carlisle, that you were 500 fighter pilots short?

General CARLISLE. Yes, sir. Five hundred eleven to be exact.

Senator MANCHIN. Five hundred short.

General CARLISLE. Yes, sir.

Senator MANCHIN. The shortness you have right now is 300 for drones. You have more shortage in fighter pilots than drones?

General CARLISLE. We are about 200 short. Nine hundred eighty one is what we are assigned, and we are 1,180 is authorized. We are about 200 short in the MQ-1/MQ-9 world. We are about 500 short across all fighter pilots. That is all platforms, F-16's, F-15's, A-10's, F-22's.

Senator MANCHIN. I thought it was like a 3-to-1 difference. For every one fighter pilot, you were three UAV pilots short.

General CARLISLE. No, sir. If you include the entire fighter force, that is a larger—

Senator MANCHIN. I understand.

General CARLISLE. It is a pretty large number. You know, the fighter community reference the line cockpits, the training, the test, and then all the other demands on that fighter community for COCOM [combatant command] positions and staff positions and things.

Senator MANCHIN. General Perkins, are you all short?

General PERKINS. Sir, right now, based on—again, when we build a capacity—and we are still building some of our Gray Eagle companies—we try to bring both the force structure, as we procure the equipment, and the pilots up. With regard to our Shadow operators that are with our organic maneuver brigades, we are at 100 percent. With our Gray Eagle manning, we are at 98 percent.

Senator MANCHIN. What kind of bonuses are you giving?

General PERKINS. Well, sir, when you sign up to be a 15 Whiskey, which is our unmanned aerial system operator, that is a 6-year enlistment, which is longer than most. You can become an infantryman for 3 years. You do have to commit for a longer period of time. Then once you complete your 6-year enlistment, right now you can reenlist, but again it has got to be for 5 years after that. Currently that is a \$11,000 bonus after you have completed 6 years, to reenlist for another 5.

Senator MANCHIN. Can you help the Air Force with some of your excess 100 percent and get them up?

General PERKINS. Well, we work very closely with the Air Force. They help us out in the field all the time.

Senator COTTON. I want to actually touch on something related here about training times. General Perkins, you are going to graduate a bunch of new privates from basic training on Friday. Correct? All around America.

General PERKINS. Correct.

Senator COTTON. Then they will go on to what is called advanced individual training.

General PERKINS. Yes, sir.

Senator COTTON. Some of them will complete in their same station what they call one-station unit training.

General PERKINS. Right.

Senator COTTON. Those proud new privates, when they get out of basic training on Friday, if they are going on to 15 Whiskey training to be one of your operators, how long is their advanced individual training?

General PERKINS. Sir, they will leave, say, Fort Jackson or Fort Sill where they do their basic training. They will go out to Fort

Huachuca where we do all of our 15 Whiskey training. They all get—now, this is post basic training, which is 10 weeks. They get 8 weeks of what I refer to as ground week. They got to take the FAA written exam, et cetera. If they are then going to be our Shadow operator, which is sort of our mid-level with our organic brigades, that is 10 additional weeks. Then if they are going to be a Gray Eagle operator, which includes an instrumentation requirement, that is 25 weeks. If they are going to be the Shadow operator, that is going to be 18 weeks of AIT [Advanced Individual Training]. If they are going to be a Gray Eagle operator, that will be 33 weeks of AIT.

Senator COTTON. I have a few comparative numbers here in front of me. Your repairmen take 17 weeks of AIT?

General PERKINS. Correct. Generally our longest—and there are different kinds of repairmen, but if you look across the Army, it averages about 12 weeks between the lowest and the highest. Generally our military operational specialties that have the highest or the longest AIT are our repair people because they have got to go through the troubleshooting. They have to learn the electronics, mechanics, et cetera. Our Patriot repair people, our radar repair people—those tend to be our longer AITs because of the requirement to understand the technicality of what is going on and being able to troubleshoot, et cetera. That is probably a medium number you said for our repair people in general.

Senator COTTON. That is just for the people who are repairing the very aircraft that these operators are flying.

General PERKINS. Correct.

Senator COTTON. Just 1 week less to learn to be a repairman for one of those aircraft as opposed to being an operator.

You are right about the repair AIT times. A basic television equipment maintainer takes 24 weeks of AIT. A Patriot repairman takes 45 weeks. Not even the Gray Eagle operators take that long.

General Carlisle, when you have new officers, they pin on their 2nd lieutenant bars. How long do they undergo training before they are prepared to operate the MQ-1 or MQ-9?

General CARLISLE. Sir, first they go through undergraduate RPA training, which is held at Randolph, and that usually lasts about 6 months. Then from there, if they are going to RQ-4, they will go to Beale and get RQ-4 training. If they are getting MQ-1/9, they will go to Holloman for that training, and that lasts between 4 and 6 months. It is about a year.

The challenge we have right now is—and one of the things we are trying to do is our training pipeline is very inefficient. We have to get better at moving those folks through. Part of it is class start time dates, the other required training they have to do. But we are working hard to get efficiency within that.

The actual full-up training to when we send them to a unit and then once they get to the unit, they go through their mission qualification training, but usually that is a top-off while they are doing combat missions.

Senator COTTON. I make the comparison and ask the question to highlight the challenges the Air Force has, whether you use officers or whether you ultimately use enlisted personnel and moving people from the schoolhouse to the front lines because I think that is

going to be a continued bottleneck no matter what course you take on who is piloting the aircraft or whatever kind of additional bonuses that you are going to provide or whatever kind of additional quality of life measures on which you can improve.

Senator Manchin, anything further?

Senator MANCHIN. No.

Senator COTTON. Well, we will conclude. Thank you very much for participating in what is a very important hearing. As you can see, there is a lot of interest in this topic on the committee. I want all of our pilots and our operators to know that the members of this committee and the Americans that we represent appreciate their service and thank them for keeping our country safe.

This hearing is adjourned.

[Whereupon, at 4:14 p.m., the hearing was adjourned.]



**DEPARTMENT OF DEFENSE AUTHORIZATION  
FOR APPROPRIATIONS FOR FISCAL YEAR  
2017 AND THE FUTURE YEARS DEFENSE  
PROGRAM**

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**TUESDAY, APRIL 5, 2016**

U.S. SENATE,  
SUBCOMMITTEE ON AIRLAND,  
COMMITTEE ON ARMED SERVICES,  
*Washington, DC.*

**ARMY MODERIZATION**

The subcommittee met, pursuant to notice, at 2:30 p.m. in Room SR-232A, Russell Senate Office Building, Senator Tom Cotton (chairman of the subcommittee) presiding.

Subcommittee members present: Senators Cotton, Inhofe, Wicker, Rounds, Ernst, Sullivan, Manchin, Gillibrand, Blumenthal, Donnelly, and Heinrich.

**OPENING STATEMENT OF SENATOR TOM COTTON**

Senator COTTON. The Airland Subcommittee convenes today to hear testimony about Army modernization to review the defense authorization request for fiscal year 2017 and the Future Years Defense Program.

I welcome our witnesses, Lieutenant General Mike Williamson, principal military assistant for acquisitions; Lieutenant General John Murray, deputy chief of staff for Army programs; Lieutenant General Joseph Anderson, deputy chief of staff for operations, plans, and training; Lieutenant General H.R. McMaster, director of the Army Capabilities Integration Center.

Thank you each for your dedicated service to our Nation.

In many hearings, the full committee has heard about some of the most diverse, complex, and dangerous threats to our national security since the end of World War II. Russia occupies land in three countries and routinely probes NATO [Northern Atlantic Treaty Organization] allies, China is building and militarizing islands out of the sea, North Korea is testing nuclear weapons and missiles, and Iran is running wild across the Middle East. But instead of strengthening our forces against these threats, we have seen sustained cuts to our military's force structure, modernization, and readiness.

Army Chief of Staff General Mark Milley often states that readiness is his number-one priority. It is hard for anyone who has led soldiers in combat to disagree, just as the moms and dads of more

than 186,000 soldiers deployed in over 140 countries could never disagree. But we cannot afford to shortchange modernization. Today's modernization is tomorrow's readiness.

As we explore the Army's modernization strategy today, I am particularly interested to explore how the Army is using its new acquisition authorities in the creation of a Rapid Acquisition office. In its understandable focus on technological breakthrough, I wonder if the Army has moved quickly enough to adopt proven technology already possessed by our allies and adversaries alike. In many cases, the desired technology may already exist in the private sector and may be within the Army's grasp. I will offer three examples.

First, active protection systems to protect vehicles from close-in threats like rocket-propelled grenades are near completion in Israel, fielded in Germany and Russia, but the United States is still in the science-and-technology phase.

Second, the Distributed Common Ground System, or DCGS, remains beset by problems. Last year, Lieutenant General Williamson testified before this subcommittee that the completeness of the DCGS program is what makes it so valuable and predicted that as we go into the May time frame where we go through our next set of evaluations, I think you will see a completely different perception of how that tool is provided.

Unfortunately, a year later a report by the Director, Operational Test and Evaluation indicates that DCGS is not a functional mission command or intelligence analysis tool, and that even under laboratory conditions, soldiers and commanders "did not consider DCGS to be very helpful for the fight" and sought PowerPoint and pencil-and-paper workarounds even when commercial, off-the-shelf solutions are potentially available.

Third, the global response force typically housed in the 82nd Airborne needs an enhanced tactical mobility program. In plain English, they need four-wheelers and other all-terrain vehicles to get from the drop zone to the front lines. This requirement was demonstrated in 2012 and approved in 2014. Here we are in 2016 when any farmer or deer hunter in Arkansas could have gone and bought one at a local dealer.

In addition, some issues sit at the intersection of modernization and readiness. I am concerned, for example, about the maintenance and modernization of theater activity sets and the Army's pre-positioned stocks to be used by rotating units or to support contingencies.

Likewise, the subcommittee is curious about the Army's plans to implement the Associated Unit pilot program in which active Guard and Reserve units will be paired up to train and potentially fight together. In both cases, modernization could be disjointed and readiness may suffer without a well-considered plan.

Finally, I am sure committee members will want to examine the recommendations of the National Commission on the Future of the Army. The Army has suggested that about 50 of the 63 Commission recommendations are very easy to implement at no cost or some of which the Army has already begun implementation. That is good news.

But, according to Army, another 15 significant recommendations will require a detailed analysis and are expensive to implement. For instance, the Army's fiscal year 2017 unfinanced requirements list includes nearly \$1.2 billion in funding to implement recommendations on aviation modernization, retain an 11th Combat Aviation Brigade, and retain four National Guard AH [Apache Helicopter]-64 attack battalions. That is not such good news.

Again, I thank our witnesses for their service and for their appearance today. I look forward to the discussion.

Senator Manchin?

#### STATEMENT OF SENATOR JOE MANCHIN

Senator MANCHIN. Thank you, Mr. Chairman, and thank all of you for your service and for helping us navigate this difficult, challenging time.

I want to thank the chairman for holding this important hearing on Army modernization. I would also like to welcome your witnesses to today's hearing and thank them for their testimony and their service to our country.

The U.S. military remains the most ready and capable fighting force in the world. However, after nearly 15 years of constant military operations, it is important that we take a step back and assess the current state of our military force and the threats that we face at home and abroad.

While the focus of today's hearing is on the Army's strategy for modernization, I think it is also imperative that we acknowledge the other challenges facing the Army, including the importance of rebuilding readiness in the regular Army, the Army National Guard, and the Army Reserve.

The Army has made rebuilding readiness their number-one priority in fiscal year budget 2017 request. The high operational tempo for the past decade-and-a-half has consumed readiness levels as quickly as they could be reconstituted. The demands on our military force will not diminish any time in the near future.

Coupled with the devastating impact sequestration has had on readiness accounts, I commend the Army for prioritizing readiness in this year's budget and ensuring that our military are trained and ready to respond to any contingency at a moment's notice. As the committee begins their consideration of fiscal year 2017 National Defense Authorization Act, it is important that we protect these investments in the readiness accounts from any misguided cuts.

While the readiness of the force is vitally important, we cannot shortchange our investments in modernization. However, in order to meet the top-line funding levels set by the 2015 bipartisan budget agreement, the Army had to reduce funding for some procurement and modernization efforts. As General Daniel Allyn, vice chief of staff of the Army, testified last month before the Senate Armed Services Subcommittee on Readiness, this year's budget request is insufficient to simultaneously rebuild decisive action readiness and modernize. To ensure sufficient readiness for the demands of today's operating environment, the Army must assume risk by reducing end strength, delaying modernization, and deferring infrastructure recapitalization and investment.

The Army's fiscal year 2017 budget request included \$22.6 billion for the Army's modernization efforts. Of this amount, \$15.1 billion was requested for procurement and \$7.5 billion for research, development, test, and evaluation activities. However, the total funding for procurement in fiscal year 2017 request is \$1.3 billion less than enacted the amount in fiscal year 2016.

In particular, the Army's aviation portfolio was hard-hit by these reductions. The aviation portfolio accounts for approximately 25 percent of the Army's entire procurement budget, and the fiscal year 2017 budget request reduced procurement quantities for the AH-64 Apache, the UH-60 Black Hawk, and the CH-47 Chinooks. I would like to know if our witnesses feel confident that the reduction in these procurement accounts will not adversely impact these programs by adding substantial cost to the overall program or have an unintended consequence of reducing the readiness of our aviation units.

At the same time, the Army has had a poor track record with their modernization efforts. Many programs have been truncated or canceled, usually after billions of dollars had already been invested. Last year, this committee gave new acquisition authority to the service chiefs with the intent that this would improve the acquisition process. I look forward to hearing from our witnesses on their thoughts on this new authority and what further actions the Army needs to take to improve its acquisition processes.

Earlier this year, the National Commission on the Future of the Army released their comprehensive study on the roles and structure of the Army. I was pleased with the Commission's report and believe it was thorough and thoughtful.

With regards to the Army's Aviation Restructure Initiative, the Commission recommended that the active component retain 20 battalions of Apache helicopters, each equipped with 24 aircraft, while providing the Army National Guard with four battalions of Apache helicopters, each equipped with 18 aircraft.

While the Commission struck a balanced compromise, the fact remains that in order to execute the Commission's recommendations for ARI [Aviation Restructuring Initiative], it will require substantial funding. According to the Army's unfunded requirements list, the Army would need approximately \$1.2 billion in additional funding to implement the Commission's recommendation of fiscal year 2017, as well as additional funding above that amount over the next several years. While it is my understanding that General Milley is still reviewing the Commission's proposal, I would welcome any comments from our witnesses on this issue.

Finally, we must ensure our men and women in uniform remain the best trained, the best-equipped fighting force in the world. In light of the Budget Control Act and the Army's constrained top-line funding levels, it becomes even more imperative that every dollar we spend on the military is spent efficiently and effectively so that our soldiers can complete their mission, win our nation's wars, and return home safely.

Again, thank you, Mr. Chairman, for holding this hearing, and I look forward to hearing from our witnesses.

Senator COTTON. Thank you, Senator Manchin.

We will turn to our witness now, General Williamson.

**STATEMENT OF LIEUTENANT GENERAL MICHAEL E. WILLIAMSON, USA MILITARY DEPUTY AND DIRECTOR, ARMY ACQUISITION CORPS, OFFICE OF THE ASSISTANT SECRETARY OF THE ARMY FOR ACQUISITION, LOGISTICS, AND TECHNOLOGY**

General WILLIAMSON. Chairman Cotton, Ranking Member Manchin, and distinguished members of the subcommittee on Airland. Thank you for the invitation to discuss the fiscal year 2017 budget request and Army equipment modernization. I respectfully request that our written statement be made part of today's record.

Senator COTTON. Without objection.

General WILLIAMSON. Mr. Chairman, today's Army prioritizes readiness while continuing to assume risk and modernization. Due to resource constraints, we simply cannot modernize the entire force with the most modern equipment. Therefore, we must do so selectively. Our resources are focused on protecting science and technology so the next generation of breakthrough technologies can be rapidly applied and exploited with our existing and our new systems.

We are also investing in targeted new systems to fill critical operation requirements and capability shortfalls. These systems include the armored multi-purpose vehicle, the joint light tactical vehicle, and fixed-wing aviation. We are incrementally modifying and modernizing existing systems to increase capabilities and to extend service life. These systems include the Paladin, the Black Hawk, the Apache and Chinook helicopters, as well as our unmanned aviation.

We also have a requirement to reset and sustain and return our existing Army equipment to the required level of combat capability so that we will be prepared to fight in any immediate contingencies.

Then finally, we are divesting excess equipment across the entire Army to reduce and eliminate sustainment costs. Systems currently being divested include the M113 armored personnel carrier, the TH-67 training helicopters, as well as the Kiowa, the Kiowa Warrior, and the UH-60 Alpha Black Hawk fleets.

Equipping is and will always remain a critical component of readiness. We cannot put our soldiers at risk by not providing them with the right equipment at the right time and at the right place to accomplish their assigned missions.

Mr. Chairman, with your permission I would like to address just two other areas. First, reduction in the Army's modernization account continues to present significant challenges for the defense industrial base, including our own organic industrial base. In developing our equipment modernization strategy, we carefully assessed risk across all portfolios to protect ongoing production and to sustain the industrial base and to include the preservation of key workforce skills.

