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STATEMENT

BY

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BEFORE THE

HOUSE ARMED SERVICES COMMITTEE

TACTICAL AIR AND LAND FORCES SUBCOMMITTEE

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Chairman Norcross, Ranking Member Hartzler, and distinguished members of the Committee, I appreciate the opportunity to discuss the test status of tactical air and mobility programs. In written testimony today, I will discuss six main topics:

1) Status of the ongoing F-35 Joint Strike Fighter Initial Operational Test and Evaluation (IOT&E), which will support a Full-Rate Production (FRP) Decision;
2) Updated test activity for several tactical air and mobility programs since the release of my Fiscal Year (FY) 2018 Annual Report;
3) Test infrastructure needed to support emergent technologies;
4) Software and cybersecurity;
5) Progress and implementation of the 2016 National Defense Authorization Act (NDAA) Section 804, or middle-tier acquisition programs under DOT&E oversight; and
6) DOT&E focus areas for FY20.

F-35 Joint Strike Fighter Test Activity

DOT&E has been working closely with the F-35 Joint Program Office (JPO), Service Operational Test Agencies (OTAs), and other stakeholders to design and conduct the most rigorous operational testing of any fighter aircraft in U.S. history. This test rigor is worthy of the F-35's groundbreaking capabilities and complexity. These agencies have welcomed DOT&E involvement and advice throughout my tenure, and it has been a pleasure to serve with them, and specifically VADM Mat Winter to provide a comprehensive and independent evaluation of the F-35 to inform the fielding, combat employment, and upcoming modernization of the weapon

system.

The nascent capabilities of the F-35 are already combining with fourth generation fighters, and current command and control architecture in support of Combatant Commanders around the world. I recognize it is crucial that I provide my independent and objective evaluation of the F-35 to inform future combat employment.

The Joint Strike Fighter Operational Test Team (JOTT) is making significant progress in evaluating the operational capabilities of the F-35 while safely conducting the IOT&E test plan. As of April 30, 2019, the JOTT has completed over 65 percent of all IOT&E open-air trials and weapon events. Operational testing to date has included cybersecurity and open-air test trials which incorporated F-35 deployments and weapons employment. The test team has compared the F-35 to fourth generation fighters, against both legacy and modern peer threats that have been fielded over the last decade. As prescribed in the 2017 NDAA, comparison testing to examine the capabilities of the F-35A and A-10C completed in March of this year.

F-35 IOT&E started in January 2018, 11 months ahead of the revised schedule, by my incremental approval of approximately 40 percent of the test trials and weapon delivery events that were ready for operational testing. The first increment began with a deployment to Alaska for cold weather testing. Subsequently, I approved the second increment in April 2018, including missions in permissive threat environments, weapons, cybersecurity, and deployments to ships and austere operating locations. The mission trials were primarily two-aircraft elements, designed to evaluate the F-35 in the roles of Close Air Support, Forward Air Controller (Airborne), Strike Coordination and Reconnaissance, Combat Search and Rescue, and Aerial Reconnaissance. Additionally, 22 air-to-air missile shots and 33 air-to-ground munitions events have been completed in operationally realistic scenarios to assess the lethality

of the platform. The test teams also conducted deployments to the USS *Abraham Lincoln* with the F-35C; to Volk Field, Wisconsin, with the F-35A; and to Marine Corps Air Station Yuma, Arizona, with the F-35B.

In December 2018, with nearly 40 percent of the mission trials and weapon events complete, I approved the start of formal IOT&E when the remaining entrance criteria were met. The JOTT is conducting the most demanding open-air trials designed to evaluate the F-35 in the roles of Offensive and Defensive Counter Air, including Cruise Missile Defense, Suppression/Destruction of Enemy Air Defenses, and Air-to-Surface Attack. Periodic operational cybersecurity testing is ongoing for the Autonomic Logistics Information System (ALIS), the training systems, the U.S. Reprogramming Laboratory, and component-level of the air vehicle. The existing test plan specifies the final two phases of IOT&E, which I will approve when the JOTT and the test support environments are ready, are open-air electronic warfare trials against robust surface-to-air threats and simulation of dense, modern surface and air threats in the Joint Simulation Environment (JSE).

