

## TITLE II—RESEARCH, DEVELOPMENT, TEST, AND EVALUATION

### RESEARCH, DEVELOPMENT, TEST, AND EVALUATION, ARMY

#### Items of Special Interest

##### *Armored vehicle fuel tank and bladder safety*

The committee notes that armored vehicles carry a significant amount of fuel, which can become a hazard to the crew in combat. The committee commends the work that the Army has done to improve crew safety, including the development of technologies that reduce risk of fuel spills when a fuel tank is punctured or ruptured, and efforts to render fuel inert where possible. Such efforts may reduce catastrophic injuries to soldiers.

However, the committee is aware of self-sealing polymers and other materials with self-healing capabilities that, combined with passive fire suppression blankets, may provide additional safety to crews within armored vehicles. Therefore, the committee directs the Secretary of the Army to provide a briefing to the Committee on Armed Services of the House of Representatives by March 1, 2017, on candidate technologies that could be used to improve the fuel containment and safety capability of legacy armored vehicle platforms and armored vehicle platforms currently in development.

##### *Army advanced body armor research and development*

The committee has consistently supported the need to provide soldiers with the most advanced body armor. The committee believes that body armor, which provides desired protection levels at the lightest possible weight, ensures greater soldier survivability and reduces injuries, while improving mission performance and effectiveness. The committee is aware that the Army's Soldier Protection System (SPS) program is seeking to reduce the weight of body armor by 10 percent, while maintaining or improving current ballistic capabilities, and would use a more holistic and systems-based approach to developing an integrated personal protective equipment kit for soldiers. The committee supports the Army's SPS effort. However, the committee believes that even as manufacturers are developing hard body armor components that achieve SPS requirements, it is also important that research and development continue on hard body armor components with even greater capabilities. The committee also believes this effort should be resourced and programmed in order to ensure that more dramatic improvements are readily available for soldiers in the near future, given the emerging threats in the global environment.

Specifically, the committee believes that a goal of doubling the current SPS requirement (a 20 percent reduction in weight while maintaining or improving current ballistic capabilities) would ensure that soldiers have the most advanced hard armor possible to better address emerging and future threats. Such an improvement will require a holistic approach to improving body armor; therefore, the committee believes that a new research and development project should be established by the Army that allows qualified manufacturers to compete to study new materials, manufacturing technologies, assembly processes, ballistic impacts, predictive modeling, and crack sensor technologies. In addition, the committee believes that such a program will also encourage body armor manufacturers to investigate high-risk technologies and processes, which are likely essential for ensuring that such a change in capability is possible.

Therefore, the committee directs the Secretary of the Army to provide a briefing to the Committee on Armed Services of the House of Representatives not later than September 30, 2016, on the advisability and feasibility to the Army of establishing such a research and development project. The briefing should also include an estimate for any additional funding needed in fiscal year 2017 to establish such a research effort.

#### *Army network integration evaluations and army warfighting assessments*

The committee acknowledges the importance of the Department of the Army's Network Integration Evaluation (NIE) exercises conducted at Fort Bliss, Texas, and White Sands Missile Range, New Mexico. The committee notes that, through this program, the Army has been able to test equipment in a realistic battlefield environment in the hands of soldiers, and the Army has been able to save billions of taxpayer dollars after the NIE proved that several programs were not operationally effective. The committee also acknowledges the importance of the new Army Warfighting Assessments (AWA), also currently planned to occur at Fort Bliss and White Sands Missile Range. The committee believes that these exercises help the Army to shape requirements for Army acquisitions, create new capabilities from existing technology, and promote interoperability between service branches and U.S. allies.

The committee acknowledges the investments already made in the Brigade Modernization Command and Fort Bliss, Texas, for the NIE and AWA missions. The committee also acknowledges that both the NIE and AWA should be, if possible, brigade-level exercises to ensure mission command requirements are met, and that any systems tested will be fully capable of deployment at the brigade level. The committee believes that the most efficient method for conducting the NIE's and AWA's is to assign a dedicated brigade to the NIE and AWA missions. However, the committee understands that the Army must use all available force structure to meet current demands for forces to support combatant commanders. The committee encourages the Army to continue to pursue both the NIE and the AWA, so that the

Army can continue to save money, fully utilize its previous investments, adequately test and shape its acquisition programs, and maintain technological superiority.

Therefore, the committee directs the Secretary of the Army to provide a briefing to the House Committee on Armed Services, not later than September 1, 2016, on the Army's long-term plans and budget figures for conducting NIE and AWA events. This briefing should also include any data available on cost savings the Army has accrued due to past NIE and AWA events. In addition, the committee directs the Secretary of the Army to determine the most cost effective means to execute the NIE and AWA missions, and to provide this information as part of the long-term plans in the aforementioned briefing.

#### *Blast mitigation technologies for combat and tactical vehicles*

The budget request contained \$122.1 million in PE 63005A for Combat Vehicle and Automotive Advanced Technology, but contained no funding for active blast mitigation technology development and demonstration.

The committee understands that active blast mitigation systems are designed to detect and react to underbody blast events encountered by combat and tactical vehicles, and notes that the Army performed tests on two prototype vehicles equipped with active blast mitigation systems in 2015. In the committee report (H. Rept. 114-102) accompanying the National Defense Authorization Act for Fiscal Year 2016, the committee directed the Secretary of the Army to provide a briefing to the House Committee on Armed Services on the results of testing on blast mitigation technology that could detect and autonomously respond to underbody explosive incidents. The briefing indicated that "based on limited testing, the incorporation of active blast mitigation technology could reduce injuries, reduce the forces and damage to other vehicle technologies, and may avoid costly retrofits to the legacy vehicle fleet when upgrading to meet increasing blast threats." The committee believes that given these promising test results, the Army should continue to evaluate this technology and that additional testing and analysis of this technology using a variety of vehicle platforms is justified.

The committee notes that while the Army is encouraged by this technology, no funding for it is programmed in the Future Years Defense Program. The committee encourages the Army to continue its evaluation of this technology, and if funds are not available, the committee expects the Army to reprogram the necessary funds to continue these tests and demonstrations on additional vehicle platforms.

The committee recommends \$122.1 million, the full amount requested, in PE 63005A for Combat Vehicle and Automotive Advanced Technology.

#### *Helicopter seating systems*

In the committee report (H. Rept. 114-102) accompanying the National Defense Authorization Act for Fiscal Year 2016, the committee expressed concern over outdated requirements and standards for helicopter seating systems (HSS).

Specifically, the committee noted that there appeared to be a lack of ergonomic design considerations, a detailed understanding of long-duration seat vibration on the body, and a lack of appropriate anthropomorphic data incorporated into helicopter seating system requirements. In response, the Director, Operational Test and Evaluation, provided a report to the committee on February 10, 2016, addressing these issues. The report confirmed many of the concerns expressed by the committee.

The committee understands that the Department of Defense and the Army are studying current HSS designs and have identified a need to improve current systems. The committee is aware that the Joint Aircraft Survivability Program Office and the Army are now identifying and developing new technologies in order to mitigate or eliminate deficiencies in current HSS performance. The committee believes the Department should accelerate development of new technologies that could provide increases in force protection and survivability, as well as reduce potential long-term disability issues for aviators. The committee directs the Secretary of the Army to provide a briefing to the Committee on Armed Services of the House of Representatives by January 15, 2017, on current HSS research and development programs.

#### *Improved refrigeration and cooling technology*

The committee supports continued research and development to improve efficiency and reduce costs of the equipment used to store food for U.S. service members stationed overseas. In locations not on a permanent installation, food is typically stored in large refrigerated container systems. The conventional technology powering these systems can be incredibly maintenance-intensive and expensive due to fuel costs. Reliance on fuel also increases personal safety risks to U.S. forces that have to transport this fuel to remote and austere locations. Therefore, the committee encourages additional investment to improve efficiency, reduce cost, and reduce risk associated with current systems.

#### *Improved Turbine Engine Program*

The budget request contained \$126.1 million in PE 67139A for the Improved Turbine Engine Program (ITEP).

The committee continues to support the Army research and development budget request for ITEP, as well as the acquisition strategy included in the request. ITEP is a competitive acquisition program that is designed to develop a more fuel efficient and powerful engine for the current Black Hawk and Apache helicopter fleets. This new engine will increase operational capabilities in high/hot environments, while reducing operating and support costs. The committee acknowledges the benefits of improved fuel efficiencies through lower specific fuel consumption that ITEP will bring to the battlefield. In addition, the committee encourages the Army to prioritize maintenance and sustainment cost savings for ITEP to ensure the continued affordability of the program.

The committee notes that the fiscal year 2017 budget request reflects an increase over last year's projection, which is an indication of the Army's support for this capability. Therefore, the committee directs the Secretary of the Army to provide a briefing to the House Committee on Armed Services by February 15, 2017, on potential options to accelerate the development and fielding of the engine so that the benefits can be realized sooner than currently planned.

The committee recommends \$126.1 million, the full amount requested, in PE 67139A for the ITEP program.

#### *Land-Based Anti-Ship Missile program*

The committee understands the U.S. Army Aviation and Missile Research, Development, and Engineering Center is developing concepts and technologies to enable the U.S. Army to conduct land-based offensive surface warfare. This includes adapting existing Army and Marine Corps High Mobility Artillery Rocket Systems and Multiple Launch Rocket System missile systems for this land-based offensive surface warfare capability. The committee supports the Army's Land-Based Anti-Ship Missile (LBASM) effort and understands the Army has programmed funding across the Future Years Defense Program in order to continue to integrate and demonstrate this capability through live-fire testing.

The committee directs the Secretary of the Army, or the appropriate designee, to provide a briefing to the House Committee on Armed Services by February 1, 2017, on the LBASM concept development effort, to include schedule and funding requirements.

#### *Lightweight metal matrix composite technology for combat and tactical vehicles*

The committee understands the U.S. Army Tank Automotive Research Development and Engineering Center (TARDEC) continues to invest in applied research, development, and demonstration programs for advanced materials technology to reduce the weight of component parts for combat and tactical vehicles. The committee supports this "lightweighting" technology development effort and is particularly encouraged by the versatility and broad application that metal matrix composite (MMC) technology could provide in reducing the weight of components and parts for military vehicles. The committee is aware that MMC technology could potentially increase the service life of drivetrains, braking systems, wheel ends, motive components, and other parts and assemblies by three to four times that of traditional steel components. The committee notes that substitution of traditional steel with MMC material technology is increasing due to greater demand for lower weight and costs for parts and components. The committee expects TARDEC to continue to resource, develop, and test advanced MMC technology and MMC manufacturing processes for military ground vehicles.

#### *Lithium ion super-capacitors*

The committee notes recent investments made by the Department of the Army in the energy technology lithium ion super-capacitors have resulted in notable achievements and technological advances. The committee is aware that continued research and development on lithium ion super-capacitors could potentially produce a hybrid lithium ion battery (LIB)/lithium ion capacitor (LIC) and is aware of the Army's interest in utilizing this hybrid as a possible replacement for the current 12V lead acid battery due to its limited operational temperatures and a high rate of failure in the field. The committee notes results to-date with both lithium ion capacitors (LIC) and with this promising new hybrid LIC/LIB technology, and encourages the Department of the Army to continue to pursue and to invest in these important technologies.

### *Long Range Precision Fires*

The committee understands the Long Range Precision Fires (LRPF) program is being developed to field a new surface-to-surface missile system that can attack a broad spectrum of targets up to 499 kilometers in range. The LRPF program would be a replacement for the legacy Army Tactical Missile System that would be considered non-compliant with current Department of Defense policy regarding cluster munitions and unintended harm to civilians. The committee understands the current notional schedule has the program entering the engineering and manufacturing development (EMD) phase in fiscal year 2020.

The committee supports the LRPF program and concurs with the analysis of alternatives completed in 2015 that recommended a new missile solution to meet LRPF requirements. The committee encourages the Secretary of the Army to develop ways to potentially accelerate the EMD phase of the program, and to fully fund the overall program to support its planned acquisition strategy.

### *Long-range Army surface-to-air missile capability*

The committee notes that the Army's current surface-to-air missile (SAM) systems have significantly less range against aircraft targets than many foreign threat systems, including the SA-20 Gargoyle, SA-21 Growler, and HQ-9. The committee also notes that over time, these weapon systems may proliferate around the world. The committee is concerned that this over-match by potential adversaries may place U.S. forces at significant risk in combat scenarios against near-peer military forces equipped with advanced fifth generation aircraft armed with precision-guided standoff weapons. The committee is also concerned that this over-match may place an excessive burden on U.S. tactical fighter aircraft operating in a defensive counter-air role. The committee believes that longer-range U.S. Army SAM capability may provide a significant upgrade to the overall U.S. military's ability to defend friendly airspace against advanced aircraft threats and deter potential adversaries. Therefore, the committee directs the Secretary of the Army to provide a briefing to the Committee on Armed Services of the U.S. House of Representatives not later than September 1, 2016, on the potential requirement for

longer-range Army SAM systems in the future, including the potential upgrade of current systems or an entirely new system.

### *Modular Handgun System*

The committee understands the Modular Handgun System (MHS) is projected to be a non-developmental item, commercial-off-the-shelf replacement handgun for the current M9 pistol. In the committee report (H. Rept. 114-102) accompanying the National Defense Authorization Act for Fiscal Year 2016, the committee noted its continued support for the MHS program, as well as the need to modernize small arms through new procurements and incremental product improvement programs. The committee continues to support the MHS program and understands the program remains on cost, on schedule, and is under source selection. The committee understands the Chief of Staff of the Army is conducting a review of the program, consistent with new authorities provided in section 802 of the National Defense Authorization Act for Fiscal Year 2016 (Public Law 114-92).

The committee is aware of the Chief of Staff of the Army's concerns regarding the extended length and cost of the required test and evaluation program, and also the overly complex performance requirements. For example, the committee understands that the final request for proposals was an extensive document, reaching 351 pages, but the technical specifications required for the handgun system were only 39 pages. The committee encourages the Army to continue to work to develop ways to streamline the existing test program in order to accelerate fielding of this capability to the warfighter.

The committee is also aware that the Army has not officially updated the small arms capability based assessment (CBA) used since 2008 to identify requirements and capability gaps for small arms. Therefore, the committee directs the Secretary of the Army, in coordination with the Chief of Staff of the Army, to update the small arms CBA from 2008, and to provide a briefing to the House Committee on Armed Services by February 1, 2017, on the results of the update. The committee does not believe this update would have any programmatic or schedule impacts to the MHS program, and expects that if impacts to the MHS program should occur, these would be a product of any potential outcomes resulting from the Chief of Staff of the Army's ongoing review of the program.