Secondly, I want to take this opportunity to express my appreciation to the members of the subcommittee for your continued efforts to strengthen and enhance the acquisition workforce. Our acquisition professionals are experienced, well-educated, and well-trained.

They are critical assets in the Army's ability to design, develop, and deliver needed capability to our soldiers.

Mr. Chairman and distinguished members of the subcommittee, thank you for your steadfast and strong support of the outstanding men and women of the United States Army, our Army civilians, and their families. This concludes my opening remarks.

[The joint prepared statement of General Williamson, General Anderson, Lieutenant General McMaster, and Lieutenant General Murry follows:]

JOINT PREPARED STATEMENT BY LIEUTENANT GENERAL MICHAEL E. WILLIAMSON,  
LIEUTENANT GENERAL HERBERT R. MCMASTER, JR., AND LIEUTENANT GENERAL  
JOHN M. MURRAY

#### INTRODUCTION

Chairman Cotton, Ranking Member Manchin, distinguished Members of the Subcommittee on Airland, thank you for the opportunity to appear before you today. On behalf of our Acting Secretary, the Honorable Patrick Murphy, and our Chief of Staff, General Mark Milley, we look forward to discussing the Army's fiscal year 2017 (FY17) budget request as it pertains to Army strategy, equipment modernization, and readiness.

We present our testimony today with a sense of urgency. With today's fiscal constraints, we risk becoming not only a smaller, but also a less-capable force. Budget unpredictability and reductions over the last several years has hampered modernization and threatens our ability to overmatch future enemies in ground combat. Investments today are critical because it is more cost effective to maintain and improve existing capabilities than regenerate lost capabilities rapidly in times of crisis. As the National Commission on the Future of the Army observed, reductions in Army modernization are elevating risk to Joint Force capability and national security. Our testimony aims to provide Congress and the American public with a greater understanding of the global security environment, the growing capabilities of our enemies and adversaries, and the capabilities and capacity the Army requires to protect our citizens and secure our vital national interests.

#### THE NEED FOR READY, MODERNIZED LAND FORCES

Since World War II, the prosperity and security of the United States have depended, in large measure, on the synergistic effects of capable land, air, and maritime forces. U.S. defense strategy requires ready Army forces capable of operating as part of joint teams in sufficient scale and for ample duration to prevent conflict, shape security environments, and create multiple options for responding to and resolving crises. As the nation's principal land force, the Army organizes, trains, and equips forces for prompt and sustained combat. Army forces are necessary to defeat enemy organizations, control terrain, secure populations, consolidate gains, and preserve joint force freedom of movement and action. Forward positioned and regionally engaged Army forces build partner capability, assure allies, and deter adversaries. To protect the homeland, foster security abroad, and win wars Army forces must have the capability (ability to achieve a desired effect under specified standards and conditions) and capacity (capability with sufficient scale and endurance) to accomplish assigned missions as part of the Joint Force while confronting increasingly dangerous threats.

We live in an ever-changing, increasingly dangerous world. Since decisions about the Army's size and reductions in Research, Development, and Acquisition (RDA) investments were made in 2014, the Islamic State of Iraq and the Levant (ISIL) captured large parts of Iraq and Syria and expanded into Libya and other locations; the Syrian Civil War escalated causing a refugee crisis in the Middle East and Europe; Russia occupied Crimea, invaded Ukraine, and intervened alongside the Iranian Revolutionary Guard Corps to maintain the Assad regime in Syria; North Korea became increasingly bellicose and tested nuclear weapons and ballistic missiles; China continues its unprecedented construction at reclaimed features in the South China Sea; and the Taliban continued to intensify offensive operations in Afghanistan. ISIL continued to conduct attacks from Tunisia, to Egypt, Lebanon, Iraq, Turkey, France and Belgium. To respond to these threats Army forces have maintained a Brigade Combat Team (BCT) in Kuwait, returned advisors and Special Operations Forces to Iraq, initiated BCT rotations in Europe, increased exercises with

partners and Allies in the Pacific, and maintained force levels in Afghanistan. Once soldiers are committed to these critical missions, it is difficult to disengage them. Due to reductions in the size of the Army and increasing commitments overseas, the pool of ready Army forces prepared to deploy rapidly and transition quickly into Joint operations is significantly challenged even as threats to national and international security are increasing.

#### EMERGING CHALLENGES

Threats, enemies, adversaries and geo-strategic competitors are becoming increasingly capable and elusive, which pose challenges to United States national security interests. Russia, North Korea, Iran and Violent Extremist Organizations (VEOs), such as ISIL, pose potential threats to United States national security interests. At the same time, the modernization of China's military forces poses a different type of challenge. Combined, those challenges represent a broad range of operations for which the Army must be prepared, from state to non-state to hybrid conflict. Analysis of threat capabilities reveals that the Army must modernize the force to be prepared to fight and win against increasingly capable adversaries.

In terms of state-based challenges, Russia's purported annexation of Crimea and invasion of Ukraine demonstrated a sophisticated combination of diplomatic, informational, military, and economic means to achieve objectives below a threshold that the Russian leadership believe would elicit a concerted NATO response. In addition, through an intensive modernization effort, Moscow is developing a significant capability in several specific military areas. In Ukraine for example, the combination of Unmanned Aerial Systems (UAS) and Offensive Cyber and advanced Electronic Warfare (EW) capabilities depict a high degree of technological sophistication that is a direct result of their modernization efforts. Robust anti-access and area denial capabilities, which include advanced air defenses and mobile gun-missile systems that range out to 400 kilometers, allow Russia to challenge air superiority from the ground. In addition, Russia possesses a variety of rocket, missile, and cannon artillery systems that outrange and are more lethal than United States Army artillery systems and munitions. Advanced close combat systems including new combat vehicles, active protective systems, and improved Anti-tank Guided Missiles (ATGMs) highlight improvements in the mobility, protection, and lethality of Russian heavy forces. It is clear that while our Army was engaged in Afghanistan and Iraq Russia studied United States capabilities and vulnerabilities and embarked on an ambitious and largely successful modernization effort.

China is modernizing its Army and is developing capabilities to project power within the air, maritime, space, and cyberspace domains. China's actions in the South China Sea lead to questions about its intention and commitment to uphold a rules based international system. Its efforts in space reveal China's determination to achieve space parity and possible superiority. China maintains its own constellation of satellites and recently demonstrated anti-satellite capabilities by shooting down one of its low earth orbit systems. China is also developing offensive cyber capabilities and an ability to jam the electromagnetic spectrum through EW capabilities that impacts United States communications and Precision, Navigation, and Timing (PNT), which severely limits what was once a significant differential advantage for U.S. forces. Additionally, China is actively fielding a fully mechanized force and has instituted realistic training to increase the readiness of its combat brigade formations. Current trends in Chinese weapons production will enable the Chinese to conduct a range of military operations well beyond its borders.

Despite increasingly constrained financial resources, the Democratic People's Republic of Korea (DPRK) continues to prioritize expansion of its nuclear and ballistic missile programs. The DPRK also maintains an aging but large and capable conventional force that has the ability to mass long-range fires on targets throughout the region, including Seoul. In addition, the DPRK military possesses cyber and chemical-biological warfare capabilities. As the DPRK continues to threaten attacks on the United States and our allies, and as the DPRK leadership faces mounting economic and political pressures, the United States must maintain its deterrent force on the peninsula and be prepared to deploy substantial ground, air, and maritime forces as part of a coalition alongside Republic of Korea (South Korea) forces in defense of South Korea and the region.

Iran employs proxies, exploits disenfranchised populations, and deploys covert operators to exacerbate sectarian conflicts, counter U.S. influence, and undermine United States interests in the greater Middle East. Iran's involvement in the Syrian, Iraqi, and Yemeni conflicts deepened over the past year. With the signing of the Russian-Iranian Military Cooperation Agreement last year, and the lifting of economic sanctions, it is likely that Iran will accelerate military modernization.

Iran's current modernization efforts include purchases of long-range surface to air missiles from Russia, an extensive fleet of unmanned aerial vehicles, cyber capabilities, ballistic missiles, and anti-tank guided missiles.

Threats to national security are also increasing from non-state actors. The emergence of ISIL is one example of how non-state actors capitalize on opportunities created by communal conflict and weak governance. ISIL's military organization; ideological base; use of mass murder and other forms of brutality; and its ability to mobilize people, money, and weapons have enabled it to seize territory and establish control of populations and resources. ISIL has demonstrated particular skill in employing social media to prosecute a propaganda campaign that complements terrorist and conventional military operations. ISIL's success, combined with the political and economic weaknesses of many Middle Eastern states has caused violent Islamist extremism to metastasize across much of the Middle East and Africa which has led to the greatest mass migration since the end of World War II. ISIL inspired, planned, and resourced attacks from Iraq to Lebanon, Turkey, Paris, Brussels, and even the homeland indicate that terrorist organizations that control territory, populations, and resources cannot be contained.

As demonstrated in these examples, future armed conflict will be complex, in part, because state, non-state, and hybrid threats are increasingly capable and are narrowing U.S. competitive advantages not only on land, but also in the air, maritime, space, and cyberspace domains. Because these threats may originate in urban areas or remote safe havens, long-range strikes will prove insufficient to defeat them. The complexity of future armed conflict requires an Army capable of conducting missions at home and in foreign lands. To maintain overmatch against elusive and increasingly capable enemies, our Army must maintain readiness for today and invest in modernization to ensure readiness for tomorrow.

#### RESOURCING ARMY MODERNIZATION

Due to resource constraints, today's Army prioritizes readiness while continuing to assume risk to modernization. We simply cannot modernize the entire force with the most modern equipment. Since fiscal year 2012 the Research, Development and Acquisition (RDA) accounts have declined by over 30 percent. Given the restrictions on modernization funding, technological plateaus and the uncertainty of world events, the Army must be selective in resourcing its programs. In fiscal year 2017, the President's Budget request totals \$22.6 billion for the Army's RDA program, which includes \$15.1 billion for Procurement and \$7.5 billion for Research, Development, Test and Evaluation (RDT&E). We are 'adapting today and investing tomorrow'. We are focused on suitable new uses or purposes for equipment in the near term; making modest investments and delaying new capabilities in the mid-term and protecting Science and Technology for the future. Specifically, our RDA resources are focused on:

1. *Science and Technology (S&T)*. Protected S&T funding ensures the next generation of breakthrough technologies can be rapidly applied to existing or new equipment designs. We are implementing a strategic approach to modernization that includes an awareness of existing and potential gaps; an understanding of emerging threats; knowledge of state-of-the-art commercial, academic, and Government research; and an understanding of competing needs for limited resources.
2. *New Systems*. The Army is making modest developmental investments based on critical operational requirements and capability shortfalls. Fiscal realities have led to the delay or discontinuance of new systems. Key investments that remain in the next generation of ground vehicle capabilities include the Armored Multi-Purpose Vehicle and the Joint Light Tactical Vehicle, a critical program for the Army and the U.S. Marine Corps. Also in this area, the Fixed-Wing Utility Aircraft (FUA), a replacement for the C-12 and C-26 platforms, is projected to be selected and begin fielding in fiscal year 2018.
3. *Modification/Modernization*. The Army must incrementally modify or modernize existing systems in order to increase capabilities and extend service life. In addition, the continuous improvement of existing systems helps to sustain the industrial base. In this area, we are focused on improving the Abrams, Bradley, and Stryker Families of Vehicles, as well as Paladin, Improved Turbine Engine Program, and the Guided Multiple Launch Rocket System Unitary. We are also improving the Apache, Black Hawk, and Chinook helicopter fleets, as well as our Unmanned Aircraft Systems.
4. *Reset and Sustain*. Returning Army equipment to the required level of combat capability remains central to both regenerating and maintaining equipment near-term readiness for contingencies.

5. *Divest.* The Army divestment process seeks to identify equipment and systems that are excess across the Total Army in order to reduce and eliminate associated sustainment costs. For example, we are divesting the aging M113 armored personnel carriers. Additionally, the Army's Mine Resistant Ambush Protected (MRAP) vehicles divestiture will eliminate a large portion of the fleet through Foreign Military Sales, distribution to other agencies, and demilitarization of older, battle-worn, excess vehicles. The Army also continues to divest its aging TH-67 training helicopters, as well as the OH-58A/C Kiowa, OH-58D Kiowa Warrior, and UH-60A Black Hawk fleets.

FISCAL YEAR 2017 BUDGET PRIORITIES

Over the last 15 years of combat operations, the United States Army had to focus on winning against specific threats in Afghanistan and Iraq that limited the Army's ability to modernize for future fights. There are currently no ground combat vehicle developmental programs which means, at current funding levels, the Bradley and Abrams will be in the Army inventory for 50–70 years. Meanwhile, threats, enemies and adversaries have been modernizing rapidly. Due to increasing enemy capability and reduction in Army resources available for modernization, risk is increasing to soldiers and missions.

The President's budget request for fiscal year 2017 prioritizes the following five capability areas:

*Aviation.* The Army continues to invest, at a slower pace, in Aviation to sustain fleet modernization and close key capability gaps in survivability and lethality. Specific investments in this portfolio include the following:

- The Army will pursue a Multi-Year Contract (MYC) in fiscal year 2017 for the *AH-64 Apache* in order to achieve cost avoidance and efficiencies, while completing the AH-64E Apache Remanufacture Program. This program is designed to renew the current Apache fleet by incorporating current technologies and a new airframe to extend the aircraft's useful life and make it one of the most technologically advanced weapon systems on the battlefield. With regard to Manned/Unmanned Teaming (MUMT), the AH-64E Apache program has successfully developed the capability to view video from all U.S. Army Unmanned Aircraft Systems (UAS) and link with and fully control the Gray Eagle UAS. In fiscal year 2017, development continues on the next step of control with MUMT-X, which will give the AH-64E Apache the capability to control all other UASs in the Army fleet.
- The *UH-60 Black Hawk* continues to be the Army's workhorse and, at 2,135 total airframes, is our largest fleet of rotary wing aircraft. Fleet modernization efforts focus on the continued procurement of the UH-60M aircraft, recapitalization of UH-60A into UH-60L aircraft, the development of the UH-60V aircraft with a digital cockpit, and divestment of legacy aircraft. In fiscal year 2017, the Army will enter into the ninth MYC to be awarded through fiscal year 2021.
- The *Improved Turbine Engine Program* is designed to provide significant horsepower and fuel savings to enable current AH-64 Apache and UH-60 Black Hawk fleets to meet worldwide operational requirements for high altitude and hot conditions. The program continues in fiscal year 2017 with two vendors undergoing Preliminary Design Review, which will lead to a down select in fiscal year 2018 to a single vendor for engine development.
- The *CH-47 Chinook*, the Army's only heavy lift helicopter, is projected to remain in service through 2060, making it the Army's first, and only, aircraft in service for more than a century. The planned H-47 Block II upgrade to the H-47F/G will restore operational payload capability, efficiently incorporate engineering changes, and increase commonality between SOCOM and the conventional Army.
- The Army has an *Unmanned Aircraft Systems (UAS)* fleet comprised of small (Raven and Puma), medium (Shadow), and large (Gray Eagle) components. All systems are existing programs of record and are under active acquisition programs to meet fleet size objectives over the next five years. Gray Eagle is a dedicated, assured, multi-mission UAS being fielded to all 10 Army divisions to support combat operations, as well as the National Training Center. Additionally, the Improved Gray Eagle, which achieves significant increases in payload, range, and station time through fuselage and engine enhancements, is fielded to Special Operations Forces and Intelligence organizations in support of global Department of Defense Intelligence, Surveillance, and Reconnaissance (ISR) requirements. Shadow is a dedicated Reconnaissance, Surveillance, and Target Acquisition UAS fielded to Army and Army National Guard BCTs, Special

Forces Groups, the Ranger Regiment, and performs Manned-Unmanned Teaming with Apache in Combat Aviation Brigades to meet the Armed Aerial Scout requirements in lieu of the divested OH-58D Kiowa Warrior. Shadow Platoons are currently undergoing a major block upgrade that provides enhanced encryption, increased endurance, improved optics, and a high bandwidth, digital data link capable of support secure transmission of multiple payloads.

- Fiscal year 2017 funds for the Army's fixed wing fleet include procurement of the *FUA*, which will begin replacing the current C-12 platforms and later the C-26 platforms.
- The *Joint Air-to-Ground Missile (JAGM)* is an Army-led Acquisition Category 1D program with Joint interest from the U.S. Navy and U.S. Marine Corps. JAGM is the next generation of aviation launched missiles to replace the laser Hellfire II and the Longbow radar missiles. Fiscal year 2017 funds the first JAGM Low Rate Initial Production lot.

