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HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES
UNITED STATES HOUSE OF REPRESENTATIVES

PRESENTATION TO THE
HOUSE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON TACTICAL AIR AND LAND FORCES
UNITED STATES HOUSE OF REPRESENTATIVES

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STATEMENT OF:

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INTRODUCTION AND STRATEGIC ENVIRONMENT

Chairman Norcross, Ranking Member Hartzler, and distinguished members of the subcommittee, thank you for having us here today to provide testimony on U.S. Air Force modernization. Additionally, thank you for your leadership and dedication to rebuilding the United States military.

Our nation faces a complex set of current and future security challenges requiring that we think and act differently and with urgency. The American homeland is no longer a sanctuary. Our citizens face threats from a variety of actors in both the physical and digital arenas. Competitors, especially China and Russia, continue aggressive efforts to negate our long-standing warfighting advantages while challenging America's interests and geopolitical position. China in particular is the nation's pacing threat. It has rapidly become more assertive, and is the only competitor potentially capable of combining its economic, diplomatic, military, and technological power to mount a sustained challenge to a stable and open international system.

The Chief of Staff of the Air Force has articulated what is at stake with his *Accelerate Change or Lose* white paper. It states "*unless we make significant changes to the Air Force's programmed force, we will not meet the pacing threat of China in 2030. Unless something changes, we will not be able to accomplish the Air Force's core mission's in the future operating environment.*" A growing body of evidence from adversary assessments, recent wargames, exercises, studies, reports, and other analysis underpins this assessment.

To make these changes will require difficult choices. It will require taking calculated risk now to reduce existential risk in the future. When considering the missions we perform today, in the Middle East and elsewhere, it is fairly easy to calculate risk and recognize the necessary changes. However, measuring risk becomes more challenging when we look into the future, at conflict scenarios with peer competitors like China. We must consider the risk that arises if we fail to recognize the need to change. The risk to our nation of losing in those scenarios far outweighs the calculated risks we are willing to take today to accelerate change.

The mission of the U.S. Air Force is to *fly, fight, and win...Airpower anytime, anywhere*. Military airpower is global, agile, flexible, rapid, and when necessary, highly destructive. The Air Force was created to realize the potential of military airpower to defend the United States, our citizens, and our friends. We know our potential adversaries respect—even fear—U.S. airpower, as they devote extreme amounts of money, time, and manpower to defend against it.

We also know they are fielding capabilities to attack the U.S. and our allies through the air. In this, they hope to hold our territory, bases, and citizens hostage, making us vulnerable to coercion. Both of these conditions are not new. They existed after World War II and provided the impetus to create the Air Force in 1947. In 2021, we must remember this “why” behind the Air Force as we look to the future. We can make the changes necessary to sustain and strengthen the U.S. advantage in airpower, but to do so, we must concentrate on the core reasons we exist.

The U.S. Air Force has five core missions: air superiority; intelligence, surveillance, and reconnaissance (ISR); command and control; global strike; and global mobility. These core missions represent what the nation expects of the U.S. Air Force, and they are part of our heritage; however, our continued ability to provide these core missions in defense of the nation is not guaranteed. The Air Force must change, because our environment is changing and our competitors are closing in. For too long, we have mitigated short-term risk at the expense of long-term, and we must correct this imbalance.

Since the publication of the National Defense Strategy (NDS) in 2018, the Air Force has worked tirelessly to identify new ways of approaching our toughest challenges in a peer fight, to include careful assessments of current and future risks. But our work is far from over. We look forward to continued engagement on the Air Force’s future force design with this subcommittee and all of our stakeholders. It is the only way to ensure we are building a relevant and ready force for the future. This year’s budget request will be another step in that journey.

CURRENT CAPACITY AND CAPABILITY

Aircraft currently in the Air Force inventory are becoming significantly more expensive to sustain as they age, and our fleet is the most aged of all. The average age of the Air Force fleet is 29 years, while the U.S. Navy is 14.4 years and the U.S. Army is 15.3 years. In comparison to our allies, the average age of the Royal Australian Air Force (RAAF) is 8.9 years and the Royal Air Force (United Kingdom) is 16.5 years. Weapons System Sustainment (WSS) costs have increased 130 percent over the last 20 years, even with a 15 percent decrease in total aircraft inventory (TAI). We need new platforms and weapons to replace an aging force, but also must invest in cutting edge technology needed to confront and pace peer threats.

Following NDS and National Security Strategy guidance, the Air Force seeks to invest in technologies and field systems that are both lethal and survivable against a peer threat. This ultimately means transitioning away from many legacy platforms in order to free up manpower

as resources to field more capable systems and modernize. If we are to modernize to address the emerging threat, we must use resources tied to our legacy platforms and weapons systems that are decreasing in relevance today and will be irrelevant in the future. We must strike a balance between risk in the near-term and risk in the future.