### *Next generation signature management technology*

The budget request contained \$75.0 million in PE 64804A for Logistics and Engineer Equipment-Engine Development, but contained no funding for the continued development of next generation signature management camouflage systems for military vehicles and shelters.

The committee is encouraged by recent research and the approval of the updated requirements document for next generation signature management systems. In the committee report (H. Rept. 114-102) accompanying the National Defense Authorization Act for Fiscal Year 2016, the committee noted the

importance of this low cost defensive capability against current and emerging threats, particularly in Europe, and encouraged the Department to accelerate development, procurement, and fielding of this advanced camouflage net system to meet warfighter requirements. The committee is aware of the high demand for this capability by forward deployed units, most notably by U.S. Army Europe, U.S. Army Alaska, 2nd Calvary Regiment, 82nd Airborne Division, 10th Mountain Division, and U.S. Special Operations Command. The committee believes the Army requires additional funding in fiscal year 2017 to continue accelerated development of its next generation signature management camouflage net systems to ensure continued overmatch against advanced sensor threats.

The committee recommends \$86.1 million, an increase of \$11.1 million, in PE 64804A for Logistics and Engineer Equipment-Engine Development for the continued accelerated development and testing of next generation signature management camouflage net systems to address the operational needs of the warfighter.

#### *Personal protective equipment development for female soldiers*

The committee is aware that recent determinations by the Secretary of Defense have opened all combat positions to female warfighters. The committee is concerned that currently available items of personal protective equipment (PPE) and organizational clothing and individual equipment (OCIE) do not meet the specific and unique requirements for female combat troops. These items of equipment continue to overly burden all combat troops with excessive weight.

The committee believes that the new Department of Defense policy presents an opportunity for the military services to focus on the “warfighter as a system” and properly address the unique needs of female service members through a holistic acquisition strategy. The committee notes that the Army is currently developing a complete Soldier Protection System (SPS) to provide soldiers with modular, scalable, and mission tailorable protection to reduce weight and increase mobility, while optimizing protection. The Army has set an overall weight reduction goal of 10 percent for SPS. The committee supports the SPS effort and expects the program to consider the unique physical requirements of female service members.

The committee directs the Secretary of Defense to provide a briefing to the House Committee on Armed Services by March 1, 2017, that outlines the plans to provide PPE and OCIE developed specifically for female service members. The briefing should include, but not be limited to: (1) plans for programming, budgeting, requirements, and procurement of female specific equipment including helmets, combat clothing, body armor, footwear, and other critical safety item equipment categories, and (2) detailed plans on integrating commercially available materials and advanced product design to reduce the load for all service members.

#### *Review of ballistic testing policy for body armor*

The committee encourages the Secretary of the Army to reevaluate the February 2009 policy instructing the Army Test and Evaluation Command to conduct all body armor first article and lot acceptance tests. The committee notes this policy may have resulted in significant program costs, and in turn schedule delays from inadequate capacity at the Government test centers. The committee encourages the Army to assess how it can better use independent testing facilities to improve efficiency, timing, and costs associated with ballistic test and evaluation.

#### *Small Unit Support Vehicle*

The committee notes that the Army family of Small Unit Support Vehicle (SUSV) fleet is used by Army units that train and operate in extreme cold weather conditions, and that it provides those units with unique capabilities not found elsewhere in the Army. In addition, while the committee is aware of the Army's effort to refurbish some of the fleet, the committee notes that legacy SUSVs are beyond their economic useful life, and have become increasingly difficult to maintain. Therefore, the committee directs the Secretary of the Army to provide a briefing to the Committee on Armed Services of the U.S. House of Representatives not later than September 1, 2016, on the potential requirement for a replacement to the SUSV fleet. The briefing should include potential options for increasing the capability beyond the current vehicles, such as additional carrying capacity, armament, and survivability.

#### *Telemedicine capabilities*

The committee is aware that the Department of Defense is developing capabilities that would provide telemedicine and remote physiological monitoring for casualty care of deployed forces. The committee recognizes that such telemedicine capabilities can provide useful reach-back support for complex injuries, especially for sensitive organs where combat medics and surgeons may not have in-depth specialty training, such as ophthalmic injuries. However, the committee notes that the military services lack an effective telemedicine system that communicates patient information and condition across the entire continuum of care beginning at the point of injury and continuing until arrival at a medical care facility.

The committee encourages the Department to continue to experiment with and examine ways to utilize emerging telemedicine capabilities to allow for consultation with outside experts or specialty institutions to provide soldiers on the battlefield with access to high-quality care for complex and difficult injuries, such as ophthalmic or cranial injuries. Further, the committee believes the Department should examine existing technology and requirements for in-transit telemedicine capabilities to determine how best to leverage best-of-breed existing capabilities to support current needs. Additionally, the committee supports the idea of partnering with subject matter experts in order to provide direct, real-time consultation between geographically dispersed military and civilian medical personnel; this would support complex diagnostic and surgical problems, as well as allow

conferencing for complicated, but less urgent patient management decisions, and virtualized training and continuing medical education.

### *Vehicle active protection systems*

The committee is encouraged by the Army's current strategy for vehicle active protection system (APS) tests and integration. The committee believes this strategy will allow the Army to better address the threats posed by the growing proliferation of anti-tank guided missiles and rocket-propelled grenades. The committee is aware of the importance of vehicle APS capabilities for forward-deployed units, specifically those units in the U.S. European Command area of operations. The committee supports this effort and encourages the Army to expedite deployment and fielding of vehicle APS technology on ground combat vehicles that will form an essential element of the European Reassurance Initiative.

The committee notes that the Army plans to conduct demonstration testing of mature vehicle APS capabilities on the Abrams main battle tank, the Bradley fighting vehicle, and Stryker combat vehicle. The committee encourages the Army to analyze options for incorporating vehicle APS solutions on additional vehicles, including the Joint Light Tactical Vehicle, and to identify the APS solutions that are best suited for deployment on lighter-weight combat and tactical vehicles.

The committee directs the Secretary of the Army to provide a briefing to the Committee on Armed Services of the House of Representatives by March 1, 2017, on the status of plans to deploy and integrate mature vehicle APS technology on deployed ground combat vehicles.

### *Warfighter Technology*

The committee is aware of the work being done by the Warfighter Technology directorate of the Natick Soldier Research, Development, and Engineering Center in improving the protection, survivability, mobility, and combat effectiveness of the U.S. Army. The committee supports the research and development in areas of advanced ballistic polymers for body armor, fibers to make uniforms more fire resistant, and lightweight structures for advanced shelters benefiting all ground troops. In order to ensure the Army remains at the cutting edge of technology in these critical areas, the committee urges continued consistent investment in improving warfighter capabilities.

### *Weight reduction for personal protective equipment*

The committee supports the efforts of the Army and the Marine Corps to reduce the weight of personal protective equipment (PPE) and organizational clothing and individual equipment (OCIE). However, the committee remains concerned that the military services are not capitalizing on the commercial industry's investments in textile materials to reduce the load carriage systems for ground combat forces.

The committee directs the Secretary of the Army, in coordination with the Secretary of the Navy, to conduct a market survey and analysis of the commercial sectors' technology and products that could be applied to current weight reduction initiatives for PPE and OCIE. The committee further directs the Secretary of the Army, in coordination with the Secretary of the Navy, to provide a briefing to the House Committee on Armed Services by March 1, 2017, which summarizes the findings of the market survey.

Additionally, the committee directs the Comptroller General of the United States to submit a report to the congressional defense committees by April 1, 2017, that reviews the efforts of the Army and the Marine Corps to reduce weight for PPE and OCIE. The report should identify the services' current weight reduction initiatives, establish a baseline for future evaluations, and assess the effectiveness of current efforts. The committee further directs the Comptroller General to provide a briefing to the House Committee on Armed Services by December 1, 2016, on the Comptroller General's preliminary findings.

## RESEARCH, DEVELOPMENT, TEST, AND EVALUATION, NAVY

### Items of Special Interest

#### *Advanced Low Cost Munitions Ordnance*

The committee continues to support development of the Advanced Low Cost Munition Ordnance (ALaMO). The ALaMO is a guided 57mm projectile, with fire-and-forget capability that requires no Littoral Combat Ship fire control system changes to counter threats against small boat swarms, unmanned aerial systems, and other emerging threats.

The committee directs the Assistant Secretary of the Navy for Research, Development, and Acquisition to provide a briefing to the House Committee on Armed Services by August 30, 2016, on achieving the objective of an initial operational capability decision in 2019. The briefing should also include, but not be limited to, an evaluation of the current funding profile of this program across the Future Years Defense Program, as well as discuss potential courses of action to accelerate or streamline the current program strategy.

#### *Aegis radar solid state improvements*

The budget request contained \$85.9 million in PE 64501N for Advanced Above Water Sensors.

The U.S. Navy has 90 destroyers and cruisers in the fleet which are equipped with the Aegis Weapon System. The heart of the system is the AN/SPY-1, automatic detect and track, multifunction phased-array radar. The existing Aegis SPY-1 radar system is based on dated technology vacuum electronic device components, such as cross field amplifiers and travelling wave tube transmitters. Each Aegis destroyer has over 70 microwave vacuum tubes in the transmitter. The

current technology in the Aegis SPY-1 radar has the highest failure rate of components in the ship's radar system.

The committee believes that there are newer, more efficient transmitters available that provide significant performance advantages in terms of very low out of band emission, very low phase noise, higher clutter improvement factor, increased range and Electronic Counter-Countermeasures capability. Specifically, additional funding could provide prototype hardware to further research and field a replacement to outdated transmitters currently in place. The U.S. Navy's DDG-51 and CG-47 fleet face operational affordability, fleet readiness, and sustainment cost challenges. Repair and maintenance of this system requires shutdown for several hours every 1 to 2 days, and on some occasions has required outside contractor support to repair and maintain. It is estimated that operational maintenance cost to maintain these radars to the required operational readiness standards is up to \$1.0 million per year, per ship. An upgrade to a solid state transmitter could achieve 10 times better reliability while reducing the operations and maintenance cost by 90 percent.

Accordingly, the committee recommends \$105.9 million, an increase of \$20.0 million, in PE 64501N for Advanced Above Water Sensors.

#### *Aircraft carrier design*

The budget request contained \$30.1 million in PE 64567N to support improved affordability for new construction aircraft carriers by providing additional design for affordability support.

The committee supports continued efforts by the Department of the Navy and the shipbuilder to better manage total ownership costs and reduce manning requirements and believes additional efforts will result in additional CVN 80/81 cost savings.

The committee recommends \$50.1 million, an increase of \$20.0 million, in PE 64567N for new construction aircraft carrier affordability initiatives.

#### *Alternative energy programs*

The committee is aware of the Department of the Navy's Research, Development, Test, and Evaluation efforts on operational energy programs. These investments include targeted efforts aimed at reducing fuel consumption to extend the range of aviation platforms, developing new propulsion systems for unmanned underwater vehicles, testing and qualifying alternative fuels, improving ship hull hydrodynamics, and improving energy storage capabilities. The committee remains supportive of cost-efficient alternative energy investments aimed at enhancing combat capabilities, strengthening mission assurance, and reducing operating costs for the Department. Therefore, the committee encourages the Department of the Navy, when prioritizing investments in alternative energy, to continue focusing on technologies that achieve these objectives.

### *Amphibious Ship Replacement Program*

The budget request contained \$6.3 million in PE 64454N for the Amphibious Ship Replacement Program (LX(R)).

The committee is concerned about the ability of the Marine Corps to project amphibious warfare power in a contested environment because of limitations associated with the amphibious ship force structure. The committee remains committed to ensuring sufficient funds are available to accelerate the programmed construction of the Amphibious Ship Replacement Program.

Accordingly, the committee recommends \$25.3 million, an increase of \$19.0 million, in PE 64454N for LX(R).

### *Automated testing*

The budget request contained no funding in PE 63597N for the automated test and analysis program.

The committee is aware that the Navy's Automated Testing and Analysis (ATA) program was established to expand the use of automated test methods currently in use by the Navy, such as Automated Test and Re-Test, and adds new methods of testing, promotes the use of automated test technologies, and standardizes automated test practices, methods, and tools. In addition, funding supports the development of enterprise level strategies to apply ATA technology to a broad range of software-intensive acquisition programs. However, the committee is concerned that this program was not funded in the fiscal year 2017 budget request, and does not believe that the Navy has an effective strategy for how to best utilize these technologies. Without that, the committee fears that the Navy will not have a manner to measure the effectiveness of these efforts, or to understand the full requirement across the Navy enterprise.

Therefore, the committee directs the Secretary of the Navy to provide a briefing to the House Committee on Armed Services on the status of this program by July 1, 2016. This update should include the current schedule for development, projected use of these tools and requirements across the Future Years Defense Program, and efforts to extend the use of these tools to other service, agency, and interagency partners. This briefing should also identify a set of metrics for assessing the programs efforts, including quantitative goals for the reduction of time and improvements in the quality of tested software across the Navy enterprise.

The committee recommends \$8.0 million, an increase of \$8.0 million, in PE 63597N to support and expand automated testing practices and capabilities across the Navy, and where relevant, with other service and interagency partners.

### *Autonomous Undersea Vehicles*

The committee notes that the Chief of Naval Operations provided a comprehensive assessment of the desired capabilities of Autonomous Undersea Vehicles projected to 2025 in the February 2016 report to Congress entitled

"Autonomous Undersea Vehicle Requirement for 2025." The committee also notes that the Department of the Navy is performing a gap analysis of autonomous undersea vehicle requirements "to determine the inventory requirements of 2025 and beyond." In addition, the committee is aware that the Secretary of the Navy is developing an Unmanned Systems roadmap strategy in 2016 to help inform future inventory requirements and investment decisions.

The committee remains interested in maintaining a significant peer advantage in the undersea domain and believes autonomous undersea vehicles represent an asymmetric opportunity to leverage atypical capabilities. Therefore, the committee directs the Secretary of the Navy to provide a report to the congressional defense committees, concurrent with the date on which the budget for fiscal year 2018 is submitted to Congress pursuant to section 1105 of title 31, United States Code, that details the Unmanned Systems roadmap strategy and the program objective memorandum 2018 investment strategy to obtain such a capability.

#### *Briefing on advanced flight control software for carrier landings*

The committee is aware that the Department of the Navy has performed flight tests with advanced flight control software for the F-35, F/A-18 E/F Super Hornet and E/A-18G Growler. This software, Maritime Augmented Guidance with Integrated Controls for Carrier Approach and Recovery Precision Enabling Techniques (MAGIC CARPET) will help aviators maintain constant guide slope throughout approach. The committee is supportive of the Navy's efforts to reduce the workload on pilots and landing signal officers (LSO) associated with performing a carrier landing. And by increasing the automation of these operations, MAGIC CARPET could allow the Navy to achieve savings without harming readiness by safely reducing the training associated with certification for carrier operations. Therefore, the committee directs the Secretary of the Navy to brief the House Committee on Armed Services no later than September 30, 2016, on MAGIC CARPET software development, flight testing, the impact on pilot and LSO workloads, potential reduction in training missions and associated savings, and a notional timeline for delivery to the fleet.