*Network.* The Army must maintain a robust Network that is protected against cyber-attacks to execute uninterrupted mission command. Key investments supporting the Network include the following:

- *Warfighter Information Network-Tactical (WIN-T)* provides "networking-on-the-move" capability. WIN-T also provides soldiers and leaders a mobile infrastructure that employs military and commercial satellite connectivity, and high capacity line-of-sight (terrestrial) connectivity. It extends the tactical wide area network throughout division, brigade, battalion, and company levels in the maneuver force. The WIN-T Increment 2 program is in Full Rate Production and fielding following a successful operational test and performing well in operations in theater.
- *Assured Position, Navigation and Timing (A-PNT)* is a critical enabler for Army warfighting functions and virtually all Army weapon systems. Program Manager Positioning, Navigation and Timing (PM PNT) and Army S&T are developing technologies to provide dismounted and mounted soldiers the capability to attain trusted PNT information while operating in conditions that impede or deny access to the Global Positioning System (GPS). These technologies include non-GPS augmentation for distributed Mounted and Dismounted PNT capabilities, pseudolite transceivers (an alternative source of GPS-like signals), and anti-jam capabilities. Both the Mounted and Dismounted efforts are structured to provide a hub capability that distributes an A-PNT solution to vehicles and soldier systems. In fiscal year 2017, Army S&T will transition A-PNT technologies for Mounted and Dismounted application to PM PNT with the Program of Record Milestone B scheduled in mid-fiscal year 2018.
- *Communications Security* supports the implementation of the National Security Agency (NSA) developed Communications Security (COMSEC) technologies into the Army by providing COMSEC systems capabilities through development and integration of encryption, trusted software, and/or standard operating procedures into specified systems in support of securing Army and Department of Defense Networks and capabilities.
- *Offensive Cyber Operations (OCO)* and *Defensive Cyber Operations (DCO)* allow the Army to protect its networks and project force in cyberspace. The Army has positioned itself with U.S. Army Cyber Command (ARCYBER) and the Cyber Center of Excellence to provide capabilities in both mission areas and will continue to do so. In the area of DCO, the Army will continue to invest in infrastructure and tools to set conditions for increased defensive capabilities. We are in the initial stages for fielding capability and fiscal year 2017 will be critical in further development.
- *Cyber Situational Awareness* is integral to OCO, DCO, and Department of Defense Information Network operations that support commanders in the conduct of unified land operations. These capabilities range from system status to mission and threat awareness to targeting and engagement data to influence cyber and electromagnetic effects. We are currently working with the Cyber Center of Excellence and ARCYBER to address these requirements.

*Integrated Air Missile Defense (IAMD).* The Army must be able to defeat a large portfolio of threats ranging from micro Unmanned Aircraft Vehicles and mortars, to cruise missiles and sophisticated short and medium range ballistic missiles. The Army will support this priority by investing in an Integrated Air and Missile Defense Battle Command System, an Indirect Fire Protection Capability, and modernization of the Patriot system.

Within this demanding mission area, the number one Air and Missile Defense (AMD) modernization priority remains the *IAMD Battle Command System (IBCS)*. IBCS will replace elements of seven existing mission command programs, and allow

transformation to a network-centric system-of-systems capability that integrates AMD sensors and weapons. A second critical priority is to significantly improve capabilities in Countering Unmanned Aircraft Systems (CUAS) and Cruise Missile Defense (CMD), while continuing to pace the Ballistic Missile Defense (BMD) threat and maintaining capability to Counter Rockets, Artillery and Mortars (C-RAM). The portfolio will accomplish this by leveraging the *Indirect Fire Protection Capability Increment II* Program and a Multi-Mission Launcher (MML) to address select CUAS, CMD, and C-RAM threats and replace Avenger/Stinger across the force. The Army is continuing investments to improve Patriot radar capabilities and field the *PAC-3 Missile Segment Enhancement* (MSE).

*Combat Vehicles.* The Army is pursuing a Combat Vehicle Modernization Strategy to ensure Army BCTs possess the lethality, mobility, and protection to achieve overmatch during joint expeditionary maneuver and joint combined arms operations:

- *Ground Mobility Vehicle* (GMV) will be procured as a Commercial/Government Off-the-Shelf (C/GOTS) solution to address a significant mobility gap in the Infantry Brigade Combat Teams (IBCT). The Army's current analysis of alternatives for GMV is expected to be complete in mid-fiscal year 2016 and inform the acquisition of a commercial, non-developmental solution beginning in fiscal year 2017.
- *Stryker Lethality Upgrades* address capability gaps resulting from more than 12 years of combat through an incremental Engineering Change Proposal (ECP) strategy currently focused on increasing mobility, electrical power, and the need to accept future network upgrades. Efforts also include upgrades to increase the lethality of the Stryker Family of Vehicles and Double V-Hull upgrades to increase vehicle protection. The Army plans to increase lethality by having half of the Infantry Carrier Vehicles equipped with a 30 mm cannon and the other half equipped with a Javelin missile on the existing Remote Weapons Station in each brigade. The Army plans to increase protection by upgrading Stryker vehicles to a Double-V Hull (DVH) architecture for four of the nine BCTs. DVH production utilizes an exchange process, removing select components and mission equipment packages from flat bottom Strykers and installing them into a new DVH.
- *Mobile Protected Firepower* will provide protected, long-range, direct fire capabilities to the IBCT to defeat enemy prepared positions, destroy enemy armored vehicles, close with the enemy through fire and maneuver, and ensure freedom of maneuver and action in close contact with the enemy. The Army plans to conduct the Mobile Protected Firepower Analysis of Alternative in fiscal year 2017 to assess the operational effectiveness, suitability and life-cycle cost of both developmental and non-development materiel solutions that satisfy requirements contained within the Initial Capabilities Document.
- *Armored Multi-Purpose Vehicle* will replace the legacy M113s at the brigade level and below to support the Armored BCT and will consist of five mission roles: General Purpose, Mortar Carrier, Mission Command, Medical Evacuation, and Medical Treatment variants. The Engineering and Manufacturing Development contract was awarded in December 2014, and we anticipate the first prototype delivery vehicle in December 2016.

*Emerging Threats.* As mentioned earlier, the Army invests in S&T to focus on critical capability gaps and allow our soldiers to operate in contested environments and win decisively against any potential adversary in the mid to far timeframe. These S&T investments will deliver capabilities to address critical gaps in combat vehicles, Future Vertical Lift (FVL), expeditionary mission command, cross-domain fires, cyber electromagnetic activities, robotics and autonomous systems, advanced protection and soldier and team performance and overmatch. For example, the Modular Active Protection System and advanced protection systems program will increase vehicle and aircraft survivability and protection against current and emerging advanced threats; Electronic Warfare efforts will focus on designing countermeasures to address threats against Army rotorcraft, ground mounted platforms and dismounted soldiers; and the Combat Vehicle Prototyping program will demonstrate advanced capabilities for the combat vehicle fleet, reducing technical risk for future programs, including the Future Fighting Vehicle. Other areas to help ensure that our soldiers are protected against emerging threats include Degraded Visual Environment mitigation to inform leadership on improvements to platform survivability; Red Teaming and Vulnerability Analysis to know our weaknesses and fix them; a directed energy component for Counter Unmanned Aerial Systems (CUAS), Counter Rocket Artillery and Mortar (CRAM), and Cruise Missile Defense (CMD); cyber situational awareness and offensive and defensive cyber operations to collect, develop understanding and defeat threat advancement in cyber electromagnetic capabilities;

and sensor protection to ensure more consistent situational awareness. Additionally, the JMR-TD will fly demonstration aircraft to prove out FVL technology and inform requirements development. FVL will conduct an Analysis of Alternatives and begin development of the initial variant. A Materiel Development Decision for the first FVL variant will occur in fiscal year 2017. Lastly, S&T investments in robotics and autonomous systems (RAS) improve Army formation capabilities in situational understanding, mobility, protection, lethality, and sustainment in ways that cannot be achieved elsewhere.

*Other Major Programs for Fiscal Year 2017.* The Squad is the foundation of the Decisive Force. Closing gaps in capabilities will ensure the Army's foundational tactical unit can close with and destroy the enemy under all battle conditions and accomplish missions in complex environments. The integration of Squad-related initiatives across numerous capability portfolios is essential to success. The Army is constantly working to reduce the weight and improve the performance of the soldier's *individual equipment*. Currently, we are researching improved ways to help redistribute the weight carried by soldiers so they can carry their load with less stress on their backs or knees. Plans include the development of new rucksacks and other equipment so soldiers can more comfortably carry their supplies, ammunition, and equipment. Research is also taking place on a new load-bearing system. Every effort undergoes extensive user evaluations by soldiers throughout the development process. The Army is also working to reduce the weight of the clothing and equipment soldiers carry by developing lighter body armor, helmets, and other equipment while addressing a wide-range of threats to our soldiers, including ballistics, blast overpressure, concealment, fragmentation, and heat.

In addition to the above efforts, the Army's Soldier Protection System (SPS) is an integrated personal protection system that integrates head, torso, and extremity protection. It maintains current standards of personal protection but with lighter weight than current systems. It is also scalable, allowing soldiers to increase the level of protection or reduce weight depending upon mission requirements. SPS consists of five major subcomponents: (1) the Integrated Head Protection System is a new helmet concept which allows the soldier to add additional protection, such as an additional layer of armor or facial protection, depending upon mission requirements; (2) Transitional Combat Eye Protection is eyewear that electronically either automatically or manually adjusts for darkness or light, which is critical when a soldier exits a sunlit street into a darkened structure; (3) Torso Protection features a new combat vest with pelvic protection that provides modular levels of protection that can be scaled up or down depending on mission requirements; (4) Vital Torso Protection provides lighter weight hard armor plates; and (5) the Integrated Soldier Sensor System will provide sensor technology to record forces that affect the soldier, as well as monitor the soldier's health status. Other important initiatives include the Lightweight Advanced Combat Helmet, which provides the same levels of protection as the Advanced Combat Helmet but with less weight and the Enhanced Combat Helmet, which provides significantly better head protection without additional weight.

In the area of *Aircraft Survivability Equipment*, the fiscal year 2017 budget request will accelerate the Common Infrared Countermeasure system and will begin fielding in the near-term. This will be coupled with the Advanced Threat Detection System (ATDS) to improve infrared threat detection. Essential to protection of aircraft against emerging threats, the Army will pursue S&T efforts to develop follow on systems that are able to defeat a threat system irrespective of its targeting and guidance systems, propulsion means, or warhead type. In addition, fiscal year 2017 funds the development of an ATDS (Detect) to replace the Common Missile Warning System.

In the area of Cross Domain Fires the Army is ensuring that area and precision fires capabilities support maneuver BCT core mission competencies. The Army is continuing research into improving organic BCT Near-Precision and Precision fires, cluster munitions replacement, and long-range fire enhancements. In the near-term, the Army will continue radar modernization with fielding the *Q-50 and Q-53 Radar Systems*, replacement of Paladin M109A6 with *Paladin Integrated Management (M109A7)*, and continued production of *Guided Multiple Launch Rocket System-Alternate Warhead* missiles.

The Army is committed to providing soldiers with the best intelligence tools and technology available. The intelligence warfighting function's priority is the Army's Terrestrial Layer, followed by the Foundation Layer and the modernization of the Aerial Intelligence, Surveillance and Reconnaissance (ISR) platforms and sensors within the Aerial Layer. The first priority is the *Prophet Ground Signals Intelligence (SIGINT)* capability. Prophet must be constantly modernized to maintain pace with changing global military and commercial technologies available to the

threat. Prophet will also bridge the operational gap until replaced by the future Next-Generation Multi-Intelligence Ground Collection System. The second priority within the Foundation Layer is a capability that enables processing, exploitation and dissemination of information to maintain highly accurate situation awareness, such as the *Distributed Common Ground System-Army* (DCGS-A). As we continue to refine and improve the current version of DCGS-A, we are committed to a full and open competition in fiscal year 2016 to develop, test, and produce the next version of this intelligence software system. fiscal year 2017 funding will provide for the fielding of enhanced Increment 1, Release 2 capabilities to the Force, which improves the tools currently used by soldiers to analyze, process, and visualize the information on the battlefield, and support Increment 2 development and testing. DCGS-A Increment 2 will provide a modernized data management architecture that complies with the Common Operating Environment, the Intelligence Community Information Technology Enterprise, and the Joint Information Environment; the integration of emerging sensor and automation technology; and enhanced ease of use and analytic capabilities. Funding also provides for the procurement of DCGS-A Tactical Intelligence Ground Stations to equip activating Expeditionary Military Intelligence battalions in all components.

The *Joint Light Tactical Vehicle* (JLTV), a Joint program with the U.S. Marine Corps, is the centerpiece of the Army's Tactical Wheeled Vehicle modernization strategy and a key enabler of Joint Combined Arms operations. JLTV provides the necessary leap in protection, performance, and payload—the Iron Triangle—to fill the capability gap remaining between the High Mobility Multipurpose Wheeled Vehicle and the Mine Resistant Ambush Protected Family of Vehicles. The JLTV is in Low-Rate Initial Production. The JLTV program will inform requirements for the potential development of a Lightweight Reconnaissance Vehicle (LRV).

The Army and the Department are working to implement the fiscal year 2016 National Defense Authorization Act (NDAA) acquisition reform provisions to improve the acquisition process by strengthening the Army Chief of Staff's voice in the acquisition process as its principal customer. There is still more to be done within the Army to streamline the process. The fundamental principle is that authority must accompany responsibility. To hold the Chief of Staff accountable, he must have the authority to fix the Army's process. We will continue to explore steps to improve the Army's process.

The Army will ensure that system requirements are affordable and do not add excess technical risk to our acquisition programs. We have instituted processes known as *Knowledge Points* to identify necessary requirements trade-offs at key decision points. This process is mandatory across all major programs and is a critical factor in achieving a more effective, more affordable, and more responsive acquisition system. Knowledge Points enable the Army Chief of Staff to formally review system requirements throughout the development phase. In addition, the Army has instituted *affordability caps* on new programs to make sure that we can sustainably afford the development and production costs. For example, we made certain that we could afford AMPV at the same time we were producing the Paladin Improvement Management howitzer and JLTV.

#### DEFENSE INDUSTRIAL BASE

Reductions in the Army's modernization account continue to present significant challenges for the Defense Industrial Base, especially for companies that do not have commercial sales to leverage and for small companies that must diversify quickly. In developing our equipment modernization strategy, we carefully assessed risks across all portfolios to ensure balanced development of new capabilities, incremental upgrades to existing systems, and protection of ongoing production to sustain the Defense Industrial Base.

The Army remains concerned about the preservation of key skills and capabilities in the manufacturing base for both our original equipment manufacturers and their key suppliers. Teaming and collaboration with our industrial base partners early in the process helps to reduce risk. Where applicable, the Army supports the efforts to develop Foreign Military Sales (FMS) and Direct Commercial Sales (DCS) that can also help to sustain the Defense Industrial Base.

The Army's approach to risk mitigation focuses on continuous assessment of industrial base risks across all portfolios. Fragility and Criticality (FaC) assessments are a critical part of the risk mitigation process and identify the fragile and critical portions of sectors within the Defense Industrial Base to facilitate risk-mitigation investment decisions. The FaC information provides Army program offices with the ability to accurately gauge how potential reductions in funding could affect suppliers

that provide the capabilities, products, skills, and services needed to maintain readiness.

The Army recently completed studies that independently assess the health and risk of the Munition, Combat Vehicle, and Tactical Wheeled Vehicle industrial base sectors. In the Combat Vehicle portfolio, production of the M109A7 Self-Propelled Howitzer System, the Armored Multi-Purpose Vehicle, ongoing FMS, as well as incremental upgrades to Abrams, Bradley, and Stryker ensure continuing workload to sustain critical skills. In the Army's Aviation portfolio, multi-year contracts for the Black Hawk, Chinook, and potentially Apache provide stability and predictability to the industrial base while achieving significant cost savings for the Army and the American taxpayer.

The Army continually assesses the health of the organic industrial base (OIB), including our depots, arsenals, ammunition plants, munitions centers, and Government Owned Contractor Operated (GOCO) manufacturing facilities. The Army maintains critical skills sets in our OIB by identifying workload to preserve capabilities, exploring FMS opportunities, and encouraging our OIB facilities to partner with commercial firms and other Department of Defense organizations, such as the Defense Logistics Agency, to meet future requirements.

The fiscal year 2017 budget request fully funds the Army's critical equipment readiness requirements and supports 13 million Direct Labor Hours (DLH) of work within the depots. The arsenals also anticipate executing 1.4 million DLH in fiscal year 2017 to sustain their skill sets. This workload will adequately preserve the depot and arsenal critical skill sets, with some risk for those systems that have either been through reset or RECAP with Congressional support. The Army is reassessing the arsenal's critical manufacturing capabilities with the Office of the Secretary of Defense and the other Services to ensure proper utilization of the arsenals to meet joint readiness requirements. Minimum workload levels to sustain these critical manufacturing capabilities will inform staffing levels and plant capacity to effectively sustain equipment readiness requirements. We will continue to modernize Army OIB infrastructure to support readiness.

#### CAPACITY ALSO MATTERS

The modernization priorities described above are critical to maintain overmatch against increasingly capable enemies. However, modernization alone is not enough. The Army requires *ready* forces that not only possess modern capabilities, but also the capacity to translate military objectives into enduring political outcomes. Army capacity is critical to deter enemies; reassure allies; surge forces to contingencies; control territory; secure populations overseas and in the homeland; and regenerate combat power. There is mounting risk associated with an Army that could prove too small to execute the strategy outlined in the National Military Strategy.