The JSE is essential to completing IOT&E and is critical for evaluating the F-35 since open-air testing limitations do not permit a robust and adequate test of the aircraft against the density and diversity of modern threat systems currently fielded by near-peer adversaries as defined in the May 2018 test plan. The JSE is also critical to support development and testing of the next generation F-35 Block 4 capabilities and future block upgrades. However, JSE development is behind schedule, and its readiness to support testing is a concern.

Currently, IOT&E test results are not publically releasable because the tests and data analysis are either not complete or results are preliminary, and because of security protection requirements. I anticipate completing open-air testing this fall and subsequently conducting test trials in the JSE to stress the F-35 against validated models of advanced real-world

threats. The current schedule projects IOT&E completion later this year followed by the Beyond Low-Rate Initial Production Report.

Block 4 development is already underway, and DOT&E is working with the Program Office, Services, and OTAs to assist with planning and identifying the necessary test infrastructure support requirements. The objective is to use an iterative incremental development approach to testing such as Development Security Operations (DevSecOps) to meet operational testing objectives and accelerate the acquisition process. We will continue periodic cybersecurity and suitability testing that will align with the annual ALIS release cycle. The planned cybersecurity testing will further assess the air vehicle, enterprise-wide ALIS, and the supply chain.

The Block 4 software upgrade test schedule will be challenging. The proposed schedule is based on a 6-month development, testing, and fielding cycle. This cycle relies on an agile approach using modeling and simulation (M&S) to improve capability delivery processes. A similar approach was partially used during F-35 System Development Demonstration (SDD), resulting in multiple unplanned software releases, increased flight testing, and a 16-month delay to complete SDD of Block 3F. For Block 4, the operational test teams are working to ensure adequate testing of each software release.

Recent Test Activity for Tactical Air and Mobility Programs

KC-46A. The Air Force grounded the KC-46A fleet at McConnell Air Force Base (AFB), Kansas, in late February 2019 due to the discovery of Foreign Object Debris (FOD) in KC-46A aircraft at the Boeing Military Delivery Center, Paine Field, Seattle, Washington. A Boeing FOD inspection team deployed to McConnell AFB to inspect all four Air Force aircraft for FOD. The team discovered debris in multiple areas of the aircraft, consisting of wires, nuts, bolts, and fasteners. The team completed its inspection, and the McConnell AFB

KC-46A fleet returned to flight on February 28, 2019.

Aircrew and maintenance familiarization (FAM) training is ongoing at McConnell AFB in preparation for the start of operational test. The FAM training is moving at a slower pace than originally anticipated due to flight cancellations because of poor weather and the non-availability of parts to complete necessary maintenance activities. The FAM training is scheduled for 75 days of KC-46A operations.

Operational flight testing was anticipated to begin May 14, 2019. It will likely slip due to the FOD problem and FAM schedule delays. The F-16 and C-17 have been certified by their Major Command (MAJCOM) to support KC-46A operational test activities. Additional receivers (i.e., F-15, B- 52, and F-35) will begin participating in operational test activities once they have been qualified for air refueling by the Air Force developmental test community and certified by the receiver Major Command (MAJCOM).

The Under Secretary of Defense for Research and Engineering has reported on two areas of significant concern as the KC-46A transitions to operational testing. First, the developmental test community assessed the Remote Visual System (RVS) as unsatisfactory for air refueling in all operationally relevant environments. Operational testing will likely confirm the RVS performance demonstrated in developmental testing. Visual acuity needs improvement, which will likely require hardware and software modifications. Second, although developmental testing found that the telescoping design loads for the KC-46A air refueling boom met contract specification, the loads are between 2 and 5 times greater than the KC-10 and KC-135. The increased loads, in turn, increase the workload for the receiver pilot. Operational testing will characterize the operational mission effects that these deficiencies have on the operational effectiveness and suitability of the air refueling system.

VH-92A Presidential Helicopter Replacement. Marine Helicopter Squadron One

(HMX-1) conducted operational assessment testing from March 1 – 28, 2019. Testing consisted of 16 sorties on 2 VH-92A Experimental Development Model (EDM) aircraft. The operational assessment's purpose was to evaluate the communications, landing zone suitability, Presidential transport, pilot vehicle interface capabilities, and the cybersecurity posture of the VH-92A. The Live Fire Test and Evaluation (LFT&E) program completed testing in August 2018, and I anticipate the final vulnerability assessment later this year. DOT&E is currently analyzing test data, the results of which will be incorporated in my report to inform a Milestone C decision scheduled for late May 2019.