#### *Common mount for electromagnetic railgun*

The budget request contained \$96.4 million in PE 63114N for power projection advanced technology. Of this amount, \$15.4 million was included for the Navy's electromagnetic railgun prototype.

The committee remains supportive of the Navy's program for developing and deploying an electromagnetic railgun. The committee recognizes the growing imperative for the Navy to field this type of weapon, not only to increase capabilities for naval surface fire support and ballistic missile defense, but to also decrease the cost exchange model when comparing the railgun to conventional missiles or guns. However, the committee is increasingly concerned that the shift in emphasis to the

hypervelocity projectile by the Strategic Capabilities Office has left the Navy with a funding gap in developing the requirements and design for a common mount, which is a necessary prerequisite to getting this capability into operational use.

Therefore, the committee directs the Secretary of the Navy to provide a briefing to the House Committee on Armed Services by February 15, 2017, on the plan and milestone schedule for demonstrating and deploying a common railgun mount for sea- and land-based applications.

The committee recommends \$106.4 million, an increase of \$10.0 million, in PE 63114N to support the development of a common mount for the sea-based and land-based electromagnetic railgun.

#### *Deployable and interoperable communications*

The committee recognizes the critical and lifesaving role of enhanced and reliable communications systems in the battlespace. The committee commends the Marine Corps and Marine Corps Systems Command for working to test and evaluate deployable, man-portable Fourth Generation Long-Term Evolution (4G LTE) and 4G LTE Advanced (LTE-A) capabilities with the ability to integrate with other multimedia communications systems that are based on commercially available technology, and demonstrated interoperability in a multiservice and multiagency context. The committee encourages the Marine Corps Systems Command to find opportunities to further evaluate and experiment with such technology to better understand the performance characteristics in real-world and field exercise situations.

#### *F/A-18 fleet physiological event rate*

The committee notes with concern the increasing rates of physiological events (PE) experienced by F/A-18 pilots over the past 5 years. In fiscal year 2015, PE events experienced by F/A-18 pilots averaged no less than 28 incidents per 100,000 flight hours across 3 F/A-18 platforms. Of concern to the committee is whether this rate is an indicator that the Navy's efforts to address the problem are ineffective, or reflects an increase in reporting by aircrew. While these PE events cover a wide range of potential causal factors, the committee notes that the potential for aircraft mishap caused by a lack of oxygen or contamination of the on-board oxygen generation system (OBOGs) is real and should be addressed. The committee acknowledges and supports the Department of the Navy's establishment of PE teams to work with industry partners to collect, examine, and test potential solutions.

While the committee recognizes that there has not yet been a confirmed loss of an aircraft or pilot due to these events, and that physiological events experienced by F/A-18 pilots appear to be occurring at a rate lower than those experienced by the F-22 fleet from fiscal years 2010-14, the committee remains concerned about the apparent increasing F/A-18 physiological event rate, which poses risk to pilots and fleet operations. As a result, elsewhere in this Act, the

committee includes a provision that would establish an independent review of the Navy's efforts to date to address this issue, with a report date of December 1, 2017.

In addition, the committee notes that two critical elements of the Air Force's effort to reduce the rate of similar events in the F-22 fleet included changes to pilot flight equipment and the installation of an automatic backup oxygen system (ABOS). The ABOS could provide an increase in backup oxygen supply as compared to the installed manual backup oxygen carried in F/A-18 aircraft. The committee acknowledges that the F-22 system was already an existing design, and that in contrast the Navy would have to study and design an automatic system, working with the F/A-18 contractor. The committee believes that no one fix is likely to address all the issues causing physiological events. Given the in-depth research and mitigation efforts that the Navy is conducting, the committee believes that examination of the feasibility of design and installation of an ABOS of some kind in F/A-18 aircraft may be an important element to reduce the rate of incidents and preserve pilot confidence in the aircraft's overall life support system. Therefore, the committee directs the Secretary of the Navy to conduct a detailed engineering and cost analysis on the potential installation of an automatic backup oxygen system in the F/A-18 fleet, and to provide a report, not later than March 15, 2017, to the congressional defense committees on the findings and conclusions of this analysis.

#### *Five-inch precision guided projectile development for naval surface fire support*

In the committee report (H. Rept. 114-102) accompanying the National Defense Authorization Act for Fiscal Year 2016, the committee noted "that current surface Navy gunnery requirements are outdated and that new technologies such as railgun and directed energy weapons are nearing readiness for technology transition." The committee referenced the Advanced Naval Surface Fires (ANSF) initiative and noted the ANSF was assessing options for providing a near-term 5-inch guided munition capability. The committee understands this capability would provide for improved and extended-range naval surface fire support. The committee continues to support the need for this precision guided capability and is also aware of the Hypervelocity Gun Weapon System (HGWS) program that is currently under consideration by the Strategic Capabilities Office (SCO). The committee notes the HGWS program would "flip the cost equation using conventional guns to defend forward bases against raids of advanced cruise and ballistic missiles" and believes there could be applications for use in 5-inch gun systems for naval surface fires support. The committee is encouraged by the development of both of these initiatives and expects the Navy and SCO to coordinate on these capabilities. The committee also expects the Navy to proceed forward with an accelerated development and acquisition strategy for this needed capability that is consistent with acquisition reform principles.

#### *Integrated surveillance system*

The committee believes that the ability to obtain acoustic intelligence on foreign submarines is a critical national security need. The committee is aware of ongoing research and development efforts within the Office of Naval Research to develop and demonstrate the technology to enable autonomous installation of passive acoustic arrays that would support the Navy's littoral undersea surveillance needs in detecting and reporting submarines. These technologies would provide the capability to autonomously classify and report on a variety of specific submarine targets of interest. The committee encourages the Office of Naval Research to continue research and development efforts to satisfy urgent requirements of the combatant commanders for additional maritime intelligence, surveillance, and reconnaissance capabilities.

#### *Joint metallurgical technology for combat and tactical vehicle hulls*

The committee notes that in-service cracks are developing in the armor hull structures of Marine Corps and Army heavy tactical vehicles, to include mine resistant ambush protected vehicles (MRAPs) that were constructed from MIL-A-46100 High Hard Armor Steel. The committee believes the military services should consider resourcing a joint metallurgical technology program to develop solutions which provide reasonable, cost effective solutions to help repair and mitigate these types of cracks. The committee anticipates that this program would help to identify, develop, and evaluate potential alternatives, models, processes, and procedures to eliminate the cracking issue in the current fleet of MRAPs and newly acquired tactical vehicles, as well as to help to reclaim lost legacy vehicle assets as a result of severe cracking in vehicle hulls.

The committee directs the Secretary of the Navy, in coordination with the Secretary of the Army, or their appropriate designees, to provide a briefing to the House Committee on Armed Services by February 1, 2017, on the advisability and feasibility of pursuing metallurgical technology to address vehicle hull cracks and repair for combat and tactical vehicles.

#### *Marine Corps unmanned rotary utility aircraft*

The committee recognizes the successful deployment in Afghanistan of the K-MAX CQ-24A unmanned rotary utility aircraft. The committee encourages the Marine Corps to continue to explore this capability by implementing a program to provide the CQ-24A with multi-mission upgrades, especially those that provide improved intelligence, surveillance, and reconnaissance capabilities and greater range. If additional test activities show promise, the committee also encourages the Marine Corps to establish a program of record in fiscal year 2018 for CQ-24A.

#### *MH-60R/S multi-mission helicopter programs*

The budget request contained \$49.3 million in PE 72207N for depot maintenance systems development, and \$11.0 million for the MH-60 service-life

assessment program, but contained no funding to support defining a MH-60 mid-life upgrade.

The committee understands that the Department of the Navy's fleet of MH-60 helicopters are rapidly approaching currently approved service-life limits due to high fleet demand and operations tempo. Based on the current MH-60 utilization tempo, the MH-60 fleet could exceed its useful service-life prior to the future vertical lift aircraft achieving initial operational capability in 2034, creating a significant helicopter inventory gap within the Department of the Navy.

The committee notes that the Department of the Navy is preparing to conduct a MH-60 service-life assessment program (SLAP) that will evaluate the rotorcraft's aircraft structures and sub-systems to identify the critical structures, components, and sub-systems that can achieve extended service-life limit goals. However, the committee is concerned that the SLAP will not include an assessment to determine the requirements for a mid-life upgrade that would keep the rotorcraft relevant by mitigating obsolescence issues and enhancing the rotorcraft maneuvering performance and mission systems. Rotorcraft mid-life upgrades could include such items as next-generation rotor blades and tail rotor, digital automated flight control system, and mission systems hardware and software improvements to increase lethality and combat effectiveness.

Therefore, the committee recommends \$54.3 million, an increase of \$5.0 million, in PE 72207N for MH-60S and MH-60R fleet mid-life upgrades. The committee also directs the Secretary of the Navy to provide a briefing to the House Committee on Armed Services by February 1, 2017, that assesses and defines which MH-60S and MH-60R rotorcraft systems, sub-systems, mission systems, and avionics should be included in a mid-life upgrade to mitigate obsolescence issues and enhance the MH-60 fleets from both maneuvering performance and combat capability perspectives. The committee also expects the Secretary of the Navy to integrate the mid-life upgrade plan into the MH-60S and MH-60R service-life extension program that is scheduled to commence in 2023.

#### *Non-imaging millimeter wave radar technology*

The committee is aware that the Department of Defense has invested significant funding over the last 10 years for development, testing, and deployment of low-power, non-imaging millimeter wave radar technology for safely detecting concealed threats under clothing, such as suicide vests, weapons, or other contraband, at stand-off distances of up to 100 meters. Most recently, the Department invested to reduce the size, weight, and power of the system by 50 percent while also enhancing its operational capabilities. The result of this investment is a prototype system that exceeds desired requirements, reducing the size, weight, and power by 80 percent, and decreasing acquisition costs by 25 percent. However, the committee notes that no additional funding has been identified by the Department to complete the prototype to the point where it would be ready for testing in an operational environment, or any form of military user

assessment. The committee believes that this technology has the potential to not only enhance force protection at U.S. military bases and embassy checkpoints in high threat regions around the world, but it could also be used in public settings to protect against terrorist attacks domestically. The committee encourages the Department to continue to invest in the development of this prototype to the point where it could be evaluated for military utility in a suitable operational environment.

#### *Ocean warfighting environment applied research*

The committee believes that superiority in undersea and maritime environments depends on rapid access and application of the latest science and technology to ever-changing mission sets. The committee understands the importance of basic research on the natural sea environment that can be transformed into technological developments that provide new or enhanced warfare capabilities for the battlespace environment by measuring, analyzing, modeling and simulating, and applying environmental factors. The committee supports the use of natural environmental applied research for all fleet operations and for current or emerging systems. This information is also used to provide timely information about the natural environment for all fleet operations. The committee urges the Secretary of the Navy to continue research efforts into the natural sea environment to support technological developments that contribute to meeting top joint warfare capabilities.

#### *Service life extension program for Auxiliary General Purpose Oceanographic Research*

The budget request contained \$42.6 million in PE 62435N for the Ocean Warfighting Environment Applied Research program.

For academic research, the Navy operates and maintains Auxiliary General Purpose Oceanographic Research (AGOR) vessels, and these vessels require a mid-life overhaul. The committee notes that funding provided to date does not fully support all of the items that the Navy has determined are necessary to fully extend the life of these AGOR ships to 40-45 years.

The committee continues to believe that oceanographic research is a core function of the Navy and remains committed to ensuring the ability of the Navy to sustain its research priorities, even in the face of fiscally constrained budgets. The committee is concerned that the Navy has been decreasing funding in oceanographic research, especially sea-going research, and is concerned about the negative long-term implications these trends are likely to have on areas like anti-submarine warfare and battlespace awareness. Navy science and technology funding also plays a key role in information stewardship, including ocean mapping, oceanographic and meteorological data, that supports Navy, national, and international scientific goals.

Accordingly, the committee recommends \$74.6 million, an increase of \$32.0 million, in PE 62435N for Ocean Warfighting Environment Applied Research, to procure the third major overhaul in the class of three AGORs. The committee notes that the inclusion of this authorization of appropriations is predicated on the Navy's use of merit-based selection procedures in accordance with the requirements of section 2304(k) and 2374 of title 10, United States Code, or on competitive procedures, to conduct these overhauls.

#### *Submarine acoustic warfare development*

Considering the increasing and evolving undersea threats, the committee believes the Department of the Navy must continue to develop next generation countermeasures, including a mix of internal and external expendable acoustic countermeasures, to maintain and improve the survivability of all U.S. submarine classes in response to torpedo attack. While the committee acknowledges that the budget request for fiscal year 2017 included an increase of \$3.4 million to stabilize the Next Generation Countermeasure Program and associated Submarine Acoustic Warfare System research and development efforts, the committee supports the planned requirement for a fully capable, reactive, and mobile device constrained in size to 3 inches in diameter and 39 inches in length. However, the committee is concerned that the current next generation countermeasure requirement requires a single 3-inch device to be launched from both internal and external launchers, despite the fact that the latter currently deploys a 6-inch device. The committee urges Navy officials to consider a more diversified approach that allows for a next generation, 6-inch externally launched countermeasure, as well as an enhanced Acoustic Device Countermeasure (ADC) MK2 device for internal launch, which could be fielded sooner and at a much more affordable cost than the Navy's current plan.

Therefore, the committee directs the Secretary of the Navy to provide a briefing to the House Committee on Armed Services not later than September 30, 2016, on the Navy's plan to achieve the most cost effective and advanced torpedo defense capability for its submarine fleet. The briefing shall include, but not be limited to: the rationale underpinning the Navy's plan to focus on smaller devices that require adaptation to launch from external tubes, with specific attention paid to the inherent limitations of internally launched countermeasures; a detailed description of plans to incrementally enhance existing internal countermeasures, such as ADC MK2; any plans to develop a fully capable 6-inch next generation countermeasure, with mobility and communications capabilities, to be launched from external launchers; and an assessment of risk and unit production costs of each of the three aforementioned program sets.