Current demand exceeds the Army's ability to supply units on a rotational basis. Today, the Army is globally engaged with approximately 190,000 soldiers supporting Combatant Commanders in 140 countries. These soldiers conduct combat operations, deter aggression, and assure our Allies and partners. In Afghanistan, the Army continues to engage the enemy as we work with Allies and partners to train, advise, and assist Afghan National Security Forces. In Iraq, we build partner capacity to fight the Islamic State of Iraq and the Levant. Throughout Africa and the Americas, we partner to prevent conflict and shape the security environment. In the Pacific, more than 75,000 soldiers remain committed, including 20,000 who stand ready in the Republic of Korea. In Europe and Asia, Army forces reassure Allies and deter aggression.

An Active Army which currently stands at 482,000 is drawing down from a wartime high of 570,000 (1,133,000 Total Force) to 450,000 personnel (980,000 Total Force) and reducing from 45 to 31 BCTs (59 Total Force). If sequestration-level cuts are imposed in fiscal year 2018 and beyond, all components of the Army would be reduced further, with active duty end strength decreasing to 420,000, the Army National Guard drawing down to 315,000, and the Army Reserves reducing to 185,000. Those reductions would create unacceptable risk to the nation. Insufficient capacity in ready land forces limits options for the President, Secretary of Defense, and combatant commanders to respond to and resolve crises. Moreover, once cut it is difficult to regenerate Army forces rapidly. Growing the Army is difficult, costly, takes time due to a lack of manpower, the sophisticated nature of weapons and equipment, the importance of training teams on collective and individual tasks, and the need for those teams to have experienced leaders.

## CONCLUSION

U.S. defense strategy requires ready Army forces capable of operating as part of joint teams in sufficient scale and for ample duration to prevent conflict, shape security environments, and create multiple options for responding to and resolving crises. Our risk to national security is increasing due to our adversaries improving their capabilities, increased global commitments, reductions in Army manpower, and reductions in resources for readiness and modernization. To mitigate risk, Army leaders prioritize investments to sustain readiness and close the most critical capability gaps. We recognize that, in our democracy, we get the Army that the American people are willing to pay for. It is our job to do the best we can with the resources that Congress and the American people provide us.

Mr. Chairman and distinguished Members of this Subcommittee, thank you for your steadfast support for our soldiers, Department of the Army Civilians, and Army Families.

Senator COTTON. General McMaster?

**STATEMENT OF LIEUTENANT GENERAL HERBERT R. MCMASTER, JR., USA DIRECTOR, ARMY CAPABILITIES INTEGRATION CENTER; DEPUTY COMMANDING GENERAL, FUTURES, UNITED STATES ARMY TRAINING AND DOCTRINE COMMAND**

General McMASTER. Thank you, sir. Chairman Cotton, Ranking Member Manchin, distinguished members of this subcommittee, thank you for the opportunity to speak with you today about the importance of ready land forces and the enduring need to maintain a ready Army with sufficient capacity and capabilities to secure our nation.

As Senator Cotton mentioned already, threats and enemies are becoming increasingly capable, and our competitive advantages that we have banked on over recent years are narrowing. Due to reductions in the size of the Army and decreased investments in modernization, as well as the improved capabilities of potential enemies, the Army risks losing qualitative overmatch in future conflicts.

With a 74 percent decrease in Army modernization total obligation authority since 2008, risk to mission and soldiers is increasing. All of today's conflicts are over the control of territory, people, and resources. Because the Army is foundational to the joint force, the increased risk applies as well to joint operations, as well as to soldiers and Army units. In particular, we must ensure that combined arms units in our Army possess the mobility, the firepower, and the protection to defeat the enemy and establish control of land, resources, and populations.

Over the last 15 years of combat operations, our Army has focused on winning against enemies in Afghanistan and Iraq. We are behind, though, in modernization against current as well as future threats. We have no current major ground combat vehicle development program underway. With current funding levels, the Bradley Fighting Vehicle and the Abrams tank will soon be obsolete, but they will remain in the Army inventory for the next 50 to 70 years.

Meanwhile, threats, enemies, and adversaries have been modernizing rapidly. To mitigate mounting risk, our Army is particularly concerned about developing future capabilities in the following areas: combat vehicles, future vertical lift, expeditionary mission command or command-and-control capability, cross-domain fires, cyber and electromagnetic activities, robotic and autonomous sys-

tems, advanced protection as was already mentioned, and soldier and team performance and overmatch in close combat.

The stakes are high. The combination of increasingly dangerous security environment, reductions in the size of the Army, decreasing investment in Army modernization, and fiscal uncertainty have increased risk to the joint force and to national security.

Mr. Chairman and distinguished members of this subcommittee, thank you for the opportunity to speak with you today. I look forward to your questions.

Senator COTTON. General Anderson?

**STATEMENT OF LIEUTENANT GENERAL JOSEPH ANDERSON,  
USA DEPUTY CHIEF OF STAFF OF THE ARMY (G-3/5/7)**

General ANDERSON. Thanks, Mr. Chairman. Chairman Cotton, Ranking Member Manchin, and distinguished members of this committee, thanks for the opportunity to talk to you about the Army's fiscal year 2017 PBR [President Budget Request] as it pertains to Army modernization. Thanks to all of you for your continued support of our soldiers, our families, our civilians, and our veterans.

As you know, the Army remains the world's decisive land force. We are currently globally engaged with 187,000 soldiers in over 140 countries, while participating in seven named operations and rotating forces through Europe, the Pacific, and the Middle East. The Army remains the foundation of the joint force, and we conduct diverse and enduring missions. We will continue to invest in training, equipping, and leader development while balancing resources between readiness and strength and modernization.

We require long-term, sustained, and predictable funding to meet our demands in today's security environment. The 2015 BBA [Bipartisan Budget Act] did provide some short-term relief. While the budget provides some predictability, it is insufficient to build full-spectrum readiness and modernize our equipment at the same time. We assume risk by reducing end strength, delaying modernization, and deferring infrastructure enhancements to build readiness for today's operating environment. These tradeoffs mortgage our future readiness and increase the risk of sending under-trained and poorly equipped soldiers into harm's way.

I look forward to working with you to ensure that our Army remains the premier land force in the world, and I look forward to taking your questions. Thank you.

Senator COTTON. General Murray?

**STATEMENT OF LIEUTENANT GENERAL JOHN M. MURRAY,  
DEPUTY CHIEF OF STAFF OF THE ARMY, G-8**

General MURRAY. Chairman Cotton, Ranking Member Manchin, distinguished members of this committee, once again, thank you very much for allowing me to testify today on the Army's fiscal year 2017 budget request.

I would simply amplify a couple things that my colleagues have already said and the chairman and ranking member have mentioned several times, and that is the fundamental issue the Army faces each and every time we build a budget, and we are facing it right now as we build a team budget, and that is how do you bal-

ance really the three legs of the stool that we deal with when we talk about how we apply our resources. That is near-term readiness, that is really manpower or structure, and it is modernization/capital investments. It is the balancing act between those three that we deal with every time we build a budget.

This budget request in fiscal year 2017 clearly prioritizes readiness. It is about a five percent increase in what we have asked for in readiness over the 2016 request. At the same time we are maintaining end-strength ramp on our way down to 450, as directed, and so you pay for that with modernization, capital investments in our installation. That is where the bill-payers are.

If you ask me if I am concerned about risk in this budget, I would tell you no. I am more concerned about the cumulative risk over the last 5 or 6 years because this is exactly the way we have built budgets for the last 5 or 6 years. I am more concerned about the cumulative effect of the impact on the modernization accounts in our installations than I am in particular one budget.

Once again, thank you for your steadfast support for our soldiers, our families, our civilians, and our veterans, and I very much look forward to taking your questions.

Senator COTTON. Thank you all.

I want to return to a concept you all raised in various ways. General Williamson, you talked about assuming risk on modernization, selectively modernizing targeted investments. General McMaster, you talked about the future of the Army and the risk we face there. General Anderson, you said we are assuming risk in modernization. General Murray, you said that you are more worried about the cumulative risk not just of this budget but five years of budgets.

When we prioritize readiness, we are prioritizing the training and the safety of the soldiers that we have in the Army today downrange, which means that we are putting at greater risk the soldiers that we are going to be sending downrange in 5, 10, 15 years just to put it in the most concrete terms. Is that fair?

General ANDERSON. It might be fair, Senator, but I think the issue is as we watch the cycle, our job is to—how we make sure from home station training, that is some of the money you are seeing pulled for readiness out of some of these programs to make sure they get better opportunity at home. Before they go to one of the training centers, be it at Fort Irwin, be it Fort Polk for their validation exercises before they out from a training perspective we are okay. The issue is going to be—and so far, as we keep doing that for all things Korea, for all things Afghanistan, all things Iraq, elsewhere, we are okay on a three-to-one cycle rotation.

The issue is going to be, though, as you allude to, is what kit do they bring, as we watch in Europe and elsewhere. That is where, as H.R. mentioned, the overmatch piece. That is the larger concern of the two.

Senator COTTON. General McMaster used the term qualitative overmatch. Could you explain what you mean by that?

General MCMASTER. Yes, sir. We are losing qualitative overmatch over our enemies, and that has a lot to do with increased enemy lethality and our inability to keep pace in protection. You mentioned active protective systems in that connection.

Also, we are seeing some disruptive technologies as our enemies really are doing four things that we have to keep up with. The first is they are evading our long-range detection. Our ability to project power onto land from the aerospace and maritime domains obviously is limited based on enemy counter actions.

They are also, though, disrupting what they see as our differential advantages, so evading us, disrupting our capabilities. We see that with cyber electromagnetic capabilities that go after our networks in such a way that we cannot rely on the precision strike capabilities that we have been able to rely on over the years.

The other thing that we are seeing disrupted from an enemy perspective, disruptive threats are tiered enemy air defense capabilities. Russia has established air supremacy over Ukraine from the ground, and so how do we contend with that sort of environment but then also how do we develop Army capabilities that have similar capabilities to those?

Other capabilities we see emerging are enemy unmanned aerial systems, and we do not have an easy fix, a quick fix for that now, and we need to develop countermeasures to enemy UAS and swarm unmanned or remotely piloted aircraft capabilities.

What we see Russia put on display in eastern Ukraine is the ability to combine these capabilities, to skim social media with the cyber capability, to identify a general target area then with UAS, and then to use massed artillery fires. We are outranged and outgunned by many potential adversaries in the future in winning that sort of deep fight against an enemy who has long-range capabilities.

Those are some of the things that we are concerned about, sir, and of course with the modernization budget going down and we are trying to manage, you know, the programs that are vital to Army modernization and we do not have the flexibility really to invest in some of these key areas where we see some new vulnerabilities or areas that we have to go after with some urgency.

Senator COTTON. General Williamson, did you want to respond?

General WILLIAMSON. I did, sir. I wanted to give an example. When General McMaster talks about competitive advantage—so I am a product of the 1980s. I came in the Army in the 1980s. But one of the things I distinctly remember was that we wanted to own the night. The investment that we made in night vision capability and laser capability gave us a competitive edge on the battlefield.

But what has happened now, separate from a state directing investment in something, what has happened now is that access to technology, so your ability to go on the Web and order something that in the 1980s we spent lots of money developing, our adversaries now have more access to things like night vision, to communications equipment, and so the investment for us is to always be one step ahead of them.

The agility that you alluded to, the ability to react quickly to new threats, to exploit new technologies, that is the type of thing that we are looking for because now the access to technology is so great.

Senator COTTON. I just think it is important that we be very frank here and that we are not engaged in political spin or military jargon. We are prioritizing readiness. I do not disagree with that

priority. We cannot send our sons and daughters into combat today without 100 percent confidence in their readiness. If you have a child in our Army who is 20 years old, they are going to be prepared for the battle downrange.

If you have a child who is 10 years old who is going to be in the Army in 10 years, right now, their lives are going to be a greater risk because we have systematically underfunded our military and specifically Army modernization programs, as General Murray said, for the last five years.

Senator Manchin?

Senator MANCHIN. The definition of insanity is pretty well defined, I think, and a lot of people back home in West Virginia ask and they wonder why we are cutting our military back when they see a lot of bad things happening around the world, more challenges than ever before. Matter of fact, I think it is more challenging now than it was when we had a full-fledged cold war going on. I have a hard time explaining why we do this, and it seems to me with a rapidly changing world that our military is not changing with it.

I guess I would ask, can you tell the subcommittee what exactly are we sacrificing by now focusing more on readiness than Army modernization? Does the Army have the capability and force structure to confront our modern-day threats? Can you discuss some of the differences in force structure and capability between today's Army considering today's challenges, Russian aggression, Syria, et cetera, and the Army at the end of the Cold War? I guess hindsight being 20/20, what would we change? What should we be doing different? So—

General MCMMASTER. Sir, I thought I would maybe talk about our projections in the future and then turn it over to Joe and Mike who can talk more about—

Senator MANCHIN. Okay.

General MCMMASTER.—today and the demands on the force today.

What we see is—our organization is charged with thinking about future conflict, learning in a focused, sustained, and collaborative manner about the future under our Force 2025 Maneuvers, analyzing what we are learning, and then implementing changes. To exactly your point, we cannot remain static—

Senator MANCHIN. Right.

General MCMMASTER.—if the risks are increasing and the security environment is changing. What we have determined and what we believe is that the trend that has allowed smaller and smaller forces to have a greater and greater impact over larger areas on land is reversing. What allowed us to do that was air supremacy, the ability to project power onto land. That is increasingly challenged now.

Our enemies are becoming more and more capable based on the technology transfer that General Williamson mentioned. They are moving into restrictive and urban terrain, and so it is very difficult to solve these complex land-based political human problems from standoff range or from offshore.

We believe that the demand for capacity, scale of land forces is not only going up today, which Joe Anderson will talk to you about, but in the future is going to continue to go up. What we see, sir,

are trends that indicate that our Army in the future risk being too small to secure the Nation.

You asked for a couple historical examples. One example is after the end of the Cold War, 1994, we did the bottom-up review—  
Senator MANCHIN. Right.

General MCMASTER.—to see what size the Army should be. Remember, the world at the time—I mean, the Soviet Union had broken apart, was not a military threat, the Chinese military was not modernized, North Korea was not a nuclear power, there was no terrorist proto-state in the greater Middle East, Iran was not the threat that it is today, and the bottom line number for the active Army at the time was 484,000. Now, the active force is going down to 450,000.

Another example is during the height of the wars in Afghanistan and Iraq our Army had 170,000 soldiers deployed to both those conflicts. Of those, 53,000 were Reserve components, so 117,000 in an active Army of 570,000. You will recall that some of the statements made at the time were the Army is straining to the point of breaking. Now, to go down to an Army of 450 with increasing commitments that Joe is going to talk about, could we sustain 170,000 soldiers overseas for contingency, which is not really a historically high number for armed conflict? I think we could not do it, sir.

I do believe that we are increasing risk for modernization as we are talking about here, but to your question, also, as we look to the future, increasing risk in terms of the size of the total Army going down to the 980 number.

Joe can talk to you about how today we are having a harder and harder time for the smaller force to keep pace with increasing demand to deter conflict and to respond to and resolve crises overseas.

General ANDERSON. The challenge, sir, as H.R. talks about, is how do you fill all the requirements? The COCOM [Combatant Command] demand is filled 64 percent by the Army, the emergent demand is 46 percent of the Army, and that is on the rise, while the COCOM demand is plateauing. But the problem with the emergent demand in Iraq, Europe, they become enduring. They do not become one-time-in like Liberia and out. They become enduring requirements.

In an unclassified mode, though, here as we talk BCTs [Brigade Combat Teams] is the simplest formation to use for comparison. The bottom line—

General MCMASTER. Brigade Combat Team.

General ANDERSON.—Brigade Combat Team between North Korea, between Russia, between the homeland and the counterterrorism fight, that adds up to a 56 BCT requirement, and that is exactly what is in the inventory. I am talking that is both AC [Active Component] and Guard. Every single piece, every particular unit under the Defense Planning Guidance, deny, defeat, homeland, counterterrorism, there is the math.

All that simultaneity, you have to assume that is the case, which is what the DPG [Defense Planning Guidance] tells you, the Defense Planning Guidance tells you. There is the inventory. That is the challenge we have just in sheer end strength, as H.R. gave you

the 450 number, 335 in the Guard, 195 in the Reserves. That is the math.

Senator MANCHIN. General Murray, I know you wanted to—

General MURRAY. No, sir, I was just going to try to answer the question you asked up front, and that is what do we sacrifice to pay for readiness in fiscal year 2017, and it is simple math. It is the aviation modernization that one of you talked about upfront, it is we will continue to delay repair of critical infrastructure on installations, which we have been doing for years, and our MILCON [Military Construction] budget is as low as it has been for a very, very long time. That is how we are paying for the upfront readiness. It is really in the aviation portfolio, it is the sustainment of facilities, and the MILCON account.

Senator MANCHIN. I am sorry, my time is up.

General ANDERSON. Senator, if I could just pile on real quick, the readiness of installation affects the training, one-station training, and that is also being underfunded.

Senator COTTON. Senator Inhofe.

Senator INHOFE. You know, I just wish that the general public could hear what you have been saying. You know, one of the problems that we have is we have a lot of politicians out there talking about how we have the best-funded and the best-prepared talking about—the general public does not know the problem that we are having right now. We know. Everyone around this table knows, and it is disturbing.