AC-130J. On January 10, 2019, the Air Force Special Operations Command (AFSOC) completed a Follow-on Operational Test and Evaluation (FOT&E) of the AC-130J Block 20+ Upgrade designed to support precision strike, close air support, and air interdiction requirements. AFSOC conducted this evaluation in two phases. Phase 1 consisted of four full mission profiles flown in and around the Eglin Test and Training Complex, Florida. These profiles tasked the crew to direct high-complexity precision strike, close air support, air interdiction, and personnel recovery missions while incorporating datalinks and aircraft defensive systems. Phase 2 consisted of three live-fire missions flown at White Sands Missile Range, New Mexico, to evaluate the ability to employ the Air-to-Ground Missile-114R2 HELLFIRE and Guided Bomb Unit-69 Small Glide Munition. Testing demonstrated the AC-130J Block 20+ modification is capable of supporting AFSOC's precision strike, close air support, and air interdiction requirements, but with minor discrepancies or acceptable workarounds.

Research, engineering, and risk reduction efforts to develop a high-energy laser for the AC-130J are ongoing. This is an example of the emerging requirement to evolve and implement Directed Energy weapon systems. My office and the Program Office have begun to develop the test processes, procedures, and measurement tools to characterize the weapon's effectiveness,

suitability, and lethality.

C-130J. The Air Force completed IOT&E for the block upgrade 8.1 configuration in March 2019. This software and hardware upgrade makes the C-130J compliant with global airspace mandates through the addition of Link 16, Civil Data Link, new GPS receivers, Automatic Dependent Surveillance Broadcast Out, and Mode 5 Identification Friend or Foe (IFF). This navigation and flight management system will likely become the baseline C-130J across Combat Air Force, AFSOC, and the Department of the Navy.

As more software is incorporated into weapon systems, their vulnerability to cyber-attacks increases. The cybersecurity Adversarial Assessment on the C-130J will provide the first data to establish the cybersecurity posture of the baseline C-130J. All other C-130J variants will leverage these data and will resource and assess cybersecurity of future capabilities separately.

F-22 Raptor. The program is fielding increment 3.2B capability this summer after the modification of operational aircraft with new hardware for stores management and a dual-use computer. The F-22 program must address several outstanding actions prior to fielding as identified in my August 2018 classified 3.2B BLRIP Report.

Developmental testing of Update 6 software and associated capabilities is ongoing and forecast to complete this summer. These capabilities include KOV-20 crypto modernization required to maintain National Security Agency certification, Link 16 interoperability, and tactical secure voice encryption algorithms.

Raptor Agile Capabilities Release (RACR) 1 testing is currently scheduled to begin in fall 2019 and will continue for approximately 1 year. RACR 1 will include initial Link 16 transmit of a limited number of messages and Mode 5 IFF transponder capabilities.

Light Attack Aircraft (LAA). The LAA program continues to conduct the planned FY19 LFT&E activities on both the A-29 and AT-6C aircraft. Fuel cell survivability testing,

including live fire of incendiary rounds into the wing fuel tanks and surrounding structure is ongoing. Live fire testing should be complete by the end of FY19 with my LFT&E report to follow. In December 2018, the Air Force decided to delay their Request for Proposals announcement. At this time, the LAA program remains on oversight, and we will support the Service's agile acquisition efforts and future LAA program testing.

Small Diameter Bomb II (SDB II). The Air Force continues the first phase of SDB II operational testing on the F-15E. Testing this year is scheduled at White Sands Missile Range for live fire and GPS jamming tests, Eglin AFB for overwater range tests against small boat targets, and the Utah Test and Training Range for Joint Terminal Attack Controller (JTAC) controlled tests. Phase 1 flight testing is projected to complete in June 2019. In general, testing has demonstrated that system performance is satisfactory. Currently, datalink reliability due to incorrect cryptographic keys is the most noteworthy deficiency, which is not specifically related to the SDB II weapon system.

M&S data validation and Integrated Flight Simulation (IFS) accreditation is ongoing but it lags flight testing. This will delay my reporting of SDB II effectiveness, which relies upon having an accredited IFS. The tentative schedule estimates March 2020 as the most severe delay date.

Cyber testing will continue through September 2019. I anticipate reporting on the results in December 2019.