#### *UCLASS, CBARS, RAQ-25, MQ-25, MQ-XX*

The committee is encouraged that the Department of Defense has completed its review of the Unmanned Carrier Launched Surveillance and Strike

(UCLASS) program and has decided to move forward with a slight variation that will include airborne tanking as an additional requirement. While this new capability was not identified as a requirement in the UCLASS Initial Capabilities Document (ICD) or the draft Capabilities Development Document (CDD) that had been previously validated by the Chief of Naval Operations, the committee recognizes the need for the enhanced capability and the positive impact it could have on the overall Carrier Air Wing (CVW). A requirement that was included in both the UCLASS ICD and CDD was the need for persistent, carrier-based intelligence, surveillance, reconnaissance (ISR) and precision strike. Furthermore, as stated in the Carrier Based Aerial Refueling System (CBARS) budget documents, “The CBARS requirements are aligned with the UCLASS which highlights the need for a persistent, carrier-based ISR, and precision strike asset.” The budget documents go on to note in the Air Segment Product Development description that the unmanned vehicle will be “capable of aerial refueling (give) and persistent Intelligence Surveillance and Reconnaissance (ISR) operations with future precision strike.”

The committee is concerned that while the follow on program continues to leverage the UCLASS ICD as its requirements justification and seems to have clear justification for the need for this platform to possess a precision strike capability, the final Request for Proposals that goes to industry may not include this as a required capability. The committee believes that, should this be the case, the Navy may be excluding a critical capability and precluding future growth in a platform that will likely be integrated into the carrier air wing for the next 30 years. In order to stay consistent with the requirements of the UCLASS ICD, the committee encourages the Secretary of the Navy to ensure that precision strike is a requirement of any follow-on platform that attempts to leverage the UCLASS ICD.

Additionally, the committee notes that the Joint Explanatory Statement to Accompany S. 1356, the National Defense Authorization Act for Fiscal Year 2016 (Committee Print No. 2) indicated that the Navy should develop a penetrating, air refuelable, unmanned carrier-launched aircraft capable of performing in a non-permissive environment. The committee continues to believe that the effectiveness of the carrier and its air wing would be enhanced by the development of an unmanned carrier-based aircraft capable of penetrating in non-permissive environments and conducting strike. The committee encourages the Secretary of the Navy to pursue the development and fielding of this capability.

Finally, the committee directs the Comptroller General of the United States to provide a report to the congressional defense committees by March 1, 2017, on the Navy’s carrier based unmanned aircraft acquisition program(s). The report shall include the following:

- (1) The Navy’s requirements and acquisition strategy for the program(s), including whether the strategies are consistent with acquisition management best practices identified by the Comptroller General;

- (2) The extent to which the program(s) have established and are meeting cost, schedule, and performance goals, including test plans and progress;

(3) The extent to which critical technologies are mature; system and subsystem designs are stable; and manufacturing processes are understood and have demonstrated capability to efficiently produce reliable, high quality systems; and

(4) Any additional matters that the Comptroller General considers appropriate to fully inform the congressional defense committees of the status of relevant naval carrier based unmanned aircraft acquisition program(s).

#### *Warfighter sustainment applied research*

Warfighter exposure to extreme environments requires critical research that is funded to study and mitigate the effects of undersea stresses on human safety, resiliency, and performance. The Navy's Warfighter Sustainment Applied Research Medical Technologies Program is directed by the Office of Naval Research, and conducts important research in this field. Research in this area includes reducing decompression sickness, arterial gas embolism, preventing hyperbaric oxygen toxicity, and exploring other ways to optimize submariner health. The committee believes the health and well-being of the force is imperative and encourages the Department of the Navy to continue investments in this field.

### RESEARCH, DEVELOPMENT, TEST, AND EVALUATION, AIR FORCE

#### Items of Special Interest

#### *Adaptive engine transition program*

The budget request contained \$285.0 million in PE 64858F for the adaptive engine transition program (AETP).

The committee continues to support research and development in the next generation of turbine engine technology. AETP will mature fuel-efficient adaptive cycle engine technologies while reducing associated technical and manufacturing risks in preparation for next-generation propulsion system development for multiple combat aircraft applications. The committee understands that significant technical accomplishments have been achieved by the Air Force Research Laboratory through a previous program, known as the adaptive versatile engine technology program, and the current AETP. The committee encourages the Department of the Air Force to continue making the necessary investments in these critical technologies and engine architectures to maintain the Nation's technological superiority over potential advanced adversaries.

The committee is encouraged that the Department of the Air Force has requested funding to award multiple contracts in fiscal year 2017, and to continue adaptive cycle engine maturation and demonstration efforts as a precursor to entering into future engineering and manufacturing development programs.

The committee recommends \$285.0 million, the full amount requested, in PE 64858F to continue the AETP program. The committee encourages the

Department of the Air Force to initiate development planning efforts for transitioning these technologies into current and future combat aircraft systems.

#### *Air Force directed energy initiatives*

The committee is aware that the Department of the Air Force established a Directed Energy Weapons (DEW) Integrated Product Team (IPT) in March 2016 to focus on operationalizing directed energy (DE) technologies. In addition to addressing technology development risks through science and technology efforts, the IPT will focus on policy issues, establishment of kinetic concepts of operation, opportunities for prototypes and experimentation, limitations, constraints, transition milestones, and critical decision points for Air Force strategic investment from 2016 to 2036. In addition, the DEW IPT will identify required test capabilities and acquisition infrastructure to support operationalizing DE. This information will be formalized in an Air Force DE Flight Plan.

The committee supports the effort to operationalize DE and recognizes the challenges, specifically the integration of DE on airborne platforms and resolution of policy issues, in achieving this goal. The committee understands that in producing the Air Force DE Flight Plan, initial concepts may prove unfeasible or not conducive to the overall Air Force Strategic Plan. Therefore, the committee directs the Secretary of the Air Force to provide a briefing to the House Committee on Armed Services by July 15, 2016, on the establishment of the IPT and efforts and progress to date. The briefing should include a discussion of any DE requirements as identified by U.S. Air Force Special Operations Command, including any AC-130 gunship requirements, such as those included in the unfunded priorities list submitted to the committee. Finally, the committee expects to be provided a copy of the Air Force DE Flight Plan upon its completion in October 2016.

#### *Air traffic control and landing systems*

The budget request contained \$9.8 million in PE 35114F for development of air traffic control and landing systems. Of this amount, \$5.0 million was requested for development of a next generation air transportation system (NextGen ATS).

NextGen ATS is an interagency effort designed to enable the transition from a ground-infrastructure dominated air traffic management capability for the U.S. national airspace system to a capability that leverages advances in performance-based navigation, non-radar based surveillance services. NextGen ATS would also transition from solid-state analogue voice communications to networked digital voice and data exchange. As part of this effort, the committee notes that the Air Force Flight Standards Agency will continue efforts to examine new civil air traffic control and landing system technologies that may have military utility, such as a remote virtual air traffic control tower capability. A remote virtual air traffic control tower system would integrate high-definition cameras providing 360 degree field of view, surveillance and meteorological sensors, microphones, signal light guns, and other devices for deployment at an airport. Inputs from these sensors

could be transmitted via data network to a remote tower center to be displayed in real time where a controller would have the tools, in addition to live video, to operate the airport in a similar manner as if located in a traditional air traffic control tower. The committee believes that a remote virtual air traffic control tower capability could provide a cost-effective alternative to traditional fixed-base air traffic control towers. Therefore, the committee encourages the Department of the Air Force to conduct an operational utility evaluation of the virtual air traffic control tower capability in fiscal year 2017 to determine whether such a system could be an alternative to current air traffic control facilities for fixed-base and expeditionary operations.

The committee recommends \$9.8 million, the full amount requested, in PE 35114F, for development of air traffic control and landing systems.

### *Deployable air traffic control*

The committee recognizes the important research and development work the Air Force conducts to support air traffic control and landing systems that enable their ability to deploy and operate worldwide. The committee notes that a portion of that work has been focused on developing a Deployable Radar Approach Control system. The committee believes such a system will not only allow Air Force units to be rapidly deployable or recoverable in austere and denied environments, but that it is also a critical component in Department of Defense capabilities for humanitarian assistance and disaster response scenarios. Additionally, as noted elsewhere in this report, the committee understands remote tower systems can provide a cost-effective alternative to traditional fixed-based air traffic control towers.

However, the committee is concerned that current efforts do not adequately address future air traffic control tower requirements, or how capabilities for fixed and deployable air traffic systems might be rationalized. The Air Force operates air traffic control towers at approximately 90 fixed installations and deploys air traffic control services in support of contingency operations and crisis response under the Defense Support to Civil Authority mission. Aging infrastructure and obsolete mobile systems will be a great challenge to the Department. These challenges are compounded by the growing need to be able to rapidly reconstitute airfields that are held at risk by cruise and ballistic missile threats in foreign theaters. Thus, the ability to provide deployable air traffic control has the potential to contribute to deterrence, and supports the ability to convincingly project power.

Recognizing the cost and operational benefits from this kind of research and development, the committee encourages the Air Force to explore opportunities, including through experimentation and concept development, to leverage this technology in order to address the range of challenges facing the Air Force. In addition to understanding the potential savings in construction and manpower, the committee encourages the Air Force to find experimentation or exercise venues to better understand how such technology might contribute to new and innovative warfighting concepts for the future.

### *High efficiency heat exchangers*

High efficiency heat exchangers are becoming increasingly necessary for engines and aircraft, such as the F-35, that generate more heat as more advanced capabilities, and thus increased weight, are added to the platform. The committee is aware that current thermal management systems (TMS) may be limited by traditional manufacturing processes, and that additive manufacturing is crucial to next-generation TMS. Therefore, the committee encourages the Air Force to make investments in additive manufactured TMS.

### *Human-machine teaming*

The budget request contained \$111.6 million in PE 62202F for human effectiveness applied research.

The committee notes that autonomy research is a significant component of the Department of Defense's new third offset strategy, and will likely provide a decisive future warfighting advantage to U.S. forces. The integration of manned and unmanned aerial systems appears prominently in future concepts for next-generation air dominance, but will continue to rely heavily on human operators and their abilities to take on increasingly cognitive loads. The committee has supported increased funding in the past for ongoing research to develop more comprehensive methods to train and rehearse warfighters for a more realistic and seamless human-machine autonomous command and control environment. The committee encourages the Air Force to continue to pursue improved continuous learning strategies for airmen and mission performance by creating, blending, and personalizing Live, Virtual, and Constructive simulation environments.

The committee recommends \$116.6 million, an increase of \$5.0 million, in PE 62202F to expand research in human-machine teaming.

### *Joint Surveillance Target Attack Radar System recapitalization*

The budget request contained \$128.1 million for the Joint Surveillance Target Attack Radar System (JSTARS) recapitalization program.

The committee notes that the fiscal year 2017 budget request projects a delay of at least 1 month in the engineering and manufacturing development (EMD) contract award, from the fourth quarter of fiscal year 2017 to the first quarter of fiscal year 2018, and a 1-year delay in Initial Operational Capability (IOC) from fiscal year 2023 to 2024 in the recapitalization of the JSTARS fleet. The committee believes JSTARS recapitalization offers significant advantages: it will decrease the logistics footprint, reduce sustainment costs, increase operational flexibility, and extend operations into anti-access/area denial environments. The committee recognizes that the overall delay is a consequence of: (1) a delay in the milestone A decision; and (2) analysis conducted by both the Department of the Air Force and the Office of the Secretary of Defense that indicates the EMD schedule will require 4 to 5.5 years.

The committee supports and understands the need for a technology maturation and risk reduction (TMRR) phase as part of the JSTARS recapitalization program, as a means to decrease cost, schedule, and performance risk prior to entering the EMD phase. The committee understands that the Air Force's acquisition strategy includes considering two radar alternatives as part of the TMRR phase. The committee believes that the TMRR phase is the appropriate place to pursue such a strategy. However, the committee also believes that pursuing multiple radar technologies concurrently within the program of record into the follow-on development phase would be inconsistent with the committee's acquisition reform initiatives. The committee expects the Air Force to down select to one radar solution as part of the EMD phase in order to ensure the program does not continue to be delayed. If the Air Force believes that alternative radar capabilities should be pursued for risk mitigation or capability enhancements in the future, the Air Force should pursue such an approach outside of the program of record with the ability to incrementally integrate in the future if necessary.

The committee has continually expressed concern that a protracted acquisition program will result in a multiyear capabilities gap, which will leave combatant commanders without an acceptable level of ground moving target indicators and battle management command and control capability. The committee also believes that the use of existing technology combined with a commercially available jet aircraft can result in a significantly faster acquisition program. The committee notes this approach would be consistent with current acquisition reform policies that direct a more streamlined and incremental approach for major defense acquisition programs. While the committee understands that the Department of the Air Force is conducting a study to determine the E-8's widespread airframe fatigue risk, which will be complete in March 2017, the committee notes that under the most optimistic scenarios, the Department can expect a shortfall of 10 JSTARS aircraft in its fleet of 16 operational aircraft by late fiscal year 2025.

Accordingly, the committee encourages the Secretary of the Air Force to develop a plan, including incentives in the JSTARS recapitalization EMD and procurement contracts, to accelerate the development, procurement, and fielding of JSTARS recapitalization program. In addition, the committee believes the Air Force should program necessary funds in its future budget requests to accelerate the JSTARS recapitalization program in the Future Years Defense Program, and to eliminate the delay in delivering initial operational capability. The committee directs the Secretary of the Air Force to provide a briefing to the House Committee on Armed Services, not later than December 1, 2016. The briefing should include one option that would accelerate the IOC to fiscal year 2022, and a second option that would accelerate the IOC to fiscal year 2023.

The committee recommends \$128.1 million, the full amount requested, for the JSTARS recapitalization program.

*KC-46 aerial refueling tanker aircraft program*

The budget request contained \$261.7 million in PE 65221F for KC-46 tanker development.

The committee continues its long-standing support of the KC-46 tanker aircraft program. The committee notes that the program has had no engineering change proposals and program officials have stated that they do not expect any engineering change proposals for the remainder of the fiscal year. The committee also notes that the program has not incurred any additional or unexpected test support costs. Because the program continues to demonstrate stable requirements and has had no requested engineering change proposals or test support cost growth, the Government Accountability Office identified \$140.0 million of the remaining \$170.0 million set aside in fiscal year 2016 for unknown risks as excess funds that could be used to offset fiscal year 2017 risk mitigation.

Therefore, the committee recommends \$121.7 million, a decrease of \$140.0 million, in PE 65221F for KC-46 tanker development.

#### *MQ-9 automatic takeoff and landing capability*

The budget request contained \$151.4 million in PE 25219F for development of MQ-9 capabilities, but contained no funding for development of the MQ-9 automatic takeoff and landing capability (ATLC).