Fighter Force Structure

The Air Force must accelerate change to its fighter force structure to meet the threat posed by China and Russia, ensuring the Air Force can achieve air superiority and dominance over peer adversaries and has the capacity to meet world-wide demands in the 2030s and beyond. Extensive gaming and analysis using the most difficult problem (i.e., China) and the most difficult scenario (i.e., Taiwan) at the most difficult time (i.e., 2035), shows that the Air Force must change the future fighter force structure mix by changing investment priorities to provide the capability, capacity, and affordability required to meet the peer threat. To just keep pace with the threat would require an additional \$6 billion to \$7 billion per year to modernize our current force projected into the future. Even if that was affordable, that force would fall well short of the capability required to counter a future peer threat. Modernization programs cannot transform our 4th generation fighters into 5th generation fighters, or 5th generation fighters into next Generation Air Dominance (NGAD).

In realistic budget projections, we must balance the need for high end technology with affordable capacity. To attain this desired fighter fleet, the Air Force must right size current aircraft inventories to expedite the transition away from less capable, aging aircraft and emphasize investment in future capabilities such NGAD and F-35 modernization. The desired Air Force fighter fleet should match capability and capacity of both platforms and weapons to mission requirements. As part of its force structure change, the Air Force must transition its fighter fleet from seven platforms (i.e., F-35, F-22, F-16, F-15EX, F-15E, F-15C, A-10) to four platforms (i.e., NGAD, F-35, F-15EX, F-16) plus the A-10 in the near- to mid-term.

In determining the correct future force mix, the Air Force is in the final stages of a comprehensive study on the optimal Tactical Fighter Aircraft (TACAIR) force. We look forward to sharing the results of this study later this summer. Simultaneously, the Air Force is working closely with the Joint Staff and OSD on DOD-wide TACAIR study. We believe the two studies will be complementary and very helpful in focusing our future investment in fighter aircraft.

Next Generation Air Dominance (NGAD)

The Air Force is investing in technologies as part of a family of capabilities to assure air dominance in the future. NGAD is an advanced, air superiority fighter designed to operate within the most challenging operational environments and replace the aging F-22. The requirement to establish and maintain air superiority within the battlespace cannot be understated as it underpins joint force operations in any theater. The FY22 President's Budget requests \$1.5 billion to fund the continued development of a next generation open mission system architecture, advanced sensors, cutting-edge communications, prototyping activities, and integration of the most promising technologies into a family of capabilities. Furthermore, this program incorporates novel agile and digital acquisition practices that are yielding favorable results and are providing greater value for the taxpayer. Our efforts are being shaped by multiple analyses, including recommendations from the Chief of Staff of the Air Force-approved Air Superiority 2030 Flight Plan, the NGAD Analysis of Alternatives, and several others from renowned analytic organizations. Continued investment in NGAD technologies is critical to ensuring continued air dominance within emerging threat environments for all future joint operations.

The Next Generation Adaptive Propulsion (NGAP) program leverages the Adaptive Engine Transition Program (AETP) technology suite and applies it to delivering capability-enabling engine options for NGAD. NGAP trade studies are complete and competitive preliminary design activities underway. The acquisition strategy for the NGAP prototyping effort accommodates funding uncertainty while driving digital transformation in the propulsion industrial base. Contract awards are expected in the third quarter of FY22.

F-35

The F-35 is the cornerstone of our future fighter fleet. The F-35 today is dominant, purpose built, and equipped with advanced weapons for the contested environment. The original program of record was designed to replace all F-16s and all A-10s. Whether the Air Force is able to afford to replace the majority of the fighter fleet with F-35s is a decision-point that is still a few years away. In the near-term, we must concentrate on achieving the F-35 capability needed for advanced threats. While the F-35 is a formidable platform today, it faces challenges to ensure it stays dominant against an evolving future threat. To keep pace with the threat in future contested scenarios, follow-on modernization efforts centered on "Block 4" enabled by

Technical Refresh 3 (TR-3) hardware must be affordably realized on competition-relevant timelines.

To best posture the F-35 force for the upcoming Block 4 / TR-3 upgrade, the FY22 President's budget request decreases the F-35 procurement quantity in FY22 to 48 from the FY21 enacted position of 60 aircraft and commits \$5.09 billion to procurement (air vehicle, modifications, and spares) and \$1.05 billion to RDT&E (including \$985.4M for Continuous Capability Development and Delivery, i.e. C2D2). Block 4/TR-3 provides the capabilities we need to address future threats and maintain advantage. Procuring additional aircraft before Block 4/TR-3 "cuts into" production and drives a retrofit bill and is therefore not desired. As a cornerstone capability, the Air Force must retain the F-35's mission contribution, even if this requires offsets from within the program.

Regarding affordability concerns, F-35 operating costs (as currently projected) and long-term sustainment costs still require continued focus to maximize affordability.

The Air Force remains focused on completing planned AETP prototype engine testing to inform potential follow-on efforts that will most appropriately leverage this revolutionary new technology, to include a potential F-35 engine upgrade. Analysis illustrates the increased fuel efficiency of adaptive engines offers up to 30% range increase depending on mission profile, 18% decrease in acceleration time and a significant increase in thermal management over the baseline F-35A power module. Applied to a notional scenario, these improvements could translate to reaching three times more targets or elimination of tanker dependence, increased aircraft survivability and Block 4+ mission system growth that increases weapon system lethality. At this time, the current F135 engine meets the warfighter's requirement; however, the F-35 program continues to monitor AETP progress closely, and if a validated requirement arises from the Air Force, implementation of AETP on the F-35 will be assessed accordingly.