Again, I point the finger at a lot of people are just not—a lot of people do not realize—I often say I looked wistfully back at the days of the Cold War, you know. Things were predictable in those days. Now, we have people, crazy people, North Korea, with capabilities that I think are greater than our intelligence tells us they are. So, yes, we are in the greatest and most threatened position we have ever been in, in my view.

General Williamson, you and I have talked before about this disastrous history of our ground fighting vehicles. Remember, going back—and I was actually in the House when this first—and speaking of how sometimes things are not projected properly, the last year I was in the House on the House Armed Services Committee, we had someone testifying before our committee saying that in 10 years we would no longer need ground troops.

Now, you do not know what you are going to have to have in the future, but the chairman is right when he says we have got to prepare right now for those kids who are 10 years old because this is what—they are the ones who are going to be paying for what we are not doing right.

But you remember very well, General Williamson, when we went into—they canceled the program after—I think it was an \$11 billion program, the Crusader program, but they actually spent \$2 billion on it. In 2002 they cut it. Normally, I like to blame Democrats but this was not the Democrats. This was—and in fact, it was so serious that J.C. Watts, a Congressman from Oklahoma, actually retired as a result of that he was so upset with that.

Then, along came the Future Combat System, you know, the FCS. Yes, this is going to replace it and they started spending money on that, and we all know what happened. They stopped that

program in 2009. Now, the closest thing we have is going along well now called the Paladin PIM [Palidan Integrated Management], the PIM program.

Now, what I would like to extract from you, not that you could control uncontrollable things in the future, but that you would do everything in your power not to let that program have the same fate as the other two programs before that.

As this happens, we are now dealing with things—sure, you have modernized some of these things. Some of these are World War II vehicles we are fighting with now. I would like to have you tell this committee, General Williamson, your evaluation of the PIM program, is it on track now, and your thoughts on that program.

General WILLIAMSON. Senator, absolutely. My starting point would be some immediate history. I would tell you there are two programs on the combat vehicle side that I would tell you I think are outstanding programs. The first one would be Paladin PIM, and I would like to talk about that for a second. The other one would be JLTV [Joint Light Tacticle Vehicle].

On Paladin PIM, as you alluded to, we made some decisions in terms of reprioritization, which left us with a critical gap, and what we were facing was really when you canceled the non-line-of-sight cannon, you ended up not having an ability to deliver fives. The investment that was made in the Paladin PIM program, I think, was significant because we were not only going to face that gap but we were really pushed up against obsolescence of existing systems.

Today, that program, which went into production, low rate, we have produced 18 of those systems, both the support vehicle and the Paladin itself. We have delivered 12 of those, and we have six awaiting delivery. That program right now is in production qualification, and all that means is that they are being produced on the line and all we are doing is guaranteeing the performance, the reliability, the repeatable processes. To date, it has gone so well that we are now looking at awarding the full rate production contract so that that can take effect in 2017 where we will buy out the remainder, which is roughly 500 plus systems.

Sir, if you remember in the beginning of my opening statement we talked about some systems we buy new, some we have to modernized and modify, and this is an example where we have been successful in modernizing a system, bringing additional capability, and filling a gap for the Army.

Senator INHOFE. Okay. That is a very optimistic answer. I appreciate that very much. I think you go on to say that you will continue to make sure that within your power nothing is going to come and deliver a fate to the PIM system.

General WILLIAMSON. Yes, sir. In fact, what I would offer—and it goes back to Senator Manchin's comment. What I would argue today is that the Army is modernized. We are modern, and as you look at our 2017 budget request, it includes modernization. What really affects us is that we have to slow down modernization, so as priorities come up, whether it is readiness or something else, we end up stretching out or delaying modernization, which adds cost in the long run. Our goal is to never let that happen—

Senator INHOFE. Good. Good.

General WILLIAMSON.—deliver to a schedule and to reduce cost and find efficiencies where possible.

Senator INHOFE. Well, good. I appreciate that. I know my time is expired, but let me just ask General Anderson if he would, for the record, respond. The reports show that some 250 vehicles are going to be needed for this European program over there, and I would kind of like to see a breakdown as to what they are for the record.

General ANDERSON. Sure. The breakdown—

Senator INHOFE. Oh, I mean, you could answer in the record if you want to. I do not want to use up all the time.

General ANDERSON. Okay. Okay.

Senator INHOFE. Good.

Senator COTTON. Senator Heinrich?

Senator HEINRICH. Thank you, Chairman Cotton.

General Anderson and General Murray, I want to sort of return to some of these tradeoffs that are being made between modernization and readiness and sort of tell the story of one particular facility and then talk more broadly and ask you about just how far we are taking those tradeoffs.

Last year, our 47-year-old communications center and network hub that was built actually in 1962 at White Sands Missile Range caught fire, and the facility is still relied upon to provide critical support for modern missile testing. The near meltdown and fire on July 2 of 2015 nearly cascaded into a full of electrical fire. It is symptomatic of the stress that we are seeing on aging facilities and shortfalls in the Army's larger modernization efforts that go with these funding levels.

Despite the urgency to replace that particular facility, a MILCON project—and you talked a little bit about how we have been underfunding MILCON—was not in this year's budget, nor is it planned to be requested by the Department until fiscal year 2019.

More broadly, I want to ask you, how are we making sure that Army test ranges are appropriately funded or at least not pushed, you know, beyond what we can bear and that modern infrastructure that is going to be necessary to meet the Army's acquisition requirements is being met? How are we working to make sure that the workforce behind that at our Army test ranges is being maintained as well?

General ANDERSON. What I was specifically talking about, Senator, was the two parts of the installations, base operations sustainment and then sustainment restoration modernization, SRM and BOS. That is the stuff that has been critically underfunded across all installations. I cannot give the specifics of the test range typically running through installation. I just command about 50 percent for the last three years.

The issue is how are you catching up and the test facilities would fall on the same category. MILCON, though, as you know, compete in a whole different—

Senator HEINRICH. Right.

General ANDERSON.—pot—

Senator HEINRICH. Yes.

General ANDERSON.—based on what the priorities are from the readiness projection platforms, two test facilities, two labs, et cetera. I would have to get back to you on how that was being broken out to compete—

Senator HEINRICH. Yes.

General ANDERSON.—but this is the rolling reoccurring phenomenon we are dealing with now for the last three plus years underfunding in all these facilities and capabilities—

Senator HEINRICH. Right.

General ANDERSON.—for a myriad of reasons.

Senator HEINRICH. I think that with MILCON in particular, even though we are definitely making tradeoffs, we tend to have a long-term plan that seems to be able to mitigate a lot of that risk. I would just bring up the issue of the question of, are we adequately sourcing and providing for infrastructure at our test ranges? Sometimes I think those particular issues do not get addressed the same way that some of our other bases and facilities do get addressed in the MILCON process.

General ANDERSON. I would say the operating force, the guys that go and go do things, do get prioritized based on what installation you are talking about.

Senator HEINRICH. Great. That is great. I have got, General Williamson, a question that is a little different in that if you have been following some of the stories coming out of the IAEA [International Atomic Energy Agency], some of the stories in the open press regarding theft of nuclear materials, the IAEA recently warned the international community about this increased danger of potential nuclear incidents because we have seen theft and misuse of nuclear materials worldwide. We have seen some incidences in Mexico and Iraq.

Such an incident at home or abroad would have real implications for servicemen and women who would have to respond who would be at risk for radiation exposure or something where they do have to respond to that. One of the things that I think is essential is that all of our soldiers have the most up-to-date dosimeter technology to be able to deal with something in the case that they had to detect and combat these sorts of threats.

Is it true that the majority of the devices that we use to measure radiation exposure for our soldiers were developed back in the Cold War with 1960s technology and are lacking the ability to relay information the way that modern information is typically relayed quickly and precisely in a network sort of situation?

General WILLIAMSON. Sir, you are correct. The technology that was employed in our existing systems—and specifically we have an ANPR 75 dosimeter, and that is what we use within the Guard, the Reserve, and the Active Duty forces. It is an effective system.

But I would tell you that after the disaster in Japan, as we helped the Japanese Government, one of the things that we discovered was I will call it a gap. As you looked at the ability to read the response, what we found is that that was all kind of manual.

Senator HEINRICH. Right.

General WILLIAMSON. The intent—what we learned there was we needed to automate that. We did a joint program. We are engaged with the Navy to build a new series of dosimeters. If you are famil-

iar with within the Army we have something called the Nett Warrior, which takes advantage of commercial technologies—

Senator HEINRICH. Yes.

General WILLIAMSON.—and it keeps you—it gives you situational awareness. The connection between this new dosimeter will be to automatically send those updates so that you can get some early warning and reduce the threat of exposure.

Now, right now, that program, the path it is on right now will get you to the deployment of new systems in the 2020 time frame, and so there is still some development work that has to be done and testing, but we think we are on the right path for a better dosimeter.

Senator HEINRICH. I have exhausted my time so I will yield back, Mr. Chair.

Senator COTTON. Senator Wicker?

Senator WICKER. Thank you.

Lieutenant General Williamson and Lieutenant General Murray, on page 11 of your joint statement it says under aviation “The Army continues to invest at a slower pace in aviation.” Let me ask you about the UH-72A Lakota. The Army’s budget request did not include funding for the Army’s only light utility class helicopter. However, the Army subsequently published an unfunded requirement for 17 Lakotas in fiscal year 2017.

When considering readiness as paramount, why did you not include any Lakotas in your base budget request? Should you lose your UH-72 production capability, what is the Army’s long-term plan to replace and/or conduct major repair and overhaul of the Lakotas if there is attrition or loss due to unforeseen accidents down the road? Absent other budget considerations, do you support Congress funding at least 17 Lakotas in fiscal year 2017?

We will begin with Lieutenant General Williamson.

General WILLIAMSON. Sir, from a broader perspective could I ask General Murray to start talking about the budget and the readiness implications and I can talk programmatic?

Senator WICKER. That will be very helpful.

General MURRAY. Thank you, Senator. There were none in 2017 because we met our production requirement in 2016 of 427 aircraft. As you are very familiar, we are using the Lakota in a variety of administrative roles and for pilot training. There was none in 2017. Basically because we bought what we needed.

The 17 you are referring to in the UFR [Unfunded Requirements] list—it was mentioned earlier—is tied to the National Commission recommendations. If those recommendations were to be enacted, we require an additional 17 Lakotas at Fort Rucker for pilot training. That was to increase—that was to account for the increased pilot training load at Rucker based upon 72 aircraft, which equals four battalions retained in the National Guard in the 11th Cav that has been talked about. That is the additional 17 in the UFR request.

General WILLIAMSON. The only thing I would add, sir, is that—so for all of our production, whether it is aviation or combat vehicles, we really have a test that takes a look at criticality and fragility. What is the impact if I slow down/increase our ability to produce those assets? Right now, because there are commercial

variants, we are comfortable that we could support a smaller number of LUHs being procured this year.

I would go back to something that General Murray said, and that is so you cannot do that year after year because what happens is, is that—if everyone focuses on the primes, but the reality is, is what I am concerned about is all of those small businesses that build parts, all of those other things that go into the final system, if I do not continue to buy certain critical platforms—

Senator WICKER. Right.

General WILLIAMSON.—we start to lose that portion of the industrial base. It has to be a consideration. I am seeing it on combat vehicles, I am seeing it in other areas that we have to make sure we understand all of the components and who manufactures those.

Senator WICKER. Okay. Well, let me say I am glad that you made the last point about the industrial base. I know that it has been the position of the Army with regard to other important assets that maintaining the industrial base is a critical part of that. It gives me some encouragement to hear your last statement, and I appreciate that. I hope you will continue to work with us on this important issue.

General WILLIAMSON. Yes, sir.

Senator WICKER. Thank you.

Senator COTTON. Senator Donnelly?

Senator DONNELLY. Thank you, Mr. Chairman. I want to thank all of the witnesses for being here with us today.

General Williamson, it is good to see you again. With or without JLTV coming online, I have been told that the Army plans to rely on Humvees to comprise the majority of its tactical vehicle fleet for decades to come. Is that accurate?

General WILLIAMSON. That is correct, sir. It is part of our light tactical vehicle strategy.

Senator DONNELLY. Knowing that we will continue to rely on Humvees for another 20 to 30 years, would you agree we need to make appropriate investments to sustain and modernize our Humvee fleet, placing priority on those areas that are most critical to the safety of our soldiers?

General WILLIAMSON. Yes, sir.

Senator DONNELLY. Okay. It has come to my attention that the average age of the Humvee ambulance fleet is more than 24 years, 10 years older than the average of all other Humvee variants and more than a decade beyond the point at which these vehicles are expected to go without major overhaul.

While we are working to modernize the Humvee ambulances for the Army National Guard, there has not yet been any investment like that for the regular Army. Does that concern you or is there any plan for that?

General WILLIAMSON. Sir, I am going to have to give you two answers.

Senator DONNELLY. Okay.

General WILLIAMSON. One—I would defer to General Murray to talk broader in terms of the modernization strategy, but what I would offer is that—and I think, sir, in part with your leadership, the investment that we have been able to make on upgrading existing Humvees within the Guard and Reserve, it has been a signifi-

cant investment for us. I could kind of show you the numbers of platforms that we have been able to address. We still have more in the future.

I think what you will find, though, is that the mix between the Humvee fleet, the projected JLTV fleet, and then what you are going to see with the introduction of the AMPV [Armored Multi Purpose Vehicle] gives me a little less concern that we will not have that kind of capability gap as you look into the future. I ask General Murray if he has any comment.

General MURRAY. The only thing I would add to what General Williamson said, sir, is add in the MRAP [Mine Resistant Ambush Protected] ambulance variant that we still have in the Army in quite a few numbers.

As we look at, you know, at the Brigade Combat Team forward level, we are really looking at track solution in terms of medical capability, and then really what you are talking about is from the BCT back. You are absolutely right; we have not figured out exactly what that capability will look like. We have several options. MRAP ambulance is one, recapping in the AC, and we appreciate the support of Congress with the National Guard in terms of their recap for their ambulance or a track variant, and that is what we are working through right now.

Senator DONNELLY. Thank you. Generally Williamson, you and I have spoken in the past about the Army's assessment that the tank transmission industrial base is particularly fragile and a critical area to maintain our track vehicle capabilities.

On a related note, it is my understanding that if the Army fields a new armored Brigade Combat Team in Europe, this unit will require modernized Abrams tanks and Bradley fighting vehicles that are not currently funded. Can you tell us what those requirements are and what you require in fiscal year 2017 to begin this effort?

General WILLIAMSON. Sir, I cannot talk to the specific numbers as the G-3 works their way through. I would like to address specifically your comment about transmissions both for Abrams and Bradleys. I will admit that I am concerned because, as a nation, we have gotten to the point where we have really one manufacturer of transmissions for our heavy combat vehicles.

Now, I acknowledge that there are people who build transmissions, but it is different when you are putting it in a combat vehicle that weighs 45 tons or 70 or 80 tons. We are engaged with that manufacturer to ensure that we have, one, enough workload to ensure that we keep not only the skill sets employed but that we also have transmissions to support whether it is this deployment in Europe or whether it is to sustain our existing platforms.

Senator DONNELLY. Well, I would like to stay in close contact with you on this subject because, particularly in this area we think in Indiana we have some extraordinary transmission capability and the ability to make this mission more successful.

General WILLIAMSON. Sir, I will do that. Again, I really do appreciate your engagement. This challenge for us on transmissions is really reflective of how we have to look at the entire industrial base in terms of support to our critical assets. Transmissions is one that we will continue to stay engaged on.

Senator DONNELLY. Well, thank you all for making sure that our soldiers are safe, that they get to come home to their families. Your hard work helps to make that possible every day. Thank you very much.

Thank you, Mr. Chairman.

Senator COTTON. Senator Ernst?

Senator ERNST. Thank you, Mr. Chair. Gentlemen, thank you for joining us here today.

I am going to tag on just something from what Senator Donnelly said, and there has been a lot of discussion about the ground combat vehicle program so I will not belabor it, but we have a situation right now as well with the Marines where they are short amphibious vehicles. We certainly do not want to see that gap increase with our war fighters in the Army as well. I do want to encourage you to keep working on this issue, and we will certainly follow up at a later date with that as well.

But I would like to go back to small arms modernization. This has been kind of a point of issue for me. In the NDAA [National Defense Authorization Act] fiscal year 2016 the Army and Marine Corps was required to jointly develop a 15-year small arms modernization plan. General McMaster, if you can address this and just maybe give us the status of the plan.

The Army is really—we have gone ahead—we have really moved ahead with respect to modernization of our battle rifle. We have added objects to them, different types of scopes. We have added other attachments for the M4 components, floating barrels, you know, a longer rail, but these are things that have been in the DOD's inventory for quite a while. Our special ops folks have used those for many, many years. Is that really weapons modernization? You know, if you could just give us an update there.

General MCMMASTER. Yes, ma'am. I know you are familiar with all the upgrades that have happened to the various weapons systems. You already sort of summarized those. I mean, I think it is 90-some upgrades to the old—you know, the M4 today versus how it was, you know, 15 years ago or something like that.