MQ-9 ATLC is a software-based autopilot system for takeoff and landing operations for MQ-9 aircraft. The committee understands that the system will allow takeoffs and landings at full operational limits, and provide auto-abort and divert capabilities not currently resident in the MQ-9. The committee further understands that initial MQ-9 ATLC development efforts began in 2011 and ran through 2013 with a total of 146 test landings, but that due to higher priorities, no additional testing has occurred since then. The committee notes that the Department of the Air Force currently plans to restart development of the MQ-9 ATLC in fiscal year 2018, but understands that acceleration of this effort will facilitate the transition away from line-of-sight operations for takeoffs and landings, improve operational flexibility by providing ability to land at divert fields, prevent the loss of aircraft due to loss of the command and control link, and increase takeoff and landing operational capability in conditions of poor visibility.

Therefore, the committee recommends an increase of \$35.0 million in PE 25219F for development of the MQ-9 ATLC.

Additionally, the committee notes some Department of Defense organizations use contractor support for unmanned aerial system (UAS) takeoff and landing operations when forward deployed, and believes that the Department of the Air Force should consider contractor support for its MQ-9 takeoff and landing operations to mitigate the demand on Department of the Air Force personnel assigned to the UAS career field. Consequently, the committee directs the Secretary of the Air Force to provide a briefing to the House Committee on Armed Services and the House Permanent Select Committee on Intelligence, not later than November 1, 2016, on contractor support to UAS takeoff and landing operations.

### *MQ-9 unmanned aircraft vehicle tactical datalink integration*

The budget request contained \$151.4 million in PE 25219F for the research and development of the MQ-9 unmanned aircraft vehicle, but contained no funding to develop and integrate a tactical datalink capability onto the platform.

The committee notes that the MQ-9 aircraft lacks the means to establish and maintain direct tactical datalink (TDL) communications with command and control, tactical agencies, and other TDL users. The committee understands that TDLs are critical capabilities used to share aircraft position, targeting data, sensor points of interest, cursor-on-target data, and target-track information derived from various intelligence sources via an airborne network of manned and unmanned aircraft. The lack of TDL single-point reception and transmission capability on board an aircraft can delay prosecution of the kill chain, impact supported commanders' time-sensitive decision-making processes, and pose an unnecessary safety issue with regard to aircraft position and airspace deconfliction. Current MQ-9 TDL communication and information transfers are not routed directly through the existing airborne TDL network, but instead are routed through multiple ground-based servers outside of the remotely piloted aircraft architecture. This method of TDL data routing causes significant delays of critical information, such as aircraft position and targeting data. An aircraft TDL radio is needed by MQ-9 operators that is compatible with all current datalink architectures in both domestic and combat areas of responsibility. The TDL radio and system should include provisions for consistent, reliable, timely, and unrestricted TDL communications, and have open architecture to allow for growth and advances in the TDL technology.

Therefore, the committee recommends an increase of \$14.0 million in PE 25219F for the development, non-recurring engineering, and integration of a tactical datalink capability onto the MQ-9 platform. This funding increase directly supports a capability requirement validated in the MQ-9 capability development document, and directly supports a "critical requirement" identified as an MQ-9 capability shortfall by the Air National Guard.

### *Open architecture Distributed Common Ground System*

The committee is aware that the Air Force has been pursuing an effort to modernize its version of the Distributed Common Ground System (DCGS) by implementing an open architecture version. The committee is generally supportive of increasing uses of open architecture approaches for system development, as well as of this effort specifically. The committee believes that open architecture has the potential to increase flexibility and agility for both development and deployment of DCGS capabilities, as well as potentially faster development and integration of applications.

However, the committee is concerned that the current program is not well organized to accept these open architecture modifications. The 2015 Annual Report of the Director of Operational Test and Evaluation (DOT&E) found that the current version of the program lacks current requirements and architecture documents, a

rigorous and comprehensive software problem tracking and reporting procedure, and an accurate description of the architecture and interfaces for the Test and Evaluation Master Plan (TEMP). Without remediating these problems, the committee is concerned that the program will be unable to fully move to an open architecture baseline. Additionally, for the open architecture development effort, the committee believes that there is insufficient documentation in specific program milestones, and that it remains unclear how the Air Force will effectively leverage an open architecture without additional changes in contracting strategy for applications running on the new architecture.

Therefore, the committee directs the Secretary of the Air Force to provide a briefing to the House Committee on Armed Services and the House Permanent Select Committee on Intelligence by January 9, 2017, on the roadmap for development and fielding of the open architecture version of the Distributed Common Ground System for the Air Force. The roadmap should include:

(1) A plan for achieving an open architecture, including identification of key milestones and decision points;

(2) A timeline for addressing the recommendations of the 2015 DOT&E Annual Report, including the updating of requirements and architecture documents, a process for documenting and redressing software and cybersecurity problems, and an update of the TEMP; and

(3) Recommendations for updating the acquisition strategy and contracting mechanisms for open architecture components of the updated DCGS system.

### *Precision metrology tools*

The budget request contained \$126.2 million in PE 62102F for materials research and development.

The committee recognizes that metrology, or the development of precise measurement tools, is an important aspect of materials research. As the ability to manipulate materials at the subatomic scale, and to generate new and novel materials from computational design, continues to advance, it will also require further development of precision measuring tools. The committee encourages the Air Force to explore new and novel methods to develop and provision for these tools, including through public-private partnerships to develop, field, and maintain cutting-edge metrology systems.

Therefore, the committee recommends \$131.2 million, an increase of \$5.0 million, in PE 62102F to support the development of advanced, precision metrology tools to support enhanced materials development work of the Air Force and its partner organizations.

### *Reusable hypersonic vehicle structures development*

The budget request contained \$122.8 million in PE 62201F for aerospace vehicle technologies.

The committee understands that hypersonic vehicles are a significant area of investment for both the Air Force and the Defense Advanced Research Projects Agency (DARPA), and have the potential to provide game-changing capabilities for the Department of Defense. The committee is aware that the Department's third offset strategy includes additional investments that will support accelerating development, testing, and fielding of hypersonic capabilities. The committee believes that such investments are critical to posturing the Department for the future warfighting environment. However, the committee is concerned that the emphasis on strike technologies has resulted in little investment to cover the research needs for reusable hypersonic vehicles. The committee is aware that past efforts, such as the Hypersonic Test Vehicle-2 flight tests, illustrate the need to better characterize the aerothermal effects on flight bodies. The committee believes that if the Department intends to develop reusable hypersonic platforms, there is a need to invest in the near term to do the characterization and materials research needed to support those future missions.

The committee recommends \$127.8 million, an increase of \$5.0 million, in PE 62201F to support the development of reusable hypersonic vehicle structures.

#### *Silicon carbide for aerospace power applications*

The budget request contained \$94.6 million in PE 63216F for aerospace propulsion and power.

The committee notes that recent research in aerospace power electronics has concentrated on fundamental materials, devices, and power-handling capability. The committee believes that the Air Force should look for opportunities to accelerate the development of actual components to go into aircraft electrical systems, especially very high-current silicon carbide power modules. The committee recognizes that the increasing sophistication and energy requirements for new systems, like avionics, computing, sensors, and even high-energy lasers, will place increasing demands on the power architectures available to the constrained size and weight of aircraft. The committee also believes that such advances will have beneficial effects when applied to legacy, as well as future generation, air platforms.

The committee recommends \$99.6 million, an increase of \$5.0 million, in PE 63216F to support the development of application-specific power circuit development using silicon carbide modules.

#### *T-X program*

The budget request contained \$12.4 million in PE 65223F for advanced pilot training, also known as the T-X program.

The Department of the Air Force's current advanced jet trainer aircraft, the T-38C, initially entered the Air Force inventory in 1961. The average age of the fleet is 50 years old, with an average of over 16,000 flight hours on each aircraft. Although the T-38C fleet has undergone costly structural life extensions and avionics upgrades, the committee believes that the aircraft is unable to address the

training gaps that have grown with the introduction of fourth and fifth generation fighter aircraft. The committee also believes that the T-X aircraft and its associated ground-based training system, collectively known as the advanced pilot training family of systems (APT FoS), will affordably address training gaps that have been identified by the Air Education and Training Command, ensuring that student pilots have the necessary skills to fly and employ current and future advanced combat aircraft. The committee notes that initial operating capability for the APT FoS is planned for 2024, and understands that full operational capability is scheduled for 2029.

The committee also understands that the costs of sustaining the T-38C fleet are growing even as aircraft availability is decreasing, and that the T-38 was originally intended to undergo replacement in the mid-1990s. Therefore, the committee believes that any delay to the APT FoS program will place the Department of the Air Force combat readiness at risk, and that maintaining or accelerating the current APT FoS program schedule is required to ensure safe and effective training of Department of the Air Force combat pilots.

Accordingly, the committee recommends \$12.4 million, the full amount requested, in PE 64233F to continue the T-X program. The committee also directs the Secretary of the Air Force to provide a briefing to the House Committee on Armed Services not later than November 1, 2016, on plans to fairly evaluate the Advanced Pilot Training Family of Systems design solutions that are based off of newly designed aircraft and existing aircraft, and potential options to accelerate the T-X program.

#### *Technology transfer*

The committee supports the Department of Defense's efforts to facilitate the transfer of laboratory-generated technology to industry partners for military and commercial use. Increased resourcing by Congress to transfer technology programs executed by the Air Force Research Laboratory has progressed, resulting in speeding up the flow of intellectual property from the laboratory and the launch of new companies based on laboratory technologies. This includes the formation of high growth potential technology startups with the promise of making gains for both the military and commercial sectors. The committee encourages the Air Force to continue to facilitate the timely transfer of intellectual property. Facilitating such transfers allows for significant advances in critical mission areas and provides the necessary resources in future budget requests for a robust program.

#### *Wide-area motion imagery*

The budget request contained \$3.8 million in PE 35206F for development of airborne reconnaissance systems, but contained no funding for development of wide-area motion imagery (WAMI) beyond line-of sight (BLOS) capabilities. The committee notes that persistent day and night WAMI capability is considered by operational commanders to be a critical intelligence, surveillance, and

reconnaissance program for combat units, and has contributed to saving U.S and allied soldiers' lives.

The committee understands that a recently validated joint urgent operational need (JUON) requires the development of WAMI BLOS capabilities.

Accordingly, the committee recommends \$18.8 million in PE 35206F, an increase of \$15.0 million, for development of WAMI BLOS capabilities.

## RESEARCH, DEVELOPMENT, TEST, AND EVALUATION, DEFENSE-WIDE

### Items of Special Interest

#### *Academia and university affiliated research center support for chemical and biological defense*

The committee understands the dynamic and ever-expanding chemical, biological, radiological, and nuclear (CBRN) threats, and is aware of the defensive capabilities that the Department of Defense Chemical and Biological Defense program (CBDP) develops to stay ahead of the evolving threat. The broad portfolio of the CBDP includes support for early warning through the development of biosurveillance and advanced diagnostics, avoiding, preventing, and preparing for surprise through technology development. These technologies address non-traditional agents and synthetic biology, and integrated, layered defense through investing in medical countermeasures, protective equipment, detectors and sensors, and hazard mitigation. The committee supports ongoing efforts of the Department of Defense to ensure that currently available and cutting edge technologies are harnessed to provide improved capabilities in the future.

The committee also understands the critical role of the Department of Defense in the larger U.S. Government efforts to addressing CBRN threats, as shown by the Department of Defense's role in the recent Ebola crisis. The committee encourages prioritizing and aligning investments in CBRN countermeasures, including medical ones, among all of the Federal stakeholders to ensure that effective countermeasures are developed to meet both military and civilian needs, and to prevent potential duplication of efforts. The committee encourages the Department of Defense to leverage a broad set of partners to meet these needs, including academia and university affiliated research centers (UARC). The committee supports utilizing the engineering and technology capabilities provided and established within academia and UARCs, and recommends that the Department of Defense increase efforts to ensure that the capabilities at these organizations are coordinated with the broad CBRN priorities within the Department of Defense, and with the larger civilian priorities through the Public Health Emergency Medical Countermeasures Enterprise. The committee also recommends that the Department of Defense increase coordination of the Advanced Development and Manufacturing facility with the capabilities available in academia and at UARCs to ensure efficient and rapid development of medical countermeasures to the evolving CBRN threats.

### *Additive manufacturing*

The committee recognizes the important developments occurring in the area of additive manufacturing, also known as 3D printing. Like any new technology discipline, the Department of Defense should stay actively involved in this community to understand and develop a better appreciation for both the opportunities it could provide, as well as the threats it could pose in the hands of a resourceful adversary. As the technology becomes more mature, and the cost for such equipment continues to drop, the committee expects the Department to find new and novel ways to utilize this technology for military uses. The committee also encourages the Department to leverage existing organizations, such as the National Additive Manufacturing Innovation Institute, as well as expand that community to include other universities, non-profit research institutes, and other industry partners to expand the state of the art for the use of additive manufacturing technology.

### *Alternative solutions to multidrug resistant bacteria*

The rise in infections caused by multidrug resistant (MDR) bacteria represents a serious threat to public health and poses a great challenge to the care of wounded military personnel. These infections prolong hospitalization, and in some, can lead to increased limb loss, sepsis, and death. Since some MDR bacteria are becoming increasingly resistant to antibiotics, researchers are working to develop alternative solutions, including engineered bacteriophage (phage) that can be standardized, manufactured, and administered similar to antibiotics.

The committee is aware of the Department of Defense's on-going efforts to develop countermeasures to MDR bacteria that leverage the whole-of-government anti-microbial resistant investments. The committee encourages the Department to continue its efforts to work with key stakeholders to develop and deploy alternative treatments, particularly phage therapy, against MDR bacteria.

### *Better Gender Reporting in Grantmaking*

The committee is aware recent research illustrates women continue to face challenges in educational and career advancement in science, technology, mathematics and engineering (STEM) fields. In a December 2015 report entitled "Women in STEM Research" the United States Government Accountability Office (GAO) determined, through analysis of available but limited data, there were discrepancies in the number of grants awarded to women and men at the Department of Defense within certain components. The committee notes this differentiation in success rates does not mean the Department is using discriminatory practices when awarding grants. The committee further acknowledges GAO reported the lack of data available to analyze limited their ability to gauge the success rates of men and women.

The committee believes the lack of complete award data containing demographic information at certain Department agencies and components impacts the ability to fully evaluate and understand if the most qualified individuals are being funded, regardless of demographics. Therefore, the committee directs the Under Secretary of Defense for Acquisition, Technology, and Logistics to provide a briefing to the House Committee on Armed Services not later than January 1, 2017, on improving data collection efforts within the Department in order to provide complete and analyzable records for grant awards.