F-22

The F-22 is the only operational multi-mission air superiority fighter aircraft that combines stealth, supercruise, maneuverability, and integrated avionics to make it the world's most capable air superiority aircraft. The FY22 President's budget request includes \$1.1 billion in FY22 for modernization efforts essential to gain and maintain air superiority against evolving threats. Raptor Release, (formerly known as the Capability Pipeline) an agile acquisition construct, combines former TackLink16, Tactical Mandates (TACMAN), and GPS M-code

programs to deliver slices of each capability on a regular release cadence to the field. Future modernizations will continue to leverage Raptor Release as a vehicle to rapidly prototype and iteratively field critical enhancements with capabilities delivered to the fleet in order to ensure “first look, first shot, first kill” capability in highly contested environments. The transition timeline from F-22 to NGAD is dependent on the progress of NGAD development efforts.

F-15

The F-15C/D supports both Homeland Defense and the air superiority mission. Our F-15C fleet is aging, with two-thirds of the fleet past its designed service life. The 234 F-15C/Ds in the Air Force inventory will reach the end of their design service life in the next six to eight years, and our analysis shows additional service life extension programs are not cost effective. The FY22 President’s budget request divests 48 F-15C/Ds from the active fleet. We have already started to replace this fleet with a modernized successor by purchasing the F-15EX. The F-15EX “Eagle II” will provide superior sensor, range, and payload for Critical Infrastructure Defense. The Eagle II additionally brings outsized long range weapons (i.e., air-to-surface and air-to-air) into a peer fight. The FY22 President’s budget request procures 12 F-15EX aircraft at a cost of \$1.335 billion. Notably, the Air Force remains fully committed to advanced 5th and next generation capabilities and the F-35. The decision to refresh the 4th generation fighter force with the F-15EX is a complementary step to both F-35 procurement and NGAD development, and helps mitigate capacity risk while balancing near-term readiness concerns.

The existing F-15E Strike Eagle fleet provides all-weather, long range global precision attack in all but the highest threat environments. The FY22 President’s budget requests \$488.7 million in FY22 to continue modernization efforts to ensure the aircraft remains viable to the 2030s. Modernizing the F-15E with Early Passive Active Warning Survivability System (EPAWSS), also used on the F-15EX, demonstrates our commitment to building a more lethal Air Force. EPAWSS will allow the F-15E/EX to survive to attack targets in high threat environments.

F-16

The F-16 is the Air Force’s primary multi-role fighter and Suppression of Enemy Air Defense (SEAD) aircraft. Our more than 600 late block F-16s will provide affordable capacity for the next 15 or more years, in both competition and more permissive combat environments. We are beginning to transition away from our oldest, early block F-16s, with a reduction of 47

planned in FY22. We will continue to modernize the late block F-16s we keep as our “affordable capacity” fighter into the 2040s. The F-16 investment strategy funds modifications for the most capable, late block aircraft to ensure they can operate and survive in today’s threat environment. The FY22 President’s budget requests \$888.3 million in FY22 to continue these modernization efforts. This includes continuing the Service Life Extension Program comprising 12 structural modifications, affecting 450 aircraft, as well as several avionics capability upgrades including the Active Electronically Scanned Array (AESA) Radar upgrade. The new radar replaces the current mechanically scanned radar, with greater ability to detect, track, and identify low-observable, low-flying, and slow-flying targets. This joint emerging operational need is critical for the F-16 platform to meet aerospace control alert mission requirements to properly defend the homeland against modern threats. These radars continue fielding in FY22.

A-10

The A-10 remains an effective close air support platform for the current Counter Violent Extremist Organization fight. With very limited utility in a contested fight, we are right-sizing our A-10 fleet for the current and anticipated future demand and then structurally extending and modernizing the aircraft we keep. We will continue to re-wing and modernize 218 A-10s while we reduce the fleet by 42 in FY22 and an additional 21 in FY23. Re-winging is the A-10’s most significant modernization program and we have purchased wings to outfit a fleet of 218 aircraft. In FY22, we will continue executing FY21 funding to begin installs and support engineering change orders, and other government costs that are typically required to execute major modification efforts of this nature. The FY22 President’s budget requests \$122.8 million (Procurement; and Research, Development, Test, and Evaluation funds) in FY22 for modernization. The 2016 and 2017 National Defense Authorization Acts restrict retiring or divesting A-10s until completion of the F-35 Initial Operational Test and Evaluation comparative tests and associated reports, and the Secretary of the Air Force briefs the findings to congressional committees. We are seeking legislative relief to delink the Comparative Test portion of the report, given that portion of testing and evaluation has been completed, from the overall Initial Operational Test and Evaluation report in order to begin right-sizing this fleet.