F/A-18 Infrared Search and Track (IRST). The Navy completed testing of the F/A-18 IRST Block 1 that incorporates an improved processor in support of a limited early fielding. This will inform the Block 2 IOT&E scheduled for 2021. The Navy conducted a total of four flights on February 12 and March 19, 2019, resulting in early fielding at Naval Air Station Lemoore, California, on March 26, 2019, with Carrier Air Wing Seventeen.

F/A-18 H-14. The H-14 aircraft software testing began in October 2018. In March 2019, a combined test detachment from VX-1 and VX-9 supported by VX-31 conducted numerous fire control missions in an electronic attack environment at Point Mugu, Sea Test Range. This detachment included F/A-18 E/F, EA-18G, and E-2D aircraft testing several programs simultaneously. Live fire testing designed to demonstrate the integration between aircraft missile systems and the F/A-18 E/F H14 and E-2D Delta System/Software is scheduled for July 2019. Additional testing includes overland fire control scenarios at Naval Air Station Fallon, Nevada, in April 2019 and large force exercise participation in Alaska in May 2019.

AIM-120C7 Advanced Electronic Protection Improvement Program (AEPIP). The Air Force completed AEPIP Tape 2 testing in December 2018 and intends to field in April 2019. Testing demonstrated that the AEPIP Tape 2 is operationally effective and suitable.

AN/TPS-80 Ground/Air Task Oriented Radar (G/ATOR). The Marine Corps completed IOT&E in December 2018. Additional operational testing will conclude the first week of May 2019. I intend to provide these test results along with IOT&E test results to inform the Block 1 and Block 2 FRP Decision scheduled for late May 2019.

Test and Evaluation Infrastructure

Emergent technologies will drive the need for new concepts of operations and test infrastructure requirements. Technologies, such as hypersonic weapon systems will require advancements in data collection, long-range tracking capability, and safety procedures. The Department will have to develop safe and effective flight test corridors that can accommodate the high speeds and long distances these weapon systems can fly to ensure they are effective under operationally realistic conditions. Weapon systems using artificial intelligence and machine learning will require new measurement methods that can determine whether a computer will make the right decisions in combat environments. More fundamentally, we need to understand

why an artificial intelligence system did what it did.

Flight testing in an operationally realistic environment is limited by the availability of test assets, a limited test infrastructure, the lack of lethality testing against modern threats, range safety complexity, high test costs, and operational security concerns. Independently accredited M&S, anchored by flight test data, will be needed to evaluate the effectiveness of these future systems. I believe the development of such M&S capability should be a priority for the Department.

Regarding M&S, DOT&E and the Test Resource Management Center (TRMC) are working with the test and intelligence communities to develop credible infrared and radio frequency models of advanced threats to support laboratory testing and augment open-air testing. Additionally, DOT&E has invested in advanced OT&E threat environment models for B-2, B-21, and similar systems that will affect numerous advanced tactical air and land programs.

These efforts, along with the F-35's JSE, facilitate future testing in operationally complex, realistic, and relevant threat scenarios that an open-air range cannot duplicate. The JSE is critical to the future of air warfare systems development.

Today, the JSE is located at Naval Air Station Patuxent River, Maryland. The Air Force intends to build two future sites at Nellis AFB, Nevada, and Edwards AFB, California. The Nellis AFB facility will be used primarily for operational testing, training, and high-end tactics development that will include F-35, F-22, and other advanced platforms in later phases. The Edwards AFB facility will focus on developmental test and will also connect to the Benefield anechoic chamber facility, supporting mission-level hardware-in-the-loop testing. Both will be used for experimentation of new technologies.

DOT&E and TRMC have partnered with the Air Force, Navy, and the Army Threat

Systems Management Office to develop and acquire Radar Signal Emulators (RSEs) as part of the DOD's Electronic Warfare Infrastructure Improvement Program (EWIIP) efforts to improve open-air range testing. This effort has delivered 16 mobile systems, capable of emulating advanced ground threat weapon systems. These RSEs are currently an integral part of F-35 open-air testing and will provide a significant test capability for numerous other weapon systems in the future. Currently, RSEs are deployed on the Nevada Test and Training Range. The assets will deploy to the Point Mugu Sea Test Range for planned F-35 test events later this summer.