#### *Broad-spectrum antiviral drug modeling*

The committee understands the importance of developing efficient and effective countermeasures against a growing list of lethal pathogens, many of which have different variants. The committee is supportive of efforts to develop broad-spectrum antiviral drugs that can be used against many different pathogen threats. The committee further believes that rapid development of these drugs can be improved by using modeling software of the drug/virus interaction to perform high throughput screening of potential candidate drugs, leading to decreased development time. After candidate drugs have been identified, it is also important to establish partnerships with biosafety level 4 facilities to allow testing of the efficacy of these drugs. The committee understands that partnerships with not-for-profit 501C3 applied research facilities can provide unique capabilities and expertise throughout the drug development process.

Therefore, the committee directs the Secretary of Defense to provide a briefing to the House Committee on Armed Services by September 30, 2016, on the current and planned use of drug/virus interaction modeling software for high throughput screening of potential small molecule drugs. The briefing should also include a list of the current and potential partnerships with not-for-profit 501C3 applied research facilities, and the potential for partnerships between these 501C3 applied research facilities and the Department of Defense Advanced Development and Manufacturing facility.

#### *Cellular and broadband signals exploitation*

The committee is aware of the United States Special Operations Command's (SOCOM) ongoing efforts to utilize commercial technology to conduct cellular and broadband survey, active interrogation, and directional finding capabilities from unmanned aerial systems. Such capabilities have been highly successful in prosecuting operations to find, fix, and finish enemy combatants and other high-value targets on the battlefield. The committee believes there will be a continuing need as such missions are prosecuted in the future. The committee encourages SOCOM to expedite the integration, testing, and limited fielding of such cellular and broadband signature exploitation capabilities for future missions.

#### *Comptroller General review of commercial practices for trust in microelectronics*

The committee remains concerned with the Department of Defense's ability to ensure access to cutting-edge microelectronics with the requisite level of verifiable trust incorporated. The committee recognizes that the Department's ability to provide superior capabilities to the warfighter is dependent, in part, on its ability to incorporate rapidly evolving, leading-edge microelectronic devices into its defense systems, while also balancing national security concerns. Currently, the Department processes for ensuring trust rely on assessing the integrity of the people and processes used to design, generate, manufacture, and distribute national security critical microelectronics. For over a decade, the Department has relied on a single domestic source for trusted leading edge microelectronics.

However, due to market trends, supply chain globalization, and manufacturing costs, the Department's future access to U.S.-based microelectronics sources is uncertain. As such, the Department is considering various potential approaches that would allow it to access commercial non-trusted sources in the global microelectronics marketplace, while still ensuring trust. Given the Department's reliance on a single source for trusted leading-edge microelectronics, and the dwindling number of domestic microelectronics manufacturers on which the Department can rely, the committee believes that there should be a better understanding of what trust capabilities exist and are in use by the commercial marketplace.

Therefore, the committee directs the Comptroller General of the United States to provide a report to the House Committee on Armed Services by March 30, 2017, that evaluates how selected commercial microelectronics businesses ensure trust. As part of this evaluation, the Comptroller General should address the following:

- (1) How do selected commercial companies incorporate trust into their leading-edge microelectronics, including techniques to protect intellectual property and prevent malicious content in devices?
- (2) To what extent could the Department of Defense leverage these practices, and what are the challenges associated with implementing these practices for defense systems?

### *Counter-unmanned aerial systems roadmap*

The committee believes that the proliferation of unmanned aerial systems (UAS), particularly small hobby systems that can be bought commercially, pose a significant challenge to the Department of Defense's capabilities to detect, track, and neutralize such threats. The committee is aware that the Army has conducted a technology red team to understand how such systems might be used against U.S. forces, focusing on potential adversarial employment and methods for avoiding detection. The committee is also aware that there has been some preliminary development of counter-UAS capabilities, and that organizations, from the Combating Terrorism Technology Support Office and the Joint Improvised-Threat Defeat Organization, are investigating technology solutions.

However, the committee is increasingly concerned that such efforts are not adequately coordinated, and have focused on near-term capabilities without taking a long-term, integrated view to developing countermeasures. The committee is also concerned that the current focus does not provide an adequate variety of tools and technologies available at the tactical unit level to detect, track, and neutralize small UAS threats. Therefore, the committee directs the Secretary of Defense to develop a technology roadmap for addressing gaps to counter the potential threats from terrorist or state actor uses of small UAS technology, with an emphasis on technology to support tactical level units, and fixed, high-value defense assets. The committee further directs the Secretary to provide a briefing to the House Committee on Armed Services by June 1, 2017, on this roadmap.

*Department of Defense medical countermeasures Advanced Development and Manufacturing facility roadmap*

The committee understands the importance of maintaining a broad portfolio of medical countermeasures, including therapeutic and pre-treatment efforts, to address high priority threats to the warfighter. The committee also understands the challenges faced by the Department of Defense medical countermeasure development due to the low quantities procured and other acquisition challenges. The committee is aware of and has been monitoring the Department of Defense Advanced Development and Manufacturing (ADM) capability, which includes a dedicated facility to support the development, licensure, and manufacturing of medical countermeasures. This facility is planned to achieve full operational capability by the end of fiscal year 2016. The committee is also aware of complementary capabilities provided by the Department of Health and Human Services Biomedical Advanced Research and Development Authority (BARDA) Centers for Innovation in Advanced Development and Manufacturing.

The National Defense Authorization Act for Fiscal Year 2016 (Public Law 114-92) required the Secretary of Defense to submit a report on the Department of Defense ADM that included cost-benefit analysis of the manufacturing and construction of the facility. The committee continues to be concerned about the potential for long-term operations and maintenance sustainment costs of the Department of Defense ADM facility, and about the possibility for duplication of efforts between the Department of Defense ADM facility and the Department of Health and Human Services ADM facilities. The committee directs the Secretary of Defense to develop and submit a report to the congressional defense committees by December 1, 2016, on the sustainment of the Department of Defense ADM facility. The report should include an estimate of sustainment costs and a roadmap for planned work at the Department of Defense ADM facility over the next 10 years, as well as details on the planned business model for ensuring continued sustainment of the facility. The roadmap should also address partnerships and use of complementary capabilities between the Department of Defense ADM and the

Department of Health and Human Services BARDA Centers for Innovation in Advanced Development and Manufacturing.

### *Desalination technology*

The committee is aware the Department of Defense has made advances in desalination technology over the last 15 years in support of large numbers of deployed forces in the Middle East. The committee recognizes that the inability to access clean water is a factor in destabilization around the world. The committee believes sharing desalination technologies with appropriate agencies, like the Department of State, to ensure advances are leveraged in development efforts is an important tool for stability and conflict avoidance. Therefore, the committee directs the Assistant Secretary of Defense for Research and Engineering to provide a briefing to the House Committee on Armed Services not later than March 1, 2017, on recent advances in desalination technologies, and how those advances have been shared with other U.S. Government agencies.

### *Explosive Ordnance Disposal equipment technology upgrades*

The budget request contained \$73.0 million in PE 63122D8Z for Combating Terrorism Technology Support (CTTS). Of this amount, \$5.7 million was requested for Improvised Device Defeat and Explosive Countermeasures.

The committee notes that conventional Explosive Ordnance Disposal (EOD) units across the military services require upgraded equipment and technology enhancements, particularly for routine inspection and search activities. The committee believes that conventional Joint Service EOD units would benefit from rapid acquisition of EOD equipment, which have high-definition resolution and encrypted signals, among other upgraded capabilities. The committee understands that the Department of Defense cancelled the Explosive Ordnance Disposal/Low Intensity Conflict program element which formerly developed and delivered Joint Service EOD advanced capabilities. The committee understands the CTTS program will absorb this mission area within the Improvised Defeat Device and Explosive Countermeasures subgroup activity.

The committee recommends \$85.0 million, an increase of \$12.0 million, in PE 63122D8Z for EOD equipment upgrades. Further, the committee encourages the Director of the CTTS program to prioritize the increased funding toward delivering advanced capabilities for conventional Joint-Service EOD units.

### *Foundational Intelligence Modernization*

The foundational intelligence analytic mission is critical to enabling combatant command situational awareness and mission planning activities. The committee understands the Defense Intelligence Agency (DIA) has initiated the Foundational Intelligence Modernization Program (FIM) to revolutionize the tools required for this mission. FIM consists of highly automated capabilities and

infrastructure including database transformation, system analysis features, and other advanced products. The committee supports the effort to achieve more effective analytic capabilities required to process, exploit, and disseminate intelligence information, and encourages DIA to utilize commercial-off-the-shelf products, when appropriate, to fulfill the requirement.

### *Future Vertical Lift*

The committee recognizes that incremental improvements or upgrades to current Department of Defense rotorcraft will not fully meet future joint service operational requirements. With the exception of the V-22 Osprey, all U.S. rotorcraft deployed in the Republic of Iraq and the Islamic Republic of Afghanistan were designed during or before the Vietnam War. The committee continues to support the development of future vertical lift aircraft and encourages the Department to expand the prototyping program. Future Vertical Lift (FVL) is a joint program, with support from the Army, Navy, Air Force, Marine Corps, Special Operations Command, and Coast Guard.

The committee understands that a key aspect of the FVL program is the Army's Joint Multi-Role (JMR) Technology Demonstrator. The JMR program includes related research on next-generation rotors, drivetrains, engines, sensors, and survivability that all feed into the FVL program. The committee notes that fiscal year 2017 is a critical year for technology development, with first flights of two demonstrator aircraft. Furthermore, wind-tunnel testing and other key milestones will reduce risk for the program of record and inform the FVL analysis of alternatives, which is expected to occur in the second half of 2017. However, the committee is concerned, due to the current resource constrained environment, that current funding levels are inadequate.

Therefore, the committee directs the Secretary of the Army to provide a briefing to the House Committee on Armed Services by January 31, 2017, on the status of both the prototype air vehicle demonstrations and supporting initiatives. The briefing should include potential options and required resources for accelerating the FVL program.

### *Handheld explosive and chemical detectors*

The committee understands the importance of U.S. military personnel having sufficient handheld explosive and chemical weapons capabilities available to detect both conventional and homemade explosive and chemical threats. Traditional detection methods are less effective for homemade explosives (HMEs) and munitions grade chemical warfare agents (CWAs) containing impurities. Providing detectors to the U.S. military that can meet the growing threat of HMEs and CWAs is important to reducing the risk of U.S. soldier and civilian casualties in areas such as the Republic of Iraq and the Islamic Republic of Afghanistan, as well as the risk of terrorist attacks on the United States.

The committee is aware of new raman laser technologies that may provide improved detection capabilities, which could be used to detect both HMEs and CWAs. The committee supports evaluation of this technology to meet critical detection requirements.

#### *High-speed aerothermal effects*

The committee recognizes that the development of hypersonic technologies will be a significant contributing factor to future military technological superiority. The development of hypersonic technologies by our adversaries continues at a rapid pace and represents a significant emerging threat. As noted elsewhere in this report, the committee believes that the Department of Defense should be examining reusable hypersonic flight structures, in addition to the strike systems that are currently being pursued. The committee is aware that past efforts, such as the Hypersonic Test Vehicle-2 flight tests, illustrate the need to better characterize the aerothermal effects on flight bodies, and fiscal constraints cannot support learning such lessons through expensive trial and error. The committee encourages the Department to examine opportunities to better conduct aerothermal effects testing, and development for supporting thermal protection systems. Any efforts that the Department pursues should look to address manufacturability, risk reduction and maturation, and coordination with interagency partners and industry.

#### *Human systems integration activities*

The committee is concerned that military service personnel are required to use systems that are inadequate to their physical, behavioral, and cognitive needs. The committee recognizes that senior service leadership encourages the use of human systems integration research and development methods in response to the National Defense Authorization Act for Fiscal Year 2008 (Public Law 110-181). Despite this, human performance research is not routinely transitioning to defense acquisition programs. Also, with no specifications required for human systems integration in acquisition programs, Requests for Proposals seldom include evaluation criteria for it, and it is ignored by program managers. Nevertheless, the committee notes that individual and team performance is the foundation of an effective military force. Ensuring that systems account for human performance abilities can make acquisitions more cost-effective, strengthen force protection, reduce potential for re-engineering, and cut time and costs of training and re-training, among many other benefits. Therefore, the committee directs the Under Secretary of Defense for Acquisition, Technology, and Logistics to examine Department of Defense policies related to human systems integration within defense acquisitions and to provide a briefing to the House Armed Services Committee by February 15, 2017, on the findings and recommendations necessary to improve inclusion of human system integration research in acquisition programs.

#### *Hydrocephalus research*

The committee is concerned that some of the estimated 294,000 service members who have sustained a traumatic brain injury in Operation Enduring Freedom and Iraqi Freedom are at higher risk for developing hydrocephalus in the future. The committee recognizes that hydrocephalus, an increased accumulation of fluid in the brain, often has a delayed onset and can easily be misdiagnosed as dementia or other aging related diseases. Given that there is currently no cure for hydrocephalus, and current treatment options are limited and have high failure rates, the committee encourages the Department of Defense to increase its investments in hydrocephalus research.

#### *Hyperspectral imaging technology*

The committee recognizes the importance of stand-off hyperspectral imaging (HSI) technologies for the detection of improvised explosive devices (IEDs) and explosive constituent chemicals and other materials used in the manufacture of IEDs such as nitrates, nitrites, phosphates, and ammonia. Therefore, the committee encourages development of new and emerging HSI technologies — these technologies include those that utilize coherent spectral imaging technology to provide real-time detection hardware and software for situational awareness, and provide a complete automated target detection capability to enable end users tasked with vital threat identification capability for time-sensitive responses. The committee further encourages development of these capabilities with manufacturers that have demonstrated airborne sensor hardware and software development.

#### *Immersive operator control stations*

The committee recognizes the importance and usefulness of current and next-generation immersive operator control stations (IOCS) technologies. These technologies significantly decrease the burden on operators for unmanned systems and reduce training time. IOCS technologies also allow for decreased operation and maintenance costs while maximizing mission effectiveness and safety. Therefore, the committee supports advancement of next-generation IOCS that includes scalable architecture and designs to better meet the current and future needs of the Air Force, Navy, National Aeronautics and Space Administration, and other agencies.

#### *Incentives for increasing private sector medical countermeasures development*

The committee is aware of the importance of medical countermeasures, including prophylactics, pre-treatments, diagnostics, and therapeutics, to protect the warfighter from chemical, biological, radiological, and nuclear threats. The committee is also aware of the difficulty in engaging industry partners to develop medical countermeasures due to the low profitability, lengthy process, and costs for doing this contract work for the Government. The committee recognizes that

strategies and incentives should be developed to stimulate private sector medical countermeasures development. Therefore, the committee directs the Secretary of Defense to provide a briefing to the House Committee on Armed Services by February 1, 2017, on potential incentives that would improve private sector, academia, non-profit, and other organization participation in medical countermeasures development. The briefing should identify any incentives that would require additional congressional authorities.