Trainers

T-1, T-6, and T-38

The Air Force is continuing investment efforts in its trainer platforms, including modernization programs for the T-1, T-6, and T-38 fleets. The T-1A Avionics Modernization Program will modernize the T-1A fleet and address known obsolescence and diminishing manufacturing supply issues. For the T-6, the Air Force is completing installation of Automatic Dependent Surveillance-Broadcast (ADS-B) Out, modernizing the Aircrew Training Devices and Crew System life support equipment, and providing logistics support. Additionally, research and development activities will be funded for the Next Generation On-Board Oxygen Generation System (OBOGS) to improve the safety of pilot training and address on-going physiological events in the T-6 aircraft. For the T-38C, modifications are also required to sustain and upgrade the fleet until the T-7A delivers, including avionics, Pacer Classic III, Talon repair, inspections, maintenance, and front canopy replacement programs until the *eT-7A* is delivered. The FY22 President's budget requests \$3.9 million, \$8.8 million, and \$54.3 million for the T-1, T-6, and T-38 fleets, respectively.

eT-7A

The Advanced Pilot Trainer (*eT-7A*) contract was awarded to The Boeing Company on 27 September 2018. The *eT-7A* System Critical Design Review was completed in the summer of 2020. The *eT-7A* replaces the Air Education and Training Command's existing fleet of 427 T-38C aircraft with 351 aircraft and associated simulators, ground equipment, spares, and support equipment. The *eT-7A* will provide student pilots with the skills and competencies required to be better prepared to transition into 4th and 5th generation fighter and bomber aircraft. The FY22 President's budget request of \$199.3 million continues the program's Engineering and Manufacturing Development and early aircraft flight test efforts, as well as procures long lead support equipment, ensuring we meet the 2024 Initial Operational Capability and 2034 Full Operational Capability milestones.

Munitions

The Air Force must maintain a suite of affordable air-to-air and air-to-ground kinetic and non-kinetic weapons delivering capability and capacity to defeat rapidly evolving peer competitors. As such, we continue to procure preferred munitions, but are tapering production as programs approach warfighter inventory objectives, while simultaneously investing in new technology to counter future peer threats in highly contested environments. During the last

several years, we have successfully ramped up production capacity across the portfolio and our FY22 President's budget request reduces procurement rates of preferred munitions to sustain inventory objectives, while continuing to provide resources to apply toward advanced weaponry and hypersonics. We will continue to invest in future weapon design, development, and fielding to ensure advanced capabilities are available to engage all future threats. To ensure success, munitions procurement will remain an item of interest across the FYDP.

Joint Direct Attack Munition and Small Diameter Bomb

The Joint Direct Attack Munition (JDAM) is the air-to-ground weapon of choice in the current fight and the expenditure rate has reduced by 42 percent in FY21 (840) compared to FY20 (1,443). After increasing tailkit production to 45,000 tailkits per year in FY18 to meet the needs of the Services and Foreign Military Sales (FMS) partners, the Air Force has adjusted to demand and now plans to procure 1,900 tailkits in FY22 with a request of \$124 million, with Navy and FMS partners procuring the remaining production capacity.

Small Diameter Bomb I (SDB I) and II (SDB II) provide reduced collateral damage effects and increased load-out per sortie for our warfighters. Due to its high operational utility, the Air Force ramped the line for SDB I from 3,000 weapons per year in FY15 to 8,000 weapons in FY17. With demand dropping and advanced standoff weapons in higher demand, the FY22 President's budget requests \$82.8 million and plans to order 998 weapons leaving residual production capacity available to FMS partners. For SDB II, the FY22 President's budget requests \$294.6 million to procure 985 weapons.

Finally, Hellfire missiles provide a time-sensitive, direct strike capability for our remotely-piloted aircraft and remain in high demand around the world. Production capacity, shared between Hellfire and Joint Air-to-Ground Missile (JAGM), was ramped up from 5,000 missiles per year in FY15 to 11,000 missiles per year in FY19. With lower demand and higher priority advanced weapons requirements, the FY22 President's budget requests \$104 million and procures at least 1,176 Hellfire missiles.

Joint Air-to-Surface Standoff Missile and Advanced Medium Range Air-to-Air Missile

As the Air Force responds to current operational demands, we are also looking to the future to ensure we are prepared to defend against more advanced threats as directed in the NDS. Doing so requires advanced weapons capabilities and the FY22 President's budget request reflects the Air Force's plan to continue investing in those areas, specifically with the Joint Air-

to-Surface Standoff Missile (JASSM), the Long-Range Anti-Ship Munition (LRASM), and the Advanced Medium Range Air-to-Air Missile (AMRAAM). These weapons provide unique and necessary capabilities for the highly contested environment.

JASSM is the premier air-to-ground, low observable missile for defeating threats in highly contested environments and is the weapon of choice for a future fight against peer adversaries. The program is focused on increasing inventory by implementing a strategy to ramp up production rates and monitor subsystems for obsolescence. To achieve this, we have partnered with industry to expand production capacity to satisfy a 47 percent increase in our inventory objective. The FY22 President's budget requests \$711 million, with the corresponding available max rate for JASSM increasing to 525.

LRASM, produced in the same facility as JASSM, is a purpose-built anti-ship missile particularly critical for the future fight in a maritime environment. The FY22 President's budget does not request procurement due to a supply chain obsolescence limitation. Future procurement has mitigated the limitation.