The weapons have improved tremendously, but as you know, it is a combination of—and you already alluded to this as well—the optics, the weapon, the ammunition, and the training. There have been tremendous improvements across all of those areas.

But what we are doing now as we look for future force development and we are working very closely with the Marine Corps Combat Development Command on this as well. It is called the Caliber and Configuration study because what you do not want is just sub-optimized for an individual soldier. Soldiers fight together as teams obviously so you want the squad, upon contact with the enemy, to be able to overmatch the enemy in close combat. We are looking at what are the configurations of calibers and types of weapons systems for small arms, crew-served weapons, but then also long-range capability and shoulder-fire capability.

That study will be done by the second quarter of fiscal year 2017, and that will help us layout the—finalize the requirements and then begin to procure or to pursue the capabilities associated with how we see the future of squad fighting.

Senator ERNST. Okay.

General McMASTER. There are some new technologies that are very promising, light-weight technologies, closed-bolt technologies, for example, for automatic weapons systems. We have an opportunity, I think, now to integrate a lot of these new technologies into the future squad.

Senator ERNST. Well, I think it is important that we remember we have a lot of modernized weapons that will go into the special ops community. That is great. They utilize those weapons, and they appreciate the advanced features of those weapons. Why are we not able to push those out then to our guys in the BCTs? You know, Specialist Joe Snuffy would probably love to have a rifle that is, you know, being utilized in special ops.

I think they are great. They utilize the technology that they have, and why do we not follow through with that and make sure other infantry soldiers on the ground are provided with those same advantages. That is something to look at.

As well if we look at, you know, the pistols that we use, when is the last time that we upgraded with the pistols? This has been a real big issue. It has been bungled, I think, with the request for proposals and so forth. General Milley recently said you give me \$17 million on a credit card and I will call Cabela's tonight and I will outfit every soldier, sailor, airman, and marine with a pistol for \$17 million and I will get a discount on a bulk buy, you know, great for General Milley. I appreciate him being forthright.

Why is it so difficult—and this is for General Williamson and General Murray—why is it so difficult for the Army to buy a basic item like a pistol?

General ANDERSON. I agree.

General MURRAY. I will start. I would like to be part of the deal with General Milley if he can get that many pistols at \$17 million.

But, ma'am, to be honest with you, I agree. I mean, we had been down a torturous path on this. I think we all know the history of it, and General Milley has been very eloquent about talking about it.

But I would just tell you and hope it is reassuring that, Senator Cotton, your letter and the authorities given to General Milley in NDAA 2016, I will guarantee you he is involved in the testing, the requirements, concurrent with the source selection when we get to that point, and every intimate detail. I mean, General Anderson and I have sat several very painful, long meetings with him in the last week or two as we dug into how we got to where we are, how we fix this. I think you are going to see a pretty good outcome coming out of it.

Senator ERNST. Okay. Well, I appreciate it. My time is expired.

Gentlemen, I do not mean to make light of this situation, and I know General Milley takes this very seriously, but I think it really gets to the basic root of the problem that we have made this so complicated when it should not be.

General MURRAY. Ma'am, if I could add one thing. Special ops soldiers in Afghanistan—which I was there 9 months ago—are carrying the same rifle that our soldiers and infantry squads are carrying. They are carrying the M4A1.

Senator ERNST. Okay. Fantastic. Thank you very much.

Senator COTTON. I am astonished that a meeting with Mark Milley could be painful.

Senator Gillibrand?

Senator GILLIBRAND. Thank you, Mr. Chairman.

General Williamson, I understand the Army was required to make tough choices for the coming fiscal year, and one of the toughest was the decision to cut the funding for the UH-60 Black Hawk program. Several of my colleagues and I have asked the relevant committees to consider the plan to significantly scale back on procurement and recapitalization for the aircraft.

If the Army's aviation budget were to be implemented as requested in the President's budget, what in your view would be the operational impact on units that rely on capabilities provided by the Black Hawk? Given the decision to essentially swap out the Army National Guard's Apache fleet in exchange for more Black Hawks, do you think that impact will be felt particularly strongly in that component?

General WILLIAMSON. Ma'am, as the technician sitting at the table, I can talk to the programmatic impacts in terms of we have negotiated a multiyear contract for the procurement. One thing I can tell you that the Army worked hard to make sure that even though we had to slow modernization down, we did not want to break that multiyear and lose the savings associated with it.

I would ask General Anderson or General Murray to talk about the operational impacts.

General ANDERSON. As you know, ma'am, the ARI program kind of locked in concrete and gave us a way ahead in terms of who had to transfer non-NFCA-related or just who had to transfer what to maintain the base to pure fleet, divest the Kiowa fleet, and make sure we had the appropriate mix between all versions from the 64s, to the Black Hawks, to the Chinooks and then how we do the unmanned team to make sure our shadows link in our Apaches and help us with aerial reconnaissance.

The plans—everything laid out by that plan is being followed through. All transfers are occurring on—this is multi-compo issue referred to. All the pieces from the active transfers to the Guard, the 60s that are coming out of 1st AD Cav and everything going for Drum and Schofield are all on progress, are all on time, and so far operationally. But as you know, the other components at 11th Cav, we are trying to build from the National Commission for Korea to help reduce that rotational burn on that peninsula to maintain our three-to-one ratio for all of our requirements.

General MURRAY. Ma'am, I would just add that out of—the Black Hawks were supposed to transfer to the Guard as part of the original ARI plan. We are four short right now. Those four will be done in June and so we will be complete on that. We are still on track to take the last UH-60 Alpha out of the National Guard in 2023, the last one out of the active component in 2025.

I have seen a lot of numbers about, you know, the differences in Black Hawk production, and that was really from 2016 enacted to the budget request you saw for 2017. We had actually planned for less production in 2017 based upon requirements.

The operational piece, I mean, the aircraft are there. They are older, but we do not see an operational impact based on that be-

cause we intend to account for some of that reduction in production 2018 and out as we build those budgets, assuming that we are not back to sequestration level in 2018.

Senator GILLIBRAND. Okay. Another topic, in your joint statement recognize the threat posed to our forces in the electromagnetic domain, particularly from military rivals with near-peer capabilities, for deployed Army forces like those stationed on the Korean and Arabian peninsulas, and Eastern Europe may be particularly exposed to some of these capabilities. Examples of electronic warfare could range from spoofing the unit's geolocation to blocking tactical-level communications between command and maneuvering units.

At the appropriate level of classification, can you discuss how the Army is orienting itself to the rapidly deployed electronic warfare capabilities of certain competitor states? In your view, do you believe the Army is identifying and fielding new electronic warfare technologies adequately enough to keep us up with the rate of change in the operational environment?

General ANDERSON. Yes, ma'am. We have got a couple of things in the works. I think you are familiar with CREW [Counter Radio Electronic Warfare], which is the Counter Remote. That is the first evolution. That is the 32,000 platforms that are out there. We do have this new multifunctional electronic warfare platform coming along, and that is a next-generation requirement. It has both an air and a ground component. But right now the CSARs, which is the C-12 version, does the jamming in the air, and the GATR is a ground jammer.

It is the million-dollar question, how do we make sure the technology we produce, the quantity we get out there in sufficient scale, you know, but the CREW has been very effective as the first whack, but now, again, as we watch what is happening—what Russia is doing, we will see what North Korea is doing, the question becomes getting the multifunctional one further along faster to keep up.

Senator GILLIBRAND. Anyone else?

General MCMASTER. Yes, I would say, as we look to the future, we are not keeping pace with the cyber electromagnetic threat. We need to catch up to it. I think it is been a real wake-up call, ma'am, in terms of what is going on in Ukraine and really not that sophisticated capabilities, and now they can challenge our systems.

What we are doing in the next two months is we have convened a team of experts to figure out what can we do now. This is again, this relates to the modernization budget. Again, our research and development budget has been reduced about 54 percent since 2008, so we do not have the flexibility we might like to have to be able to pile onto these sort of problem sets. But this is something obviously we can work with the joint community.

The problem is we rely—we made the assumption several years ago that we would be able to achieve and maintain air supremacy, and what we have seen an Ukraine is that Russia, with its tiered-air defense capability, is not allowing—would not allow our systems maybe even—to fly in a scenario. We have to regain our competency and our capability of terrestrial-based electronic warfare, signal intelligence capabilities. That is one aspect of it.

The other aspect, though, is mission assurance for us, as you already mentioned, the threat to precision navigation and timing. How do we assure our own systems can degrade gracefully and operate in a contested and congested cyber electromagnetic environment? We have a short-term effort that I mentioned. Joe Anderson mentioned some of the long-term capabilities we are trying to develop. But what we have seen broadly here is that we cannot rely on maintaining dominance in any domain, and we need synergistic capabilities across each of our services so we can fight together as a team and pose the enemy with multiple dilemmas and ensure we can protect our own ability to operate.

Senator GILLIBRAND. Thank you. Thank you.

Senator COTTON. Senator Manchin has another obligation, but one more question, so I will turn to him for that question.

Senator MANCHIN. I am so sorry. Thank you for the consideration.

By fiscal year 2018 the Army projects its end-strength levels to be at 980,000 uniformed personnel; 450,000 to be regular Army; 335, Army National Guard; and 195, Army Reserve. With all of the new challenges that we have around the world, emerging threats and this and that, I guess just cut to the quick, is the Army able to meet the security needs of the United States with those figures? What do we need to do to change that so that we can meet the needs?

General ANDERSON. Thanks, sir. I think, as you heard our chief testify a while ago, we are at high risk to do that. As I rambled earlier about all the plans we have to be prepared to defend against, the issue becomes again how do you sustain and how do you build combat capabilities. We talked about it takes about three years to get a brigade built, but how would you be able to sustain the operations I described earlier?

Again, the best categorization we use or the numbers we are going to now are minimally sufficient. But as the chief risk assessment to the chairman, it is a high risk for us to support things around the globe.

Senator MANCHIN. General, the only thing I would say is if, you know, if we do not listen to the people that have the knowledge such as you on the expertise and we start setting caps and different things that basically sound politically correct and we can sell them back home, it makes no sense at all because when things go to hell in a hand basket, people want to make sure we are protecting them.

I will use basically Afghanistan. You know, how do we get to caps of 10? Was that something was right—you know, I am sure that there was—and I am not going to put anybody on the spot there, but if I am correct, I think that figure was closer to be like 13, 13-5, 13-6, so we did not repeat the sins of the past as Iraq. But we did not adhere to that.

I think we are to the point now we want to cut through the chafe and get the numbers and see if this committee and this subcommittee can work towards getting you the strength that is needed.

General?

General MCMASTER. As we look to the future, sir, we think that risk will become unacceptable to national security in terms of the size of the force, and it is because of what we have mentioned. We have been able to have smaller forces have bigger impact—

Senator MANCHIN. Right.

General MCMASTER.—because we were not as challenged in the cyber electromagnetic domain, in the aerospace domains. We see the demand for land forces going up to do the things you have always wanted land forces to do, to defeat enemy organizations, but to establish control of territory, which is what all these conflicts are about today.

But then what is really critical is to regard the consolidation of military gains politically as an inherent part of conflict. When we try to solve complex land-based problems exclusively from standoff range, you get a situation like we have seen in places like Libya, for example, where you cannot consolidate those gains.

I think the two big implications for land force as we look to the future is the consolidation of gains, as I mentioned, as an integral part of conflict, and the second of these is the importance of land forces to deter enemies and to deter enemies not by the threat of punitive action later but by having the demonstrated capability to deny the enemy their objectives, deterrence by denial.

These are—as we look to the future and we see the ships that have happened quite recently in the geopolitical landscape where we see this probing by China, by Russia, I think you make the argument by Iran at the frontiers of American power, and as these revisionist powers are trying to advance their interests at the expense of U.S. interests, it is very important to have land forces as a credible deterrent against a revisionist power waging the sort of limited wars for limited objectives.

Senator MANCHIN. But 980, I am just saying, is there a number? Is it going to be 1-1, 1-2, 1-3? Where do we need to be as far as our personnel?

General MCMASTER. Yes, sir. Sir, we—

Senator MANCHIN. Three years out, you know, knowing we have emerging threats. I know that is a tough one.

General MCMASTER. Sir, I think—I mean, as we look to the future that if you look at the—as I mentioned, 484,000 in 1994 when the world was a much safer place, and I would say we are going to 34,000 less in the active force now, that the number is, I think, in the future is going to be much larger.

The thing is, I think, from your perspective as well—not to be presumptuous about this—but it is much easier to retain a capability than to have to rebuild it. It is much easier to maintain a deterrent than to have to rebuild a deterrent capability and capacity once it is gone.

Senator MANCHIN. Thank you.

Thank you, Mr. Chairman.

Senator COTTON. Senator Rounds?

Senator ROUNDS. Thank you, Mr. Chairman. Gentlemen, thank you all for your service. It is appreciated and sometimes we do not say it enough, but we appreciate what you do.

I am going to follow up a little bit on what Senator Manchin was working on. Just at the end of my time I would like to lay this out

for you over the next few minutes. If you could, please, if there are just a few items that we as policymakers are either doing or that we should not do that would be helpful to you in you carrying out your mission, would you just—at the end of this would you give us the one or two things that you think would be helpful to you in your job, okay?

But let me begin by this: It seems that an important consideration of the Army's modernization effort is its cyber capabilities. I understand that the Army is undertaking a number of significant initiatives in this regard. These include the creation of 11 Cyber Protection Brigades in the National Guard, a Cyber Center of Excellence at Fort Gordon, Georgia, and a separate cyber branch for offices in the same level in the Army as other branches.

Could you share with me a little bit, what is the current state of play for these initiatives, and are you seeing any problems recruiting and retaining the cyber workforce, both military and civilian?

General ANDERSON. Yes, sir, thanks. We are building a COMPO 41—the cyber mission force, active component is 41 teams, 20 of which are Cyber Protection Teams and the other 20 are Cyber Maneuver Teams. The Reserves are building 10 teams, CPTs, and the Guard is building 11 teams, sir, CPTs.

The issue is the timeline, very extensive training. I think one of your concerns was the Guard piece. Selecting these folks and making sure they can pass all the prerequisites to get to the program remain a challenge for both COMPOS. The length of training it takes, we are not going to be all fully operational, capable until the end of 2018, fiscal year 2018, so it is a very long pipeline for the 2017 to build that force.

The good news is, as you referenced Gordon, the Cyber Center of Excellence, great programs, and the synergy they get between being co-located with the NSA [National Security Agency] makes it very powerful from an operational perspective.

But twice a year now, EW [Electronic Warfare] cyber, heavily focused NTC [National Training Center] rotation January and June. Every rotation has a red team and then the hardest challenge we are having now is how do you operationalize cyber down at the tactical level? How do you help commanders figure out how they can shoot things like unmanned aerial systems down with these cyber guns? I mean, the technologies are out there, the capabilities are out there, but how do we get those deeper in our formations than what we have currently now from the teams that operate here at Fort Meade and the teams down at the Cyber Protection Brigade down at Fort Gordon?

But it has come a long way, and the Army is now the executive agent for the Department of Defense on cyber offensive ranges. We are very defensively focused. Now, we are working that capability at the Joint Readiness Training Center and how that enables skill sets in that function down at Fort Polk, so some pretty good things.

Senator ROUNDS. I understand that some of the individuals and the competencies that you begin with and the built-ins that we have got in some cases you may find the competencies that you want in some unusual places.

General ANDERSON. Right.

Senator ROUNDS. In doing so, that it may not fit necessarily the traditional individual that you would expect to be the next young person you would recruit into the Army. I am just curious. What are the challenges in finding the talent that it takes with regard to cybersecurity, and how do you approach that differently, if you do, than what you what in terms of looking for the right people that you would normally find in the Army today?

General ANDERSON. The problem is they are another one of these low-density enabler categories. You are typically robbing Peter to pay Paul. For example, the forensic CID [Criminal Investigative Division] agents that do all—that can dig into computers and find all the stuff in there to figure out what you did, we have taken guys like that and brought them into cyber, and then you have this criminal investigation command complaining because we have taken their high technical experts.

The problem is, sir, it is competing resources between a very limited gene pool. How you recruit, so like the Army Cyber Institute that the military academy does and now that we actually have an officer commissioning source that actually screens those kind of students you are talking about and figures out which ones are the better ones to be vectored into this highly technical field, that is starting to be one of our feeders.

But it is going to take us a generation to build a capability from, you know, the officers that lead the teams to the warrants. The warrants, as you can well imagine, are very experienced, and the NCOs [Non Commissioned Officers] are typically coming out of the intel pool. You are typically grabbing intel analyst-type people, and that is the guys and gals you see on these teams. It is a nut-and-shell game until we get more capacity.

Senator ROUNDS. Well, my time is just about up, but with the chairman's indulgence, I would just really like to know is there something out there, gentlemen, that we can do as policymakers that we are not doing or things that you would like to share with us that you would like us to do?

General ANDERSON. Long-term, predictable, sustainable funding.

General MURRAY. I would just echo that, sir. I mean, the inability to plan budgets year-to-year based upon threat of sequestration, continuing resolutions, that really makes, from my perspective, the most difficult thing.