#### *Interagency unmanned aerial system research*

The committee notes that important progress has been made toward integrating unmanned aircraft systems (UAS) into the National Airspace System. Focus areas for the committee continue to be the development of sense and avoid systems, airworthiness certification, and safe integration of UAS into the National Airspace System. The committee recognizes that resolution of these issues continues to require a collaborative effort between the Department of Defense, the Federal Aviation Administration (FAA), and the National Aeronautics and Space Administration (NASA). Provisions in previous National Defense Authorization Acts have encouraged collaboration among those three organizations, including section 1052 of the National Defense Authorization Act for Fiscal Year 2013 (Public Law 112-239), and section 1087 of the National Defense Authorization Act for Fiscal Year 2014 (Public Law 113-66). Through this collaboration, the committee believes that the Department of Defense can benefit from sharing human performance data and advanced sensor technology for applications in a civil environment, including next-generation integration, development of minimally manned large cargo aircraft systems, optionally piloted systems, and highly integrated UAS sensor systems and control stations. The committee understands that the Department of Defense and NASA will develop airworthiness certification processes for these advanced capabilities, which the committee believes will facilitate FAA development of civil standards, and increase the number of commercial products available to the Department of Defense, all while improving the competitiveness of the U.S. aviation industrial base.

Accordingly, the committee encourages the Department of Defense, the FAA, and NASA to continue collaborative efforts to solve UAS research issues.

#### *Intestinal mucosal barrier research to address chemical and biological threats*

The committee is aware of the breakdown complications of the intestinal mucosal barrier associated with nuclear, chemical, and biological threats. The intestinal mucosal barrier is believed to play a key role in severe medical conditions that occur following trauma, burns, and chemical and biological exposures by containing digestive enzymes within the intestine. The breakdown of the intestinal mucosal barrier may influence a range of serious health conditions after a trauma when the digestive enzymes leak through the intestinal mucosal barrier, initiating shock and organ failure. The committee encourages the Department of Defense

Chemical and Biological Defense program to evaluate establishing research activities regarding the intestinal mucosal barrier to investigate alternative therapeutic treatments to respond to a broad spectrum of chemical and biological agent exposure.

### *Laboratory Quality Enhancement*

The committee is aware that the Laboratory Quality Improvement Program, later renamed the Laboratory Quality Enhancement Program (LQEP), was chartered in 1994 to propose initiatives for improving Department of Defense laboratories. Over time, the primary focus on this effort has been on the personnel panel, which has proposed many valuable ideas for sustaining and improving the laboratory workforce.

However, the committee believes that the LQEP has not been utilized to its full potential, in part because of the organization mismatch in its reporting chain, as well as the sole focus on personnel issues, and the lack of direct participation from the laboratory directors. Elsewhere in this Act, the committee includes a provision that would codify and expand the roles and responsibilities of the LQEP to ensure its sustained attention on these issues. The committee believes codification of LQEP will provide an instrument to support both Department needs for ideas to sustain and grow the technical community in the Department of Defense, as well as provide a vital link and demand signal within the congressional oversight committees, which is necessary to carry out any recommendations requiring statutory modification.

Furthermore, the committee believes that by including representation from the laboratory directors and the operational community in these panels, LQEP can be an even more effective tool for recommending changes to Department processes and regulations. For example, by including the installations and facilities management community into the facilities panel, participants can better navigate existing processes, while also identifying areas or issues where existing processes are insufficient to the needs of the laboratory community.

### *Low Energy Nuclear Reactions (LENR) Briefing*

The committee is aware of recent positive developments in developing low-energy nuclear reactions (LENR), which produce ultra-clean, low-cost renewable energy that have strong national security implications. For example, according to the Defense Intelligence Agency (DIA), if LENR works it will be a "disruptive technology that could revolutionize energy production and storage." The committee is also aware of the Defense Advanced Research Project Agency's (DARPA) findings that other countries including China and India are moving forward with LENR programs of their own and that Japan has actually created its own investment fund to promote such technology. DIA has also assessed that Japan and Italy are leaders in the field and that Russia, China, Israel, and India are now devoting significant resources to LENR development. To better understand the national security

implications of these developments, the committee directs the Secretary of Defense to provide a briefing on the military utility of recent U.S. industrial base LENR advancements to the House Committee on Armed Services by September 22, 2016. This briefing should examine the current state of research in the United States, how that compares to work being done internationally, and an assessment of the type of military applications where this technology could potentially be useful.

#### *Minority-serving institutions and minority-owned businesses*

The committee recognizes the near-term, mid-term, and long-term impact that science and technology collaboration has on our warfighting capabilities and overall defense posture. Industry, academia, other non-governmental organizations, and Defense Department research, development, and prototyping entities, such as the Defense Advanced Research Projects Agency, all play a critical role in advancing national security. The committee is aware of the Department's efforts to harness the talent and innovation taking place in minority-owned businesses, veteran-owned businesses, small businesses, and minority-serving institutions such as Historically Black Colleges and Universities, and Hispanic-Serving Institutions. The committee encourages the Department to continue to collaborate with minority-serving institutions and minority-owned businesses. Additionally, the committee urges the Department to increase opportunities for partnerships in science, technology, engineering, and mathematics education programs, research and development efforts, and other areas across the Department's science and technology enterprise.

#### *Monoclonal antibody therapeutics*

The committee is aware of the recent work by the Department of Defense Chemical and Biological Defense Program in developing monoclonal antibody therapeutic drugs to treat the Zaire strain of the Ebola virus. The monoclonal antibody development by the Department of Defense was incorporated into the ZMapp therapeutic for Ebola that was used experimentally to treat some people with Ebola virus disease during the 2014 West African Ebola outbreak, and is currently undergoing further development. The committee encourages the Department of Defense to continue research into monoclonal antibody therapies for use as medical countermeasure to other biological agents, including diseases such as smallpox or the Sudan strain of Ebola.

#### *MQ-9 anti-icing capability*

The committee notes that an anti-icing capability for the MQ-9 unmanned aerial system has been pursued by the Department of Defense, and specifically U.S. Air Force Air Combat Command, U.S. Special Operations Command, and U.S. Air Force Special Operations Command (AFSOC). However, the committee is concerned

that a lack of capability prioritization and technical issues have delayed initial fielding times.

The committee notes that a recent Laboratory Innovation Crowdsourcing (LINC) requirement solicited by the Department's Combating Terrorism Technology Support Office (CTTSO) stated that, "The current MQ-9 was fielded without the exact understanding of how it was affected by icing." The report continued that, "Due to the lack of data, the Air Force imposed conservative flight restrictions in order to reduce the risk to the weapons system ... AFSOC is interested in the development and testing of innovative de-ice technologies that allow the MQ-9 to cruise in light icing and visible moisture." This LINC initiative solicited by CTTSO for outside approaches reinforces the committee's belief that the Department's current approach to satisfying this operational requirement is disjointed and uncoordinated.

Therefore, the committee directs the Secretary of Defense, in coordination with the Commander, U.S. Air Force Air Combat Command and the Commander, U.S. Special Operations Command, to brief the Committee on Armed Services of the U.S. House of Representatives not later than October 1, 2016, on the Department's efforts to field an anti-icing capability for the MQ-9. This briefing shall be in classified form as required.

#### *Nanomaterials in Combat Systems*

The committee is aware that nanomaterials are being incorporated with increasing frequency in many commercial products and processes because of their ability to make materials stronger, lighter, more durable, more reactive, more porous, or more conductive, among other things. The committee is also aware that the Department of Defense has been leveraging that commercial research, as well as investing in other areas with specific defense-related applications. The committee believes that the Department should be pursuing additional opportunities to transition that research into military combat systems. Therefore, the committee directs the Secretary of Defense to brief the House Committee on Armed Services by March 1, 2017, on the potential military applications of nanomaterials in combat systems. The briefing should outline the use of emerging technology with nanomaterials to identify areas where possible enhancements or improvements to equipment used by each of the service branches might be possible.

#### *Non-destructive counterfeit parts detection tools*

The committee is aware that the Department of Defense has made significant progress since 2012 to reduce the risk of counterfeit electronic parts entering into the Department's weapon systems' supply chain. However, the committee recognizes that much work remains to improve the Department's ability to identify and mitigate such risks. Although responsibility for eliminating risk of counterfeit parts belongs to industry suppliers to the Department of Defense at all tiers, the committee encourages the Department to be proactive about identifying,

developing, and validating independent tools that defense suppliers could easily use to rapidly identify counterfeit electronics in the supply chain accurately and at low cost. The committee believes that the Department should evaluate the need to identify or develop best-of-breed, non-destructive counterfeit parts detection tools that it can use, or that could be made available to defense industrial base suppliers, to support the overall mission of ensuring the integrity of electronic components of defense weapon systems.

#### *Prioritization of joint test activities*

The committee recognizes that developmental and operational test and evaluation activities are critical steps in research and development programs. Joint programs can be especially complex, and thus substantially more difficult to manage, with competing demands for resources, personnel, service priority, and the need to coordinate over multiple bureaucracies. The committee is concerned that the Department of Defense does not adequately prioritize research and development projects; unfortunately, there are instances when expensive projects from one military department may receive a low priority for testing time and resources at facilities operated by different military departments.

Therefore, the committee directs the Director of the Test Resource Management Center to provide a briefing to the House Committee on Armed Services by December 1, 2016, on the policies and processes for coordinating test and evaluation resources for joint and multi-service research and development projects. The briefing should include recommendations for improving the Department's ability to make cross-service prioritization decisions related to test and evaluation facilities for joint and multi-service programs.

#### *Program intermediary agreements*

The committee recognizes that Partnership Intermediary Agreements (PIAs), as defined in section 3715 of title 15, United States Code, have been useful tools for the Department of Defense to engage with and leverage small and non-traditional businesses. As the Department continues to expand its efforts to seek out, assess, and engage non-traditional small business vendors in the Department of Defense's development and acquisition efforts, the committee believes that PIAs could be more effectively used as a tool for engaging this community. For example, the committee is aware that a PIA was used by the commander of U.S. Special Operations Command to establish its SOFWERX initiative, which the committee views as a rapid, highly effective, and highly cost-effective way of engaging with the vendor community to meet special operations forces capability needs. The committee encourages the Department to examine new and innovative ways to use PIAs, such as providing technology assessments or design reviews to understand manufacturability, fitness for use, material availability, and other assessments that can reduce development cycle times.

### *Ribonucleic acid technology research*

The committee recognizes that the Department of Defense faces significant challenges with infectious diseases, which hospitalize more service members each year than those wounded in combat. Effective prevention and rapid treatment are key elements in controlling outbreaks of infectious disease. The committee is encouraged by the progress the Department has made to address the treatment for infectious diseases that can benefit our warfighters, as well as affected civilian communities throughout the world, based on techniques utilizing ribonucleic acid that would be delivered directly to the body to produce a desired antigen or specific antibody. The committee encourages the Department to continue its research in this area and to look for further applications of this technology, which could lead to the ability to rapidly and inexpensively produce antigens and antibodies via chemical synthesis.

### *Rotorcraft degraded visual environment*

The committee notes that the Department of Defense Appropriations Act, 2015 (division C of Public Law 113-235) appropriated an increase of \$20.0 million above the budget request for the development or procurement of a degraded visual environment (DVE) system for rotorcraft programs. The committee is aware of the challenges that the military services face in regards to operating rotary winged aircraft in austere environmental conditions, including brown-out landings and marginal weather, while operating in difficult terrain. According to the Army, degraded visual environment conditions contribute to approximately 25 percent of its rotary wing mishaps. The committee notes that the Army's Special Operations Command (SOCOM) has made DVE a top priority, and that the Army is looking at leveraging the work that SOCOM has already performed in order to accelerate this capability across Army rotorcraft programs.

Therefore, the committee directs the Secretary of the Defense to provide a briefing to the House Committee on Armed Services by December 1, 2016, that includes an update on Army, Navy, Marine Corps, and Air Force plans to integrate DVE capabilities into their respective rotorcraft and tilt-rotorcraft programs.

### *Secure cellular communications for senior leaders*

The budget request contained \$14.0 million in PE 33126K for long haul communications, including for the development and fielding of senior leader communications and mobility systems.

The committee is aware that the Defense Information Systems Agency (DISA) is responsible for developing, fielding and sustaining senior leader communications systems for the Department of Defense, the President and other senior leaders throughout the executive branch. This includes the Department's mobility program, which seeks to leverage commercial carrier infrastructure to provide entry points for both classified and unclassified wireless capabilities. The

committee understands that in fiscal year 2017, DISA plans to continue testing and evaluation of mobile device management capabilities, and full deployment of the Device Mobility Classified Capability. The committee is concerned that the current fielding plan is not being fully implemented with the priority such capabilities require. Therefore, the committee directs the Director of DISA to provide a briefing to the House Committee on Armed Service and the House Permanent Select Committee on Intelligence on the status of this program by July 1, 2016. This update should include the current schedule for development, identification of the requirement for the needed number of devices, and the fielding schedule to users for the next 24 months. This briefing should also address any funding challenges, or policy impediments to fielding that satisfies the full articulated requirement.

The committee recommends \$19.0 million, an increase of \$5.0 million, in PE 33126K to support the development and implementation of a top secret secure voice cellular solution for senior government leaders.

#### *Small turbine engines for missile programs*

The committee understands the critical importance of small turbine engines in missile programs, and believes that continued innovation in this technology will help the United States to better maintain its technological edge in the area of precision guided missile systems. In order to encourage innovation, the committee supports robust competition in this area. While foreign competition does exist, the committee believes that the United States needs to retain a technology leadership role in this strategic technology sector. The committee notes that small turbine engines are in many ways more challenging than large turbine engines because of high rotational speeds, limited volume for combustion, larger leakage paths relative to the size of the turbomachinery, storage requirements, and on-wing starting requirements. Therefore, the committee encourages the Secretary of Defense to explore ways to create additional competition among domestic suppliers in the area of small turbine engines, and in particular small turbine engines for missile programs.

#### *Social media analysis cell*

The budget request contained \$148.2 million in PE 63648D8Z for joint concept technology demonstrations (JCTD).

The committee is aware that the mission of the Joint Concept Technology Demonstration program is to support the identification, development, and demonstration of forward looking concepts to satisfy multiservice and combatant command priorities through rapid prototyping and experimentation. The JCTD program has a track record of exploring new concepts and technologies at low risk, but with major payoff to testing these concepts without the risks and cost associated with new acquisition programs. In addition to providing some limited residual capability for users, JCTDs can be useful in informing requirements and reducing the risk for future, follow-on acquisition efforts.