Production of AMRAAM missiles, a critical air dominance weapon, remains consistent with FY22 procurement levels by requesting \$214 million for 168 missiles, as industry partners begin to cut-in a solution to obsolescence issues through the Form Fit Function Refresh (F3R) effort.

Stand-In Attack Weapon (SiAW)

To defend the nation in an increasingly competitive global environment, we must look beyond currently fielded weapons systems and invest in future advanced munitions capabilities. To that end, the Air Force continues to invest in development of the Stand-In Attack Weapon (SiAW) to deliver a strike capability to defeat rapidly relocatable targets, a hallmark of the highly contested environment. SiAW is the munition that gives the F-35 unique air-to-surface capabilities in the high end fight for the entire Joint Force. The FY22 President's budget requests \$166.5 million for SiAW development and prototyping.

Hypersonics

The Air Force is poised to field the first production hypersonic munition in the DoD. The AGM-183 Air-Launched Rapid Response Weapon (ARRW) is completing test and begins procurement with budget requests of \$160.8 million for 12 munitions in FY22 and \$238 million for research and development. Capable of employment from fighters as well as bombers, the Air

Force is also developing the Hypersonic Attack Cruise Missile (HACM) to complement ARRW. The FY22 President's budget request of \$200 million for HACM development is designed to result in production article procurement in late FY26.

Intelligence, Surveillance, and Reconnaissance (ISR) and Command and Control (C2)

Aligned with the NDS, the Air Force is aiming to re-orient the Intelligence, Surveillance, and Reconnaissance (ISR) Enterprise by aligning ends, ways, and means to address the peer threat environment through the increased use of human-machine teaming. The end goal is a ready Next Generation ISR Enterprise possessing a decisive advantage for the warfighter while remaining competent across the entire spectrum of conflict.

To meet the challenges of a highly contested environment, the future ISR portfolio will consist of a multi-domain, multi-intelligence, collaborative sensing grid that uses advanced technology. It will be resilient, persistent, and penetrating to support both kinetic and non-kinetic capabilities alike. Global Integrated ISR must transition to connected, survivable platforms, and that requires accelerating investment and accepting short-term risks by transitioning away from outdated and underperforming ISR assets that offer limited capability against peer and near peer threats.

The FY22 President's budget request takes further steps towards repurposing, retooling, automating, and stabilizing the force to ensure the ISR Enterprise can achieve this vision within the next decade.

MQ-9

The FY22 President's budget request of \$357.9 million will continue MQ-9 fleet modernization efforts aimed at providing needed capabilities to the Combatant Commands. To date the MQ-9 fleet has flown over 2.5 million hours, with 91 percent of those hours supporting combat operations. This level of warfighter support is facilitated by a unique program architecture in which MQ-9 sustainment and modernization efforts are managed as separate, yet fully integrated and complementary, programs of record. This allows the Air Force to focus on operating and sustaining fielded MQ-9s while development and testing of planned modernizations are conducted in parallel. By structuring this way, mature and proven upgrades for the program at large are delivered when and where they are needed.

MQ-9 modernization efforts include the establishment of an MQ-9 Multi-Domain Operations (M2DO) configuration which are capability upgrades that will keep the fleet relevant.

Some of the upgrades in the M2DO configuration include Anti-jam Global Positioning System, C2 Resiliency, Enhanced Power, Link-16, and an effective and reliable open systems architecture. Additionally, the MQ-9 program is actively engaged in mitigating the operational and maintenance impacts of sustaining a multi-configuration fleet as well as enabling airspace integration and access.

RC-135

The Air Force is committed to sustaining and upgrading the RC-135 fleet as it continues to be our most capable, relevant, and viable signals intelligence platform. Continued modernization using rapid acquisition and fielding processes is critical as we address emerging peer threats and the return to great power competition. The RC-135 is critical to our decision advantage as it provides vital intelligence data at unrivaled speeds to both the national-level intelligence community and the tactical-level warfighter.

The FY22 President's budget request facilitates mission system improvements for the entire RC-135 variant fleet. Efforts include the automation of additional search and detection capabilities, improved near-real-time data distribution and collaborative processing, and exploitation and dissemination supported by enhanced artificial intelligence algorithms. Also, the first KC-135 to WC-135 conversion will be accomplished and delivered in FY22. Finally, our partnership with the United Kingdom's RAF on the RC-135 and the RAAF on the MC-55 Peregrine continues to set the standard for cooperative efforts that strengthen alliances while increasing partner interoperability.

RQ-4

The RQ-4 Global Hawk uncrewed aircraft system provides high altitude, long endurance, all weather, wide area reconnaissance and surveillance. The FY22 President's budget request of \$121.7 million furthers modernization and sustainment efforts, to include modernizing the ground segment, addressing diminishing manufacturing sources, and standing up and assigning a maintenance depot for RQ-4 launch and recovery elements and mission control elements.

The Ground Segment Modernization Program is on track to complete installation of upgraded cockpits at Grand Forks Air Force Base and Beale Air Force Base in FY23. Finally, the Secretary of Defense signed the certification waiver for RQ-4 Block 30 divestment as stipulated in the FY21 NDAA. Funding made available over the FYDP by the divestiture will enable the Department to invest in penetrating ISR capabilities.