General McMASTER. I would say, sir, just recognizing the synergy of the joint force and recognizing that investments to ensure that we can overmatch the enemy in close combat is as important to the investments that we make in the maritime and aerospace domains.

General WILLIAMSON. Sir, I would just echo the stability in funding, but what I would add is this notion of risk. If you want to operate in an environment where we are leading and causing our potential adversaries to react to us, it means you have to be able to take some risk. That is risk on the science and technology, and that is risk in terms of modernization. How do we find those things and have the agility and the ability to incorporate them very quickly that causes the enemy to have to react to us as opposed to us waiting to find out a new capability that the enemy has and forcing us to react?

Senator ROUNDS. Thank you for your service, gentlemen.

Thank you, Mr. Chairman.

Senator COTTON. Senator Sullivan?

Senator SULLIVAN. Thank you, Mr. Chairman.

Gentlemen, good to see you all again. I want to go back to Senator Manchin's questions about end strength and, you know, General McMaster, you mentioned that we could be approaching a point at which this is unacceptable, the risk level. But it seems to me it is a pretty dramatic statement that the chief and the senior leadership in the Army is saying that we are at a high risk. I do not know how many other service chiefs or how often the Army chief of staff has previously said high risk.

If you look at just the recent testimony of Secretary Carter and General Dunford in front of the SCAS [Senate Committee on Armed Services], they all talked about these emerging threat environments, all of which have increased. If there is one common theme that we have heard in the last year is how much the threat environment globally has increased. Yet, the glide path to 450 has been straight down.

There is a number of us—I think it is a bipartisan sense that 450 Active Duty force is unacceptable risk. Again, General McMaster, you said high risk. You said it is getting to unacceptable. My view is high risk from the senior Army leadership when they are saying that that is unacceptable risk. Do you all agree that 450 then is high risk for the country?

General MURRAY. If I could, sir, and just in terms of the—so it is high military risk is what General Milley said, and then he specified that that does not apply to enemies like ISIL or the Taliban, the enemies we are currently fighting right now. That is high military risk against the near-peer—

Senator SULLIVAN. Correct.

General MURRAY.—state-type actors. I absolutely agree with the high military risk categorization.

Senator SULLIVAN. Do you think that—so I would assume since General Milley thinks it is high risk, that all four of you would agree. Do you think that is unacceptable risk?

General McMASTER. Well, sir, from my personal opinion it is. I think that it is unacceptable risk because of a combination of factors. This is not a criticism of policy to say that it is time to make a reassessment.

I think you have already recognized, and I think we all recognize, that the threats to national and international security are increasing. Many of those threats are interconnected. It is impossible to remain insulated from a lot of these threats.

As you mentioned, our Army is going to a historic low. In terms of active force strengths, the smallest it has been since before World War II. We have not been modernized. We did spend a lot of money for Iraq and Afghanistan against those enemies, but it is not the kind of modernization we will need to fight the threats that we see emerging.

In the recent CSIS [Center for Strategic and International Studies] report, they called this, you know, the triple whammy, you know, of really, first of all, taking a huge cut that is bigger than previous cuts in a postwar period. By the way, it is—I am not

sure—I do not think it is a postwar period. I mean, we are still obviously fighting in Afghanistan and in Iraq and across the greater Middle East.

But the second point is that this previous draw-downs that happened after the Cold War, after Vietnam, happened after the Army had been modernized considerably. The old Big Five had been largely bought out before the end of the Cold War. We have not done that, so we are not recently modernized, plus we have a big cut.

The third thing is that the RDT&E [Research Development Testing & Evaluation] money has also taken a cut that is at a historic high as well. I think the threat is—I think primarily the thing that I would personally be most concerned about is the size of the total force, but it is that in combination with the modernization of resources.

Senator SULLIVAN. That is a great answer. Again, I think there is a lot of agreement on this committee that 450 is an unacceptable risk, and I think a number of us are going to start to work to try and reverse that.

Let me ask just two quick questions. One is kind of operational, one is much more strategic. You know, General McMaster, you talked about how long it takes to actually stand up a unit once you have cut it. How long does it take to stand up an airborne unit once you have gotten rid of it?

I was recently down at JRTC [Joint Readiness Training Center] and watched one of our finer airborne BCTs [Brigade Combat Team] do their initial forced entry operation, over 800 soldiers, middle of the night jumping into an airfield, pretty awesome instrument of American military power. You cannot grow that overnight. How long, if you got rid of an airborne BCT, would it take to regenerate that kind of expertise in capability?

General MURRAY. Sir, we do not have experience rebuilding, but, I mean, we do have experience in terms of an Armored Brigade Combat Team recently when we grew the Army. When we grew the Army to 45 BCTs. We only really grew from scratch one BCT, and it was an armored not an airborne, and that was a 31-month ordeal to grow a BCT, so somewhere in that order of magnitude.

I would just like to clarify one thing that may have come off differently. When we collectively say high military risk and individually said high military risk, whether that is unacceptable or not it is not our position to—

Senator SULLIVAN. No, I got that. I said it was unacceptable.

General MURRAY. Okay.

Senator SULLIVAN. I know you did not say that. At a certain point I would imagine you would all agree that it is unacceptable. I know you did not say that today. I said that today, though. Yes, sir?

General MURRAY. I mean, all I am saying is basically we are happy to identify the risk and then, you know, it is up to our civilian leadership to determine whether that is acceptable or unacceptable.

Senator SULLIVAN. Hearing that the uniformed military leadership of the U.S. Army says high risk at 450, in my view from this committee's perspective is unacceptable risk.

Thank you, Mr. Chairman.

General ANDERSON. Sir, can I make one comment, though? An Airborne Brigade Combat Team is much more lethal effective than an Armored Brigade Combat Team, so chances are it is probably about 6 years to build one.

Senator SULLIVAN. That is what I was thinking as well, but I did not say that.

General ANDERSON. I knew you would.

Senator COTTON. Especially if it is based in Alaska according to the father protector of the 4th through the 25th.

Senator SULLIVAN. Probably the most important Airborne BCT in the entire U.S. Army, but we can debate that another time.

Senator COTTON. General McMaster, to build upon Senator Sullivan's comments about 450,000 being an unacceptable risk in terms of end strength, there are some ideas in this Congress to mandate a higher level than that, say 480, 490, what have you. What would be the implications if Congress took that step but did not increase funding any?

General MCMMASTER. Sir, from a historical perspective and then, you know, they could answer that from a—it would be disastrous in terms of Army readiness. It would be disastrous in terms of really—it could be—talking about unacceptable risk, it could result in very high risk to not only the mission but to soldiers who would not be prepared for combat because they have not had the proper training work or could be overmatched by an enemy because they had rudimentary equipment.

As you know, there are a lot of big armies in the world. There are some big armies in the world, and many of those armies I would welcome—I mean, I would not be really fearful of engaging them in close combat because they are not sufficiently modernized. They do not have the kind of training and leaders necessary to be effective.

Sir, I would say that really what is necessary for an army is to have the balance that Joe Murray talked about earlier.

General MURRAY. Chairman Cotton, so the Army will never give up the readiness of its formation. If you increase the number of soldiers without an increase in top line, we will ensure the readiness of our soldiers. What you will do is modernization will take another hit.

At this point, I mean, we cannot stretch out things much more than we have. We would have to go in and start canceling programs like we do not want to do and slowing down production across probably every portfolio to the minimum sustainment rate. I mean, so we would further decrement installations, MILCON, and modernization to make sure that higher force level was trained and ready.

Senator COTTON. Mandating a higher end-strength without increasing funding would mean a hollow force unless you borrowed more money from modernization to pay for readiness, therefore, further undermining the modernization-readiness balance we discussed earlier?

General MURRAY. It makes the problem we have right now even worse.

Senator COTTON. General McMaster, roughly how much does it cost for, say, 10,000 troops?

General MCMMASTER. I want to ask Joe Murray about this, but the rough figure is typically \$1 billion for every 10,000 soldiers. I think sometimes that—I mean, that sounds like a lot. Obviously, it is a lot. But I think when you compare that to some of the higher-ticket weapons systems and so forth, you know, really what the Army is is soldiers, right, and so that is really what gives us the capacity that we need to help defend our nation.

Senator COTTON. Before this Congress considers moving forward with mandates on end strength, we need to consider how we might pay for that to ensure both readiness and modernization.

Senator Blumenthal?

Senator BLUMENTHAL. Thank you, Mr. Chairman.

I am very concerned about the level of procurement of Black Hawks, which have been serving the United States Army for more than 35 years, as you observe in your testimonies, the workhorse of the Army's aviation force, and it is not only used by us, America, not only by you, by our services, but by our partner nations across the globe. There have been continuous modifications to modernize it, to make it more capable, and to implement technology and capacity and efficiency that make it increasingly valuable.

I am very, very concerned that the level of request for the fiscal year 2017 budget is inadequate. In fact, I have written a letter joined by 13 of my colleagues and 21 Representatives expressing concern regarding the need for additional Black Hawks in the fiscal year 2017 budget.

Right now, my understanding is that the requested level is 36, which is substantially below the projection of last year, 24 below last year, roughly half of what the Army itself seems to believe is necessary to continue with modernizing and keeping capable our aviation capability.

I invite you to comment on the—I ask you to comment on the level of the procurement request in the fiscal year 2017 budget and focus particularly on how we are raising the cost per unit if we lowered the level of procurement and how we may lose the defense industrial base that produces these helicopters, specifically, the men and women who are highly skilled and efficient who may leave because they are in fact laid off, particularly in light of the drop-off in commercial production. As you know, the commercial side of this industry is very challenged at the moment.

You know this subject better than I. I have suggested some questions, and I invite any or all of you to comment.

General MURRAY. I will start off, and I am sure General Williamson can answer, sir. So—and I am sure General Williamson will say this. We did not violate the multiyear contract. When we took it down to—and your number is correct; 36 is in the budget of Black Hawks. That is in accordance with the multiyear, and that applies to the Apache and the Chinook as well. We will maintain the multiyear contract, maintain the workforce.

You are also correct, a difference of 24 between what was enacted in 2016 and what you saw in the best request. When we built the 2017 budget before the BBA [Bipartisan Budget Agreement] hit and we understood what our top line was going to be, we had actu-

ally planned to reduce it to 50, so it is actually 14 between what we planned and what we put into the budget request based upon the BBA.

It is going to have an impact, but fundamentally, to pay for the increase in readiness that the chief's number one priority is the near-term readiness, we had to go someplace to find that money. It is about a five percent cut in procurement, about a five percent increase in readiness. It is almost a direct proportion in terms of what we cut.

We have protected the aviation portfolio for the last three or four years based upon our plan originally, the ARI. I just remind you that this budget did not account for the National Commission's recommendations. This budget was built around ARI. The recommendations came in after we had turned in our budget, and that is why you see some of the things in our UFR request.

This year, to find that kind of money for the Army, there was about a \$2.6 billion bill. We had to go to aviation to find that type of money to pay our decrement based upon the BBA. We do have plans in the out years, and they are plans, until we see what the 2018 budget is going to look like, whether it is closer to PB levels or BCA levels. We do have plans in the out years to try to buy back some of that divot we would be taking in 2017.

Senator BLUMENTHAL. General Williamson?

General WILLIAMSON. Sir, I just wanted to add a couple comments and start by acknowledging at least two of the things that you said, and the first is this notion of the Black Hawk being a workhorse for us. As you know, at any given time we have had over 220 helicopters deployed in support of operations in combat, millions of hours of flight in support of our troops, and so that helicopter is critically important to us.

I would echo something that General Murray said in terms of we went into this with an awareness of what was that minimum, and in this case it was 36. But this is where I would have to acknowledge your other point is that when we negotiate those kinds of deals, any multiyear, it is with an awareness of what gives us some efficiencies in the plant, what affords us the opportunity to meet production numbers, all of those things in line with the needs of our service.

But the point that you made about the commercial side is really important. On the other side of the table when they are negotiating those rates, when they are negotiating that price with us, it is in anticipation of understanding what they are going to get from commercial sales and also—and this is a factor that is not often considered is other sales to our allies as an example. As we have seen the stress, if you will, in military budget, along with these new pressures on the commercial side, that has to be a factor.

We try to work very closely with our vendors, with our partners with an understanding of what happens to their vendors and the agreements that they reach with their subs in order to give us that price.

To just finish with something else that General Murray said is that as we are continuing to engage with our vendors on the aviation side, as well as on the combat vehicle side, we are trying to give indications of what goes beyond 2017 so that they can think

through not only their workforce but also things like capital investment or their plant and their facilities and also for their machinery. It is not something that we take lightly, sir, and we will continue to stay engaged.

Senator BLUMENTHAL. I appreciate the very articulate points that you have made, and I can well understand that you appreciate that production of helicopters, production of most anything that is so essential to our Army and our military cannot be turned on and off like a spigot. It takes planning, it takes training of a workforce, it takes capital investment, and I am grateful to your sensitivity, and I would like to pursue some of these questions.

This is a very complex and developing situation, and I know that we have a common interest in making sure that procurement is at a level that we look beyond this fiscal year to what is available and at what cost in future fiscal years. I think these are all very, very important points.

Thank you, Mr. Chairman.

Senator COTTON. Senator Sullivan?

Senator SULLIVAN. Thank you, Mr. Chairman.

Gentlemen, I just wanted to end with kind of a broader question on how the Army is thinking about broader strategy and how we should be thinking about broader strategy. You know, General McMaster, you have written about this. You and I have both had the opportunity to serve under General Abizaid, who has thought a lot about these issues and, you know, when he was one of the first military leaders, started talking about the long war and thinking about how to address that, he has even talked recently about a raid force concept in the Middle East.

But a lot of that came out during the time when we were not also having to think about conventional near-peer situations like we do today. How is the Army thinking about kind of broader strategy, you know, the long war or whatever else we are—that you are thinking about in terms of looking at 2, 3, 4 years from now, and then how should we be thinking about that as well? I open that up to everybody.

General McMASTER. Sir, first of all, I think what we are seeing is really the value of forward position, joint forces and Army forces in particular, and deterring conflict against determined enemies and capable enemies. Obviously, we—

Senator SULLIVAN. You mean in foreign countries?

General McMASTER. In foreign countries, sir, so—

Senator SULLIVAN. The value of allies is pretty important in our—

General McMASTER. Yes, sir.

Senator SULLIVAN.—broader strategy. You know, whether it is the President in his recent, you know, Atlantic interview or some of the candidates on the campaign trail, remarkably, there seems to be almost a dismissive attitude towards allies. I think it is incredibly shortsighted. The President's comments in his recent interview were very shortsighted. I think some of the comments coming out of the campaign trail are.

Allies are critical to forward deployment, correct?

General McMASTER. Yes, sir, and our engagement with those allies is what can bolster their will and their capabilities. Obviously,

we want to deter conflict, and we have succeeded in doing so for over 60 years on the Korean Peninsula, over 70 years since the hit of World War II in preventing great power conflict.

I think as we look at the way that threats to United States security are evolving, especially with, you know, the four-plus-one construct for state actors, these are the revisionist powers of Russia and China, along with North Korea and Iran who have been taking bellicose and hostile actions, and the plus one is transactional terrorist organizations, ISIL [Islamic State of Iraq and the Levant] but also al Qaeda and associated groups and so forth.

When we look at what is required to deal with those threats, it is a joint force and in particular it places a very high demand on ready land forces. I mean, I do not mean to sound snide, but, I mean, ISIL does not have a navy or an air force, and they are doing okay. The need for ready land forces that have the will and the capability to close with capable and elusive enemies, enemies that operate in and amongst populations and restrictive terrain, who avoid being classified as a target from standoff range, and now you combine that with enemies that now are demonstrating sophisticated long-range capabilities, cured air defense capabilities, creating this so-called anti-access/area denial threat.

What we need is we need to maintain ready land forces that can deploy rapidly, they can be forward positioned, but then also deploy rapidly and then transition quickly into operations. Those land forces, I mean, those land forces have to have mobility. They have to have protection. They have to have lethality.

I mean, we cannot—a lot of times you will hear the terms, you know, light and nimble. Well, you know, Richard Simmons is light and nimble, but we do not send him to go do harm to somebody or to defend our nation. We need forces that can get there and fight once they get there. For us, that is a combination of Airborne and Infantry Brigade Combat Teams, Stryker Brigade Combat Teams, and Armored Brigade Combat Teams.

But what we see, to your question about the future, what do we see in the future for Army forces? Army forces will have to do, as I mentioned, when they have always had to do: defeat enemy organizations on the ground, secure territory to deny its use to the enemy, protect populations, but now increasingly, project power outward from land into the maritime aerospace and cyberspace domains in part to help ensure freedom of movement and action for maritime and aerospace forces.

Russia has established air supremacy over Ukraine from the ground, for example. China is building landmass in the South China Sea to project power outward from that landmass into the maritime and aerospace domains.

What our Army has to do is develop some of these new capabilities that allow us to support the joint force better, but I think when we see how technology is evolving, threats to our security from the shifts in the geopolitical landscape, the kind of missions we are going to have to conduct, and the sort of—you know, what we have learned from history and what is happening today, we see the demand for ready land forces going up, not going down.

Senator SULLIVAN. Anyone else? Gentlemen?