The Department has a current shortfall of operationally representative, full-scale fifth generation test targets for advanced weapons systems such as the F-35. The Department must develop and acquire a full-scale, threat-representative fifth generation aerial target to ensure that our advanced weapon systems are tested against a very credible threat in an operationally realistic environment. This will provide Combatant Commanders with a detailed understanding of an advanced weapon system's lethality and mission effects to support their operational employment decisions. At least 15 current and near-future DOD programs have requirements against fifth generation adversaries, to include three air-to-air missiles, three fighters, two surface-to-air missiles, and seven command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) systems. An unmanned, affordable, full-scale fifth generation target with the requisite electronic attack capability, radar cross section, and flight envelope performance supports the lethality evaluation of advanced weapon systems against fifth generation threat-representative targets.

Another shortfall that the Army will work internally to address is funding required for the development of the Tactical Engagement Simulation with Real Time Casualty Assessment (TES/RTCA). This funding is currently not included in the proposed 2020 budget; the Army will reassess whether this program should take priority over others during the FY 2021 Budget

cycle. The TES/RTCA systems are essential to creating a complex and evolving battlefield environment for ground force-on-force test and training. Sustained investment and regular upgrades in TES/RTCA capabilities are necessary to ensure that the survivability and lethality characteristics of new and upgraded combat systems are accurately represented during operational testing. This funding line is critical to meet the lethality goals set by the 2018 National Defense Strategy and the Army's modernization plans.

Software and Cybersecurity

Today, we live in a software-defined world, and our weapon systems are no different. This reliance on ever-increasing sophisticated and complex software has a dark side. The dark side is the susceptibility of software, and the networks that host the software, to cyber-attacks. The more software, the more complexity; the more complexity, the more vulnerabilities.

Today a key way to harden our systems against cyber-attacks is to attack them ourselves using "cyber Red Teams" that act like an adversary. DOD's cyber Red Teams are very capable, but as countries like Russia and China continue to improve their cyber capabilities, the gap between the Department's cyber Red Team capabilities and those of our adversaries is widening. My organization is working with the Department's Red Teams to close that gap by helping them acquire additional personnel, more advanced tools and training. However, there is a need for more resources in this area to keep pace with the ever-growing cyber threats. Money alone will not solve this problem; it will be solved with intellect. Our software and cyber scientists must be smarter than the adversary's. To address this issue, the Department should secure seed funding for a select group of Service academies, private companies, universities, and national laboratories to grow the DOD cybersecurity test workforce and capabilities. In order to provide additional test capacity, the skills of cyber testers needs augmenting with advanced, automated, and autonomous cybersecurity test tools. Scholarly panels, such as the Defense Science Board,

remind us of important vulnerabilities requiring attention beyond just the Internet Protocol (IP) network assessments that currently consume most of our time and resources. Some of these "beyond IP" vulnerabilities include supply chain, software, and electromagnetic spectrum, and require addressing cybersecurity test shortfalls as soon as possible.

2016 NDAA Section 804 Acquisition Update

With the enactment of the 2016 NDAA Section 804, my office has fully supported the Services' implementing middle-tier acquisition programs, while ensuring that adequate operational testing is conducted prior to fielding. I am collaborating with the Office of the Under Secretary of Defense for Acquisition and Sustainment to develop Department-wide guidance for middle-tier acquisition programs.

My office is fully supporting the Services' processes to implement middle-tier acquisition for the following 10 air and land and expeditionary warfare programs.

- **Air-launched Rapid Response Weapon (ARRW).** The ARRW is a rapid prototyping effort. The program is developing their initial test strategy in collaboration with DOT&E and will begin flight testing in 2021 at the earliest.
- **Hypersonic Conventional Strike Weapon (HCSW).** The HCSW is a rapid prototyping effort. The program is developing their initial test strategy in collaboration with DOT&E and will begin flight testing in 2021 at the earliest.
- **B-52 Commercial Engine Replacement Program (CERP).** The B-52 CERP is a rapid prototyping program. The Air Force will modify and deliver up to two prototype aircraft for initial performance and flying quality testing followed by an operational capability demonstration in FY25. The B-52 CERP will transition from a rapid prototyping phase to a production program in FY26. The Air Force will then conduct a tailored IOT&E with production low-rate initial production aircraft and

trained operational crews in FY28 in advance of large-scale fielding. DOT&E is currently collaborating with the Air Force to develop a streamlined and tailored test strategy for this program. DOT&E approval of the program test strategy is anticipated this summer.