COMPASS CALL

COMPASS CALL is the Air Force's only wide-area, standoff, Airborne Electronic Attack (AEA) Command and Control Warfare/Information Operations weapon system. The COMPASS CALL program is currently undergoing a re-host effort to transition the capability from an EC-130H to an EC-37B in order to maintain U.S. Electromagnetic Spectrum (EMS) Superiority in future conflicts. To date, six EC-37B aircraft have been procured and are undergoing modification, with limited fielding planned to deliver in the FY24 timeframe. The FY22 President's budget requests \$352 million for developing System-Wide Open Reconfigurable Dynamic Architecture (SWORD-A) capabilities while deferring the next aircraft procurement. The open and agile architecture of SWORD-A enables capability that can respond to the evolving threat landscape. SWORD-A capabilities make the EC-37B the centerpiece of the Electronic Warfare (EW)/EMS Superiority Strategy of the Air Force and DoD.

E-8 JSTARS

The E-8C JSTARS provides wide-area Ground Moving Target Indicator (GMTI) capability and dynamic Battle Management Command and Control (BMC2). JSTARS aircraft will have survivability challenges in future scenarios, as airborne GMTI platforms have to operate closely (from within contested areas) to adequately sense ground moving targets. The future of the GMTI is a pivot to space. As such, the Department is transitioning from legacy airborne GMTI platforms to space-based capabilities, where sensing will be possible in anti-access/area denial (A2/AD) scenarios. As part of this transition, the FY22 President's Budget request divests four E-8C JSTARS aircraft. The Air Force is pursuing a Secretary of Defense certification to divest the fleet across the FYDP, as directed by the FY21 NDAA.

E-3 AWACS

The E-3 AWACS provides wide-area Airborne Moving Target Indicator (AMTI) capability and dynamic Battle Management Command and Control (BMC2) to build an accurate battlespace picture. The FY22 President's budget request of \$311 million funds modernization efforts to address diminishing manufacturing sources (DMS) to maintain its cutting edge BMC2 capabilities. Despite these modernization efforts, however, the AWACS fleet cannot perform the full spectrum of AMTI needed to support combatant commanders today. Although there are promising future technologies that could someday operate without a crewed airborne command and control platform at the tactical edge, these future concepts are not projected to be ready

before the end of service of the AWACS platform, creating the need for a bridging capability now. The Department is actively evaluating options for such an AMTI platform.

FUTURE CAPABILITY

Competing against rising peer adversaries during this time of unprecedented technology change requires a competitive acquisition system—one that is faster and more agile than our rivals. Consequently, the Air Force is transforming what we buy, how we buy, and who we buy from to retain the battlefield dominance we presently enjoy.

Understanding what to buy begins with a deep understanding of our potential adversaries and the anticipated future operating environment. We are using a future force design that incorporates adversary assessments and lessons from wargaming and other analysis to drive warfighter requirements and our acquisition choices. We will continue to incorporate our learning from these activities into future design iterations. This overall force design is being folded into our planning and programming in order to transition from the force we have to the force we need.

Faster Acquisitions

Fielding systems faster is step one. Through rapid prototyping authorities granted by Congress, like Middle Tier of Acquisition, we are trimming low-value-added steps that previously bogged down programs and slowed capability to warfighters. In May 2019, we achieved our “Century Challenge” goal of removing 100 years from program schedules and we’ve just kept going toward a new goal of 150 years. By the end of FY20, we identified 83.75 years of program accelerations for MTA programs and an additional 29 years of accelerations by tailoring our traditional acquisition programs. Rapid prototyping—“flying before you buy”—is not just a faster acquisition approach; it allows risks to be tackled earlier, before systems are in production when there is still time to troubleshoot. The benefit is proving out in our MTA programs, which maintain the same documentation and discipline as traditional programs.

The Department of the Air Force is embarking on an acquisition transformation by driving a “Digital Trinity” of initiatives into our acquisition enterprise. The Digital Trinity consists of Digital Engineering, Agile Software Development, and Open Systems Architectures. These three initiatives will greatly reduce acquisition schedules, increase our access to innovative and emerging technology, reduce vendor lock, and allow us to field warfighting systems at the speed of relevance. Digital Engineering approaches will change the way we do

business – shifting us from a document-based enterprise to one based in models and data, allowing us to analyze, assess, and make decisions regarding our system designs at machine enabled speeds. Agile Software Development enables us to deliver rapid, iterative improvements to our software in an assured and secure manner. Finally, Open Systems Architecture will maximize flexibility in system design, improve access to commercial products and competition, and enable our weapon systems to be affordably and quickly modernized and upgraded.

To successfully do this, the Department must establish a digital environment, or “tech stack,” that is accessible across organizations—both industry and government—and enables our workforce to access, understand, and modify the models of our weapon systems. We must change the way we do business beyond document-based descriptions of our weapon systems toward model-based systems engineering methods that extend across the lifecycle from design to disposal. We must apply smart coding and containerization to bring functionality from the labs to the field at a rapid pace.