General ANDERSON. I think, sir, the whole—back to your Allied peace, that is the whole thing behind the regionally aligned forces concept. You know based on the global demand we have for all things Iraq, Afghanistan, Kuwait, and the whole GRF [Global Response Force] piece, but the bigger issue becomes how do we appease, and it is all about the assurance, deterrence. We watch this in Europe every single day, as we watch and let it resolve, as we work all those nations, and from where we are stationing equipment to where we are storing equipment to where all the exercises are. But when you run a 55-exercise activity over the course of a fiscal year, a lot of effects in terms of our partners. We are having equal success in the Pacific with specific pathways.

When you look at those two models and the differences it makes from Balikatan, Foal Eagle, all the different exercises, Cobra Gold, the different exercises that are just going on, it is a huge enabler, and we do build some good partner capacity.

Senator SULLIVAN. Well, I appreciate the emphasis on allies because if you look at our potential adversaries, they all seem—whether it is North Korea or Iran or China or Russia, they seem to have a hard time collecting any allies, and yet we have most of them and yet we are at this interesting period where some of the leadership in our country seems to be—right at this moment when allies matter more than anything and they are part of Army strategy and doctrine, we are being dismissive, which I think is shortsighted for our leadership in this country. Thank you, gentlemen.

Thank you, Mr. Chairman.

Senator COTTON. General McMaster, in light of the comments you just made, what is your opinion of the Reconnaissance Strike Group from recommendation 22 in the Commission report?

General MCMASTER. Sir, I think this is a really important initiative, and so what we think is—you know, we have some opportunities now. If we would have the resources, you know, to be able to pursue some of these capabilities, we can integrate them into formation.

The problem we have now that is on the topic of modernization is we see some technologies that are very, very mature, for example, some new combat vehicle technologies, new power train capabilities, demand reduction in terms of, you know, hybrid and power and energy capabilities, light weight band track, independent suspension, active protective systems, improved lethality, but we do not have a place to put those now in terms of a prototyping program that is well-funded or a combat vehicle program. We need to develop these technologies, apply them, combine them so we developed a real no-kidding capability but then put them in organizations.

We think that the trend is combined arms at lower levels. The trend is toward longer-range weapon systems. The trend is toward integrated air and ground formations. We want to build formations that are capable of operating widely dispersed with combined arms-air-ground capabilities over wide areas but can maintain mutual support, right, because we do not want those to be, you know, a bunch of Little Bighorns that occur simultaneously across a large area.

We have to be able to fight together as a team, as part of the joint team, and we think this kind of a force, a force that can project power at greater range, combine arms-air-ground at lower levels, can essentially elevate the tactics of infiltration to the operational level.

This is the kind of ideas that are consistent with Reconnaissance Strike Group. We are undergoing a force design effort now looking at the Army of 2030 as part of our Unified Quest war game. By the end of this calendar year, we are going to have some proposals about what we would like future Army organizations to look like and how those organizations would fight together under realistic conditions and under contingencies that we think are plausible in the 2030 time frame.

General MURRAY. Sir, H.R. was basically talking—I mean, so the concepts that General McMaster described apply really to all four recommendations in—you know, it was not just the Reconnaissance Strike Group. There is no arguing with the concepts. The chief is still—we are about a week or two out from offering up where the chief is on his thoughts on all 56 recommendations after the Sec Def, and then we should have something over here very shortly after that.

Senator COTTON. Okay. We have had a good discussion so far. I need to close out with just a few specific programs that have been touched on earlier but we have not gone into at length. First, DCGS: There was a January 2016 DOT&E [Department of Test & Evaluation] report about DCGS Increment 1, Release 2, concluding that it was operationally effective, operationally suitable, and not survivable.

I have some doubts about the testing parameters that were used, also, the inability to get the data that would allow us to quantifiably test against critical needs like intelligence, fusion, targeting, data synchronization. I also have some doubts about the size of the data set, had 191 different entries, which are several orders of magnitude about what you would see on the combat terrain, and some reports that the system had to be rebooted every 20 hours, which is not suitable for an operational environment.

General Williamson, as I mentioned in my opening statement, you had said last year that you thought the value of the system would be shown by May. Where do you stand on that now on the value of the DCGS-A program?

General WILLIAMSON. Sir, I go back to some of the comments you just made. Both, first, ATEC, the Army Test and Evaluation Command, their assessment was also suitable, effective, and survivable and DOT&E's report in terms of operationally suitable.

But I would like to set those aside for a second. Having gone out and seen the system and obviously working very closely with the PM, we understand that there are additional capabilities that are required in that system. On the ground what I saw was that the brigade level, that system with trained soldiers provides the capability to commander. I think what we have seen is that lower echelons we probably—not we probably—we have to do more to reduce the complexity of the system and the ease of use. I think that is what you are going to see in Increment 2 of DCGS.

We have reached out to industry to include three requests for information so that we could understand what industry believe they could provide in a capability. We had 80 one-on-one sessions, and we included two industry days where we brought in over 240 vendors who said here is what we think you need to do. We think we have a path forward on improving the usability of that system. From an operational standpoint, I pass to General Anderson.

General ANDERSON. Yes, sir, we had a mission command summit last week. The issue is what does the field want? The field is frustrated, as you very much know, and of course the bigger challenge is fixed site, static, DCGS, much less challenge, deployable, small unit, much more difficult, and battalions are having a hell of a time.

The issue was to try and get a balance between the 129 app version that has been developed, down to something between the DCGS-Lite, which the SOF has, which is four apps, and we think we have come to about 20, so that is what we laid out last week at Leavenworth, and now it is back out to the field to say did we pick the right apps to give you the COP [Common Operating Picture] so your analysts have the tools they need. Then the question becomes how do we work the intel-sharing from a brigade platform that is less challenged by this, or a battalion platform is extremely challenged.

When I was out at the interview in the fall, not one of the six battalion commanders out there underground said that they wanted DCGS in their TACs [Tacticle Command Post] but they knew they needed the common operating picture tools, and that is—

Senator COTTON. That is why we hear reports of using workarounds like the old pencil and paper—

General ANDERSON. Right.

Senator COTTON.—and PowerPoint—

General ANDERSON. Analog, right.

Senator COTTON. It sounds to me like it is not working very well.

General ANDERSON. I am going to—

Senator COTTON. I mean, it works fine if you are an O4 NMI and you live it day in and day out. It works less fine if you are an E4 in a battalion TAC.

General ANDERSON. That is the key, sir—

Senator COTTON. Expeditious—

General ANDERSON.—the training. The bottom line, the young E5 who was operating that system—now, 1st AD is a little bit separate from the brigade modernization command, but it is the big C2 [command and control] facility there right at Bliss, the sergeant E5 intel analyst had not touched that machine until the first day of the exercise. That is a huge piece of—part of the problem.

General MURRAY. This time last year, Chairman Cotton, and this is differently than obviously a brigade, but I had E4s in my division headquarters to section using DCGS in Afghanistan. Now, it was not moving every day, but I do agree that we still have some issues to work through. But I think one of the biggest issues we have to work through is the training piece because we are not giving these kids time to train on this system before asking them to operate them.

There are ways that we can get after that. There is a facility at Fort Stewart called the IROC [Intelligence Readiness Operations Capability] which has DCGS up and running every day. I just mandated my DCGS operator. That was their place of duty. They were not pulling guard, they were not going—they would go to the range and qualify, they would go right back to that facility. They knew DCGS in and out, and they were operating it each and every day in a garrison environment.

That is the other effort besides the effort to make things simpler is to make sure we understand that DCGS is a weapons system, and it is just not something you are going to pick up like a smartphone and jump on it and get on it. It has got to be trained day in and day out whether you are in garrison or in a deployed environment.

Senator COTTON. Okay. I want to move on to the next topic. I have to say that I still have my doubts about that. Active protection systems for vehicles, I will direct this towards General Williamson and maybe General McMaster as our armor expert.

As I mentioned at the outset of my opening remarks, as part of the Army's fiscal year 2017 budget proposal, the Army reportedly plans to experiment in commercially available active protection systems as part of Abrams, Bradley, and Stryker survivability enhancements, to put it simply, systems that would be able to intercept something like a rocket-propelled grenade could you briefly describe the efforts that are planned for fiscal year 2017?

General WILLIAMSON. Sir, I will start out by talking about the path to 2017, and then I will defer to General McMaster to talk about the capability itself.

As indicated, sir, by yourself and by others on this panel, the need to take advantage of these technologies is critical, and we are seeing our adversaries start to take advantage. We are not unfamiliar with the capabilities of active protection systems. We have made choices that we wanted those systems to mature from a safety standpoint, from a reliability standpoint, and therefore had not employed them.

What we have seen over the last, I would say, 24 months is some advances made both on the commercial side but also by our allies in the employment of those systems, and so we have reached out to them.

We have taken two paths, sir. First of all, we started on a science-and-technology path with a modular active protection system. That system really has three pieces, the first one being how do we develop a modular system that gives me, first, the ability to sense. How do I detect that something is being fired at me? Then the first part will be can I provide an obscurant to make it more difficult for something to hit the system.

The second point is the soft-kill capability. Today, if you look out at about 90 percent of the weapons that would be fired against a platform, those can be deterred by some sort of electronic means. Then the third is kinetic. It is directly intercepting a system that has been fired at you. That is force on force.

What we know is that some of those technologies are more mature than others, and so what we want to do is reach out, and we have started out today. We have started that in fiscal year 2016

to take advantage of existing systems. There are roughly four out there that we have considered, and we are now doing the integration work on a Bradley, a Stryker, and an Abrams.

The fiscal year 2017 request allows us to complete that. We are coming an above-threshold reprogramming to help us get started sooner and to start that effort with our vendors.

Senator COTTON. General McMaster, do you have anything to add?

General MCMMASTER. Sir, I think you are highlighting an immensely important capability. As General Williamson said, we have seen these technologies before and we have seen them employed.

I think there are just a few quick points on this is, first of all, a lot of times we pose ourselves with a false dilemma of either waiting for the perfect capability later or doing something now. I think this is a case where we have to do both. We need the capability for hard kill, soft kill target location, and then we have to integrate that into the formation as well. You want to protect an individual vehicle, but you want the formation to be protected.

It is a ground problem, but it is also an air problem now with rotary-wing aircraft. Advanced protection systems for aviation and for ground and then tied to counter UAS [Unmanned Aerial Systems] and C-RAM [Counter Rocket, Artillery, and Mortar], or counter-rocket artillery and mortar capabilities. We see these technologies having a lot of commonality, and it could be tied as well to directed energy, electronic warfare capabilities.

We have to really work hard on a concept to integrate a lot of these emerging technologies longer term. But there is an immediate threat that we can see now from enemies who possess this capability and we do not. We see that with Russia, for example.

Senator COTTON. Given the programs you described, if successful, when might we actually see vehicles commanded by the next generation of H.R. McMasters downrange in Eastern Europe and Middle East with these systems?

General WILLIAMSON. Sir, on the expedited version, taking advantage of commercial existing systems, we will do that characterization this year, integrate those onto existing platforms. Early next year, we will be able to make a decision, essentially a go/no-go that says this adds more value and more protection than not having it. At that point in 2017 we make the decision to start outfitting, equipping systems, and I believe that in 2018 you have formations equipped with a measure of protection.

Senator COTTON. Good. I think, as we have discussed, as Senator Ernst raised in her questions, this fits in with the theme of modernization and readiness. Some of these items, because of their availability off the shelf, sit at the intersection of readiness and modernization that can be done so quickly, that they can actually contribute to readiness today for the force as opposed to readiness for the force 10 years from now.

I want to turn to a third topic, activity sets and pre-positioned stock. I am getting into great detail. These are obviously platforms that are designed to support rotational troops that are in contingencies in places like Eastern Europe, South Korea, so forth. I will throw it up there for whoever wants to take it. Activity sets and pre-positioned stocks are very equipment-intensive undertakings.

We are expanding them worldwide. Where do the vehicles and other associated equipment in the sets and stocks come from?

General ANDERSON. A variety of means, sir. The Europe piece first, the European activity set is going to be the first set to be converted to start building the first ABCT [Armored Brigade Combat Team] APS [Active Protection Systems] set for Europe. Starting first quarter 2017 we start deploying heel-to-toe brigades. The next brigade to do that is 3rd Brigade, 4th ID out of Carson.

They will bring their equipment from home station with them, and when that gets delivered to Europe, that EAS stuff will get harvested to build the first set of that APS, and then the second APS set will get built from the conversion 225 when Hawaii converts from a Stryker to a Lite. The Strykers from Hawaii will go to the West Coast, the 81st between Washington, Oregon, California, that ABCT's kit will get modernized, and that will get sent over to be the second set.

The stretch will be based on what we do with additional force structure now based on Korea and elsewhere, where would you harvest—how could we possibly harvest based on the Korean equipment set on the peninsula based on taking potentially somebody's home station set if we have to build more, or do you harvest within the APS sets? Like APS-5's kit right now is all—the next rotation to Kuwait is also going to be the entire brigade comes with all of their kit, and then the kit that is being used now in Kuwait for Spartan Shield, that will get harvested to get reset back into APS-5. It is kind of a—again, between APS and what you may have to pilfer now here at home station based on what we do structure-wise or other set-wise.

General MURRAY. I would just add, sir, so we have plenty of tanks and we have plenty of Bradleys, and it is based upon force structure reductions we have had, and we have really lightened the force over the last 10 years, so we have many fewer armored brigade combats.

The problem is they are not modernized, and so if you go down to Anniston down in Alabama, I mean, we have yards of tanks, but it takes money to bring them up to the most modern configuration. We have enough Bradleys. Where you get into issues is primarily with wheeled vehicles, recovery vehicles, engineered, low-density equipment. That is where we have equipment issues that you are talking about, new production. The way General Anderson kind of laid it out is exactly right.

The fundamental thing we are kind of struggling with right now is how many unmanned sets of ABCT equipment do we really want to have? You talked about the value of pre-positioned stocks, and I do not disagree with that, but there is also the value of having a manned ABCT, and so we are getting to the point now where we are going to have to start making some decisions about how many unmanned equipment sets we can really afford.

I would just add, General Williamson was pretty specific with APS and AT [Anti Tank], and I would say that it is going to depend upon funding levels. If, for instance, we were back at sequester levels, I would be less confident that we were going to be able to do APS and AT and start fielding.

Senator COTTON. It seems like a challenging balance to get back to the pre-positioned activity set. On the one hand, if that equipment is needed, you need it to be the most capable equipment we have. On the other hand, you might have it sitting idle for years at a time.

General MURRAY. Yes, sir, and an earlier question was about the next generation of Bradleys and tanks, and that is actually in the ERI [European Reassurance Initiative] OCO [Overseas Contingency Operations] request, and so the 81st equipment that General Anderson talked about, the intent is to turn that into the SEP A3 and the Bradley V4—other way around—the SEP V3 and the Bradley A4 for that second set of ASP stock in Europe.

Senator COTTON. One final topic, General Murray, obviously, aviation has been a main recurring topic of conversation here. That is in part because it is pretty expensive, I think 20 percent of RDT&E, 20 percent of our procurement, but also, as we look at some of the capabilities our adversaries have that General McMaster has cited, you know, are our rotary-wing aircraft able to support troops on the ground given the kind of tiered air defense you see from the S300 or S400 systems in places like Ukraine or Syria or wherever else Russia might position them or sell them?

General MURRAY. I will let H.R. kind of tag onto this, too, Chairman Cotton, but, I mean, you know, if you have those type of active air defense systems, we would have a difficult time operating rotary—we would have a difficult time operating fixed-wing. I think H.R. will kind of say that is the requirement for ground forces because we have always operated—so, for instance, we have also taken a lot of artillery out of our force structure because for the last 15 years we have operated under the assumption that we would always have air supremacy from our Air Force. We have got a great Air Force, but here recently within the last year or two, we have got to challenge that assumption. In that type of threat environment, no, we could not operate our rotary-wing aircraft.

You talked about protection, and we have talked about APS. APS, as H.R. said, also applies to air. We are probably further along with the APS for aviation, our rotary-wing aircraft than we are for ground, and we have continued to invest in that as well.

General McMASTER. I would just say it would put a premium on really operating low level for rotary-wing aircraft. Anything that is medium or high altitude is extremely vulnerable to the long-range systems. Then as you are operating at low level, you really have to ensure mutual support, as you know, between ground and air forces and aviation forces. This is where the 11th Aviation Brigade comes in as very important because we have to train as air-ground teams, develop that common understanding of how we provide that mutual support.

Ground forces clearing, for example, shoulder-fired air defense systems so then attack aviation can operate above or maybe even slightly behind those ground forces and pose that enemy with multiple dilemmas. We want, obviously, our enemies to respond to multiple forms of contact simultaneously, indirect fire, aviation, ground so that they cannot respond to everything that we are doing to them in close combat.

In those kinds of tiered air defense areas, it put a premium on air-ground operations at the lower tactical level and ensuring mutual support between our aviators and our infantry armored cavalry team.

Senator COTTON. All right. Gentlemen, thank you very much for your time. Thank you very much for a productive conversation. Most importantly, thanks for your service to our country.

This hearing is adjourned.

[Whereupon, at 4:34 p.m., the hearing was adjourned.]