The committee further notes that an area of growing concern is the monitoring and assessment of adversarial propaganda and misinformation, which can be highly effective at masking the intent and activities of adversarial actors. The committee is concerned that there has been limited application of new technologies or concepts in this space, especially in the use of ever-increasing data from social media sources that can be leveraged to amplify and inform other warning, force protection and battlespace awareness activities of the Department of Defense. The committee believes that the use of social media analysis capabilities should be explored in a relevant operational environment to experiment and determine the possible value to military operations.

Therefore, the committee recommends \$158.2 million, an increase of \$10.0 million, in PE 63648D8Z to demonstrate technologies and concepts for a social media analysis capability to support the needs of the Commander of U.S. European Command.

### *Strategic Capabilities Office*

The budget request contained \$844.9 million in PE 64250D8Z for development activities of the Strategic Capabilities Office (SCO).

Created in 2012 by the Deputy Secretary of Defense, SCO has the mission to identify, analyze, demonstrate, and transition game-changing applications of existing and near-term technology to shape and counter emerging threats. SCO is comprised of a relatively small number of personnel and relies on other program office personnel and resources to execute its mission. The committee appreciates the nature of SCO's mission and sustained leanness of the organization; however, the committee notes the budget for SCO has grown exponentially each fiscal year. For example, the fiscal year 2017 budget request is nearly double the request for fiscal year 2016.

The committee is concerned that such rapid budget growth may bring with it some risks, including the demands on SCO's small staff, demands on other Department of Defense personnel, and impact of SCO decisions on existing programs. For example, the committee is aware of SCO's inclusion on the electromagnetic railgun development, and subsequent reprioritizing of its planned investment in that program for fiscal year 2017, resulting in a funding gap that could not be covered by the program office.

Additionally, the committee remains concerned that the transition of technologies from SCO has not been adequately captured and conveyed to the oversight committees. The report required by the committee report (H. Rept. 114-102) accompanying the National Defense Authorization Act for Fiscal Year 2016 has not been delivered and is now almost 6 months late. In order to support prudent use of taxpayer resources, and to ensure proper oversight of these activities, the committee believes this report should be provided and concerns addressed before supporting full funding of planned activities.

Therefore, the committee recommends \$804.9 million, a decrease of \$40.0 million, in PE 64250D8Z for development activities of the Strategic Capabilities Office.

### *Technology enablers for directed energy weapon systems*

The committee is aware that the Department of Defense has made significant advances in the development and operational demonstration of directed energy weapons systems. Each military department has demonstrated a marquee program in this area, such as the Navy's Laser Weapon System deployed on the USS *Ponce*, the Army High Energy Laser Mobile Demonstrator, and the Marine Corps' Ground Based Air Defense System. Along with technology demonstration activities like the Robust Electric Laser Initiative and the High Energy Liquid Laser Area Defense System, each of these programs demonstrated the increased power output and power on target necessary to develop a militarily useful directed energy weapon.

However, as the Department has made progress in raising the power levels of these systems, it has also demonstrated the need for emphasis on development in other technology areas necessary to realize the full potential of laser weapons. For example, higher power output requires improved beam control to engage targets at greater distances, as well as better thermal management systems to dissipate the increased heat load. As the Department has been overcoming foundational technical challenges, new challenges have emerged that will impact the operational uses for directed energy weapons.

Therefore, the committee directs the Assistant Secretary of Defense for Research and Engineering, in coordination with the research components of the military departments and the High Energy Laser Joint Technology Office, to provide a briefing to the House Committee on Armed Services by January 20, 2017. This briefing should provide a roadmap for enabling technologies, including:

- (1) Beam directors and adaptive optics, including deformable mirrors;
- (2) Thermal management needs and capabilities;
- (3) Integration challenges with fire control systems, including potential future needs for fire control for laser systems;
- (4) Power architectures and power electronics needs;
- (5) Facilities and test range capabilities; and
- (6) Other areas as deemed by the Secretary.

### *Third Offset Strategy*

The committee supports the Department of Defense Third Offset Strategy development efforts. As the Deputy Secretary of Defense has described it, the Third Offset Strategy is focused on strengthening conventional deterrence against great powers through targeted technology investments and new operational and organizational constructs.

The committee is encouraged by the Department's technology investments, including those within the Strategic Capabilities Office (SCO) that adapt existing weapon systems in new ways to get game-changing capabilities into the field more quickly. These efforts align well with the committee's acquisition reform initiatives discussed elsewhere in this Act. The committee is also encouraged by the Department's increased emphasis on wargaming and on strategic initiatives to better understand Russian and Chinese military thinking.

The committee believes that the Third Offset Strategy effort is a useful vehicle for focusing the Department on how to deter and counter the Russian Federation and the People's Republic of China. Much of this focus has been on technology; however, the committee also believes that further attention must be given to strategic thinking about deterrence, including the relationship between conventional and nuclear deterrence, and the relationship between deterrence and assurance.

The committee encourages the Secretary to review the Department's ability to support rapid decision making and agile force employment, as the committee recognizes that future near-peer conflicts are likely to unfold faster, across multiple regions and warfighting domains. The committee also encourages the Secretary to engage the military services as it recognizes that, for the Third Offset effort to be successful, the military services must embrace it.

Lastly, the committee is concerned about any Third Offset efforts that distract from the primary focus on deterring Russia and China. While the committee acknowledges the benefits of Silicon Valley outreach for technology innovation, particularly through the Defense Innovation Unit Experimental (DIUx), it believes that such commercial technology will not provide an enduring warfighting advantage over near-peer adversaries.

#### *Transition of biosurveillance prototype*

The committee understands the importance of biosurveillance tools at U.S. military installations throughout the world to provide installation commanders with early, high-confidence detection and increased situational awareness. The committee is aware of the recent efforts by the Department of Defense to develop a 3-year advanced technology demonstration of biosurveillance technology for deployment on the Korean Peninsula, known as the Joint U.S. Forces in Korea Portal and Integrated Threat Recognition (JUPITR).

The committee supports the Department of Defense's efforts to rapidly integrate, test, and demonstrate cutting-edge technologies to develop strengthened biosurveillance capabilities to meet these critical force protection needs. The committee encourages the Department of Defense to continue to use advanced technology demonstrations to rapidly integrate and evaluate emerging technologies in biological and chemical defense. The committee also encourages the Department of Defense to leverage the advanced technology demonstration efforts to quickly field JUPITR to the U.S. Forces Korea, and to ensure that relevant technologies

from JUPITR are transitioned into programs of record. The committee recommends that the Department of Defense collaborate with other U.S. Government partners, including the Department of Homeland Security, to share the results of the JUPITR demonstration with relevant programs implementing biosurveillance to meet homeland security requirements.

#### *Treatment of traumatic brain injury*

The committee is aware of the magnitude of traumatic brain injuries (TBI) sustained by service members, both in deployed and non-deployed environments. TBI accounts for approximately 20 to 25 percent of documented combat casualties in the wars in the Republic of Iraq and the Islamic Republic of Afghanistan. The committee continues to support the Department of Defense's many efforts to investigate the mechanisms of traumatic brain injuries and develop mitigation/prevention strategies. The committee is aware that pre-clinical research has recently demonstrated that induced therapeutic hypothermia is a promising neuroprotective strategy for treating TBI by effectively reducing increases in intracranial pressure and cellular damage caused by injury/trauma. The committee encourages the Department to continue their diverse TBI research programs, and supports the development and deployment of technologies that can be used to provide additional TBI treatments, including induced therapeutic hypothermia, to our service members. Further, the committee remains concerned about the long-term effects of TBI, particularly multiple occurrences of TBI, on members of the Armed Forces. Peer-reviewed research has demonstrated a link between multiple traumatic brain injuries and the onset of dementia, and has suggested a link to Alzheimer's disease later in life. The committee understands that the Department of Defense has undertaken research to investigate the relationship between traumatic brain injury and Alzheimer's disease. The committee commends this effort and encourages the Department to continue funding such projects.

#### *United States-Israel Anti-tunnel cooperation*

The committee notes that section 1606 of the National Defense Authorization Act for Fiscal Year 2016 (Public Law 114-92) authorized a new, joint United States-Israel anti-tunneling program to protect United States and Israel forces from terrorist attacks.

The Principal Deputy Assistant Secretary of Defense for Special Operations/Low-Intensity Conflict stated during a March 1, 2016, House Committee on Armed Services Subcommittee on Emerging Threats and Capabilities hearing that the U.S. and Israel plan to execute 17 counter-tunnel projects for tunnel detection, tunnel mapping, and intelligence collection. At the same hearing, the Commander of U.S. Special Operations Command stated that the subterranean threat is used by terrorists, but also affects other mission areas. The committee continues to support this program; however, the committee is aware that none of

the funds authorized and appropriated in fiscal year 2016 have been executed as of April 27, 2016.

Therefore, the committee directs the Secretary of Defense to provide a briefing to the House Committee on Armed Services not later than June 30, 2016, as to the status of United States-Israel anti-tunnel cooperation, including:

- (1) The status of the Memorandum of Agreement;
- (2) The full plan for project development;
- (3) The current plan for expenditure of funds, including an identification of entities that will be receiving or have received funds; and
- (4) A clarification of future requirements.

#### *Unmanned advanced capability combat aircraft and ground combat vehicles*

Section 220 of the Floyd D. Spence National Defense Authorization Act for Fiscal Year 2001 (Public Law 106-398) mandated a goal, regarding unmanned advanced capability combat aircraft and ground combat vehicles, that by the year 2010, one-third of the aircraft in the operational deep strike force fleet would be unmanned, and that by year 2005, one-third of the operational ground combat vehicles would be unmanned.

Congress subsequently requested reports outlining the Department's progress towards achieving these goals in 2006 and 2008. The committee notes that there has been no update provided by the Department since 2008.

Therefore, the committee directs the Secretary of Defense to provide a briefing to the House Committee on Armed Services, no later than September 15, 2016, on the Department's progress in meeting the congressionally mandated goal. The briefing shall include an assessment of progress towards meeting the goals identified for the subset of unmanned air and ground systems established in section 220 of Public Law 106-398, as well as an assessment of existing, viable unmanned ground vehicle technologies that can be economically used for making significant progress toward the achievement of the 2001 goal within the next 5 years.

#### *U.S. Special Operations Command rapid prototyping and SOFWERX initiative*

The committee notes that the SOFWERX initiative and facility within U.S. Special Operations Command (USSOCOM) creates a forum for accelerating the delivery of innovative capabilities to U.S. Special Operations Forces (USSOF) by engaging industry, academia, and Government laboratories, as well as hosting innovation and rapid prototyping sessions designed to overcome seemingly intractable problems. The committee notes that these sessions have started to refine and inform current and future USSOF requirements, as well as acquisition and engineering decisions, while increasing the potential to field capabilities faster. The committee applauds this revolutionary approach, which was established by USSOCOM in September 2015 using a Partnership Intermediary Agreement, as defined within section 3715 of title 10, United States Code.

The committee understands that each project within the SOFWERX facility is funded via related research, development, test, and evaluation (RDT&E) programs, including \$0.5 million funded by the Tactical Assault Light Operator Suit effort, and an additional \$2.0 million for fiscal year 2016 within PE 1160402BB, Advanced Technology Demonstrations. For fiscal year 2017, the committee notes that USSOCOM expects to spend \$2.5 million from the Operations and Maintenance, Defense-Wide account for SOFWERX facility and support, although RDT&E efforts are not defined. While these initial investments for SOFWERX appear to be low-dollar thresholds, the committee encourages USSOCOM to seek cost-sharing agreements and cost-saving measures with other Department of Defense entities, such as those within each military service, the Defense Advanced Research Projects Agency, or other non-traditional funding sources when appropriate. The committee encourages USSOCOM to limit growth and overhead of this initiative to ensure affordability across the Future Years Defense Program, and expects to be kept fully and currently informed of the many initiatives expected to spiral from SOFWERX. The committee also expects to be informed of how USSOCOM is sharing technological advances and lessons learned about incentivizing innovation across the Department. Therefore, the committee directs the Commander, U.S. Special Operations Command to provide a briefing to the House Committee on Armed Services by September 1, 2016, on SOFWERX and associated RDT&E efforts.

#### *Utilization of electromagnetic spectrum*

The committee is aware of and encouraged by Department of Defense efforts to better utilize the electromagnetic spectrum (EMS) to meet both current and future requirements. The 2014 Department of Defense EMS Strategy and efforts by the Defense Information Systems Agency recognize that appropriate spectrum utilization is critical to efficient operations across all warfighting domains. To meet these challenges, the Department has appropriately set objectives that expedite the development of technologies that allow spectrum sharing, increase spectrum efficiency gains, and access wider frequency ranges. The committee is also aware that pursuant to the Bipartisan Budget Act of 2015 (Public Law 114-72), \$500.0 million in spectrum relocation fund proceeds were made available to all Federal agencies for activities intended to improve the efficiency and effectiveness of spectrum use. The committee encourages the Department to utilize this and other funding to develop and deploy EMS mitigating technology, such as solid state transmitters, which have the potential to address known spectrum sharing and spillage issues with Navy radar systems.

#### *V-22 defensive weapons integration analysis*

The budget request contained \$174.4 million in PE 64262N for V-22 research and development, but contained no funds for development and integration of defensive weapon systems.

The committee notes that various models of the V-22 support tactical airlift requirements for special operations and general purpose forces of the Department of Defense. However, the committee is concerned that given the emerging flexibility the V-22 has exhibited in multiple contingency and training operations, the aircraft may be unintentionally limited by its lack of defensive weapons and having to rely upon other airborne armed assets to provide escort during tactical airlift infiltration and exfiltration operations. The committee understands that options may exist to develop and integrate defensive weapons capability onto V-22 platforms, but the Department has not coalesced in deriving mutual requirements that could satisfy each of the services within the Department that utilize the capabilities of the V-22.

Therefore, the committee directs the Secretary of the Air Force, in coordination with the Secretary of the Navy and the Commander of U.S. Special Operations Command, to provide a briefing to the House Committee on Armed Services by December 1, 2016, that specifies all requirements for V-22 defensive weapon capabilities within the Department of Defense, and provides an analysis of viable alternatives that could be implemented to fulfill those requirements. The analysis should examine alternatives that could ensure a full, fair, and open competition among qualified vendors that utilizes an expedited timeline, encouraging innovation, affordability, and enhancing the versatility of the V-22.

#### *Vector geo-location technologies for Special Operations Command*

The committee recognizes that the Joint Threat Warning System (JTWS) provides credible threat warning and intelligence information to special operations forces (SOF) that is key to providing enhanced situational awareness, force protection, and time-sensitive intelligence for targeting to supported SOF elements. The committee is concerned that the current JTWS-Air Variant System provides Precision Geo-location (PGL) coverage only in the very high frequency (VHF)