The Air Force is pursuing these initiatives on several fronts. First, our Air Force Digital Campaign, with over 900 participants, is drafting best practices and training, developing acquisition tools and enablers, and crafting the steps forward. The Air Force issued acquisition guidance for each of the three elements of the Digital Trinity, as well as criteria for programs to achieve e-designations: a formal acknowledgement of weapon systems championing and reaping the benefits of these modern practices. We are actively deploying acquisition enablers, software containerization and code reuse platforms, and open architectures embodied in ever-maturing Government Reference Architectures.

Finally, we have a number of trailblazing programs that are actively employing these initiatives and experiencing great results. The T-7 program, our next training aircraft, is embracing model-based engineering and 3D design tools. In doing so, Boeing reduced assembly hours by 80% and cut software development time in half. The aircraft moved from computer screen to first flight in just 36 months. Our Ground Based Strategic Deterrent (GBSD) Program analyzed over 6 billion variant designs digitally prior to making a selection. GBSD’s implementation of all elements of the Digital Trinity will enable faster design cycles and optimized weapon system decision making, ensuring the land-based element of our nuclear triad is a deterrent for many years to come. The A-10 Enhanced Wing Assembly program demonstrates the value these principles bring to legacy platforms. Implementing digital

engineering resulted in 236,500 operational hours returned to the A-10 fleet through individual aircraft maintenance assessments based on risk analysis methods pioneered by the organic A-10 government team. These tools have the ability to ensure airworthiness, safety, and affordability of the A-10 fleet into 2030 and beyond. We're excited about the potential of these new digital practices and look forward to reaping the benefits.

Smarter Acquisitions

As a key innovation engine for the Department of the Air Force, AFWERX teams Airmen and Guardians talent with commercial technology developers to transition agile, affordable, and accelerated capabilities. Per May 2020 direction from the Vice Chief of Staff of the Air Force, AFWERX 1.0 was combined with AFVentures and Agility Prime. In this arrangement we moved AFWERX under the Air Force Materiel Command, where the Air Force Research Laboratory provides the “organize, train, and equip” functions for AFWERX, while strategic direction is provided by the Service Acquisition Executive. In December 2020, SpaceWERX became part of AFWERX, and in January 2021, the Small Business Innovation Research and Small Business Technology Transfer Center of Excellence also joined AFWERX. Together AFWERX establishes technology, talent, and transition partnerships for competitive commercial advantage and military capability through the three lines of effort, AFVentures, Prime, and Spark.

“Air Force Ventures” or “AFVentures” is a key means of accelerating capability development by adjusting our work with startups, small businesses, and private investors. With over eighty percent of our nation’s research and development (R&D) now commercial—and our Defense Industrial Base continuing to shrink through mergers and acquisitions—transforming the way we work with commercial companies is imperative. In 2018, we began energizing our Small Business Innovation Research/Small Business Technology Transfer Program (SBIR/STTR) to lower barriers for commercial tech companies, speed contracts, and bring private investment into the Defense market. Since 2018, using our AFVentures process, we have awarded more than 2,000 contracts, with over 75 percent of the recipient small businesses being new to the Department of the Air Force. Those companies have gone on to raise \$2.2 billion in follow-on private capital and win \$1.4 billion non-SBIR government funding, resulting in a \$5.6-to-\$1 Return-on-Investment for the Department of the Air Force.

This Air Force Ventures process – one in which we open the door for innovative

companies to propose ideas to the Department of the Air Force – showed strong value last year in being applied to non-Defense missions. Specifically, the AFVentures team was integrated into the Department of the Air Force Acquisition COVID-19 Task Force used to fight the COVID-19 pandemic, and asked to scale their operations to support FEMA, DHHS, and Joint priority missions. Over the course of 2020, the AFVentures process brought in over 3,700 pandemic-fighting ideas, 449 of which were identified to meet emerging COVID-19 related requirements – including PPE manufacture, digital contact tracing, and remote telework. The AFVentures evaluation approach, which can scale to evaluate hundreds of proposals in a matter of weeks, was implemented by the FEMA Emergency Response team, evaluating over 300 proposals and resulting in \$645 million worth of awards. In all, the lessons learned from last year showed that the AFVentures process can be quickly implemented to solve emerging and urgent needs.

In an effort to scale the AFVentures success and accelerate transition of emerging technologies AFWERX established Prime. The first Prime program is Agility Prime. Agility Prime is a non-traditional program seeking to operationalize commercial electric vertical takeoff and landing (eVTOL) vehicles (i.e., “flying cars”) for military missions to accelerate the emerging commercial market. Agility Prime is the only all-electric passenger aircraft program in the U.S. Government. So far the program has awarded more than \$100M of contracts with close collaboration between FAA, NASA, DOT, DOE, and HHS. Agility Prime use cases include: humanitarian response, disaster relief, firefighting, distributed logistics, personnel recovery, disaster response, ship to shore delivery, and medical evacuation. The Department of the Air Force has unique testing and safety resources and military use cases to help mitigate current commercial market and regulatory risks. Agility Prime has been using these resources, rather than significant R&D funding, to attract investors, build confidence, and expedite commercialization, all while providing warfighters revolutionary flexibility with assessment across 13 different air mobility missions, some that will be tested in exercises beginning this year. Since releasing the Innovative Capabilities Opening in February 2020, 24 companies have applied. Two of those companies have made it through the Air Force airworthiness process, with several more following soon. This unlocks their opportunity to generate revenue for commercialization and to generate more data for accelerated learning, and civil and military certification. The program is designed to certify safety and airworthiness, procure systems for the most promising missions, and reach operational capability by FY23. Expanding our R&D

enterprise from creator to catalyst is key for accelerating dual-use technology and countering the advantages of state-sponsored industrial bases. Based on the success of this model, AFWERX Prime announced Space Prime as the follow-on to “Agility Prime.” Other potential Primes go across five sectors to include commercial alternative energy, autonomy for mission and maneuver, digital engineering and advanced wargaming, supersonic travel, and microelectronics.