- **Air Operations Center – Weapon System Modification (AOC-WS Mod).** The AOC-WS Mod program is utilizing rapid fielding for the existing portfolio and the planned expansion of the portfolio. DOT&E is collaborating with the Air Force Operational Test and Evaluation Center to develop operational test plans that support agile software development and rapid fielding of new capabilities.
- **F-22A Raptor Agile Capability Release (RACR).** The F-22A program will continue to deliver combat capability while transitioning to the RACR construct this fall, after completion of the next software release. The RACR delivery cycle process begins this year and is forecast to continue through the Future Years Defense Plan, with each software release on an annual basis. In FY20, RACR 1 will undergo a Force Development Evaluation (FDE) conducted by the 53rd Wing.
- **Next Generation Combat Vehicle (NGCV) Optionally Manned Fighting Vehicle (OMFV).** NGCV OMFV is a new system that transports soldiers to advantageous positions on the battlefield to engage in close combat. The NGCV-OMFV is expected to replace the Bradley Fighting Vehicle, and may potentially include mission roles for scouts, fire support teams, and engineers in Armored Brigade Combat Teams. Testing of rapid prototypes begins in FY20. DOT&E is collaborating with the Program Office to conduct an operational assessment in FY22. The acquisition strategy transitions to a Major Defense Acquisition Program (MDAP) after the operational assessment and selection of a single vendor at

Milestone C in FY23.

- **Next Generation Squad Weapons (NGSW)**. The NGSW program consists of the NGSW-Automatic Rifle (AR) and the NGSW-Rifle, and is intended to increase small unit lethality. The NGSW-AR is the planned replacement for the M249 Squad Automatic Weapon; the NGSW-Rifle would replace the M4 Rifle for frontline combat units. Both the AR and Rifle will fire a newly developed 6.8 millimeter caliber bullet. Multiple vendors will produce prototypes in FY20. DOT&E is collaborating with the Program Office and the Cross Functional Team to ensure soldier feedback throughout the prototype phase, culminating in an operational test in FY22.
- **Integrated Visual Augmentation System (IVAS).** IVAS is a conformal head mounted digital sensor system with an immersive display designed to improve soldiers' aim, navigation, and training. IVAS integrates with the Nett Warrior system providing network enabled situational awareness and command and control. Government furnished low light and thermal sensors will enable wide field of view high performance sensors. IVAS will receive frequent soldier feedback during development. Each feedback event will reflect an increase in size and scenario complexity to better shape IVAS capabilities. The four progressive capability sets will be evaluated by my office over the next 24 months. The first of these feedback events completed in March 2019 with commercial assets; squad-sized soldier elements conducted small-scale unit operations and live fire events.
- **Extended Range Cannon Artillery (ERCA).** ERCA incorporates a new cannon and ammunition upgrades with the existing M109A7 Paladin chassis to increase firing rates and maximum range. ERCA includes a modified cab, gun mount, cannon, and breech resulting in a 30 to 52 kilometer increased range. The program plans to deliver ERCA prototypes in FY22 with testing to follow. DOT&E is collaborating with the Program Office and the Cross Functional Teams to conduct

both the operational and live fire test events in FY22.

- **Mobile Protected Firepower (MPF).** The MPF is a new armored, tracked vehicle intended to provide enhanced firepower to infantry units. The Army picked two vendors to build prototypes for test and evaluation. Rapid prototyping activities will include developmental testing and soldier feedback of up to two different unit sets of prototypes followed by an operational assessment in FY20-21. My office is involved with the planning for both events in collaboration with the Program Office and the Cross Functional Team. The MPF plans to transition to an MDAP for low-rate initial production in FY22.

DOT&E Focus for FY20

As I execute my statutory responsibilities to ensure our warfighters are prepared for combat equipped with secure and credible weapon systems, and trained to use them effectively and decisively, I am most impressed with the spirit of collaboration between OSD and the military Services. I remain committed to increasing collaboration between DOT&E and other agencies within the defense community and to facilitate more rapid development and deployment of weapon systems without sacrificing the integrity or independence of the T&E community. My initiatives for FY20 focus on the key areas of software-intensive systems and cybersecurity, collaborating with developmental test and evaluation (DT&E) to conduct OT&E earlier in the system development and acquisition process, adapting T&E for emergent technologies, and improving our testing environments while enhancing the required T&E workforce.

As always, my staff and I stand ready to address any questions or concerns you may have on this testimony.