Foundational to the success of any of these AFWERX efforts is the amazing innovation network of Airmen and Guardians being empowered by Spark. AFWERX Spark has implemented fellowship programs to include the Defense Ventures Fellows, AFRL Fellows, and Academic fellows to rotate through AFWERX or private industry. Additionally, Spark empowers over 80 base-level Spark Cells to ensure close connectivity with current needs of our Airmen and Guardians.

Integrated and Adaptable Acquisitions

Our potential adversaries are modernizing and advancing individual systems while bringing families of systems (or systems of systems) together into an architecture to deny U.S. interests and counter potential U.S. action. To meet this threat we must not just field capable individual systems but also integrate our systems so they can work in unison to achieve the necessary operational effects on increasingly rapid timelines allowing us to fight at machine speeds. The Department of the Air Force must not only invest in war-winning capabilities but also invest in war-winning technology architectures. By way of analogy, it is no longer sufficient to have the right ingredients, but we must also have the best recipe.

To achieve this integrated approach, we continue to design, demonstrate, and evaluate a Department of the Air Force-wide integrated architecture under the auspices of our Department of the Air Force Chief Architect. This effort will require programs and platforms themselves to be built with agility via open systems and open standards so that they can adapt and upgrade components quickly in response to threats or opportunities to integrate technology as advances are made. We will also be engaged in a regular campaign of learning at the architecture level with live demonstrations and evaluations of how we fight and where we fight. This is critical to moving from simply buying ingredients and hoping they form a coherent recipe, to a deliberate approach that impacts overall Air Force and Space Force architecture design, investments,

technical requirements for future capabilities, and acquisition baseline updates for current systems.

An example of this impact of force level demonstration and evaluation occurred in February of this year during an Architecture Demonstration and Evaluation with U.S. European Command. This effort showed the importance of demonstrating and evaluating at the architecture level not only "how" the Department fights but also "where" it fights. By taking Architecture Demonstrations and Evaluations to the field, the Department uncovered mission-critical gaps that could not have been uncovered merely at test ranges. This testing allows us to discover and fix the problems now rather than on the road to conflict when it would be too late to correct. We are committed to working with our Joint and Allied Partners so that existing systems can join easily. We ask Congress to support this capability so that future operators on the battlefield enjoy the same empowered capabilities they presently enjoy at home.

Connecting With the Joint Force

One effort that will stress how fast and smart our requirements, acquisition, and operations process can move is Joint All-Domain Command and Control (JADC2) powered by the Advanced Battle Management System (ABMS). Charged by the Secretary of Defense with leading the concept development for JADC2, the Department of the Air Force is building ABMS to create decision superiority by delivering relevant information and capabilities to warfighters and operators at all echelons. ABMS will integrate today's and tomorrow's sensors; develop applications embedded with artificial intelligence, sophisticated algorithms, and multi-layered protections to make sense of massive amounts of trusted data; link space capabilities with weapons systems and personnel across all domains; and design pods, platforms, pathways, procedures, and policies that connect and integrate the warfighter better and faster than in any time in our history.

On 24 November 2020, the Department of the Air Force Rapid Capabilities Office (DAF RCO) was assigned as the Integrating Program Executive Office (PEO) for ABMS in a deliberate transition to start acquiring enduring capability through focused acquisition efforts and investments in digital infrastructure. ABMS continues to leverage technology integration opportunities borne out of rapid technology innovation and evaluation campaigns across the Department.

The ABMS acquisition effort will pursue two interconnected investment paths: enduring digital infrastructure investments and Capability Release packages, which leverage those enduring investments but focus on closing kill-chains and delivering immediate operational capability to the warfighter. DAF RCO is working in conjunction with the acquisition community to ensure Air Force and Space Force systems have seamless interoperability and compatibility to meet the JADC2 operational requirements. The six ABMS capabilities required to connect the warfighter are secure processing, connectivity, data management, applications, sensor integration, and effects integration.

Driven by requirements approved by the Chief of Staff of the United States Air Force and the Chief of Space Operations, Capability Release #1 (CR #1) (Airborne Edge Node) will focus on the edge network to enable sharing of information across 5th generation tactical air and provide situational awareness to KC-46 and C2 nodes. Data from CR #1 (Airborne Edge Node) will enable faster decision-making by the tactical, operational, and strategic customers.

Thank you again for the opportunity to testify before this subcommittee. The dialogue we have today will help us design, build, and operate a force capable of fighting and winning now and in the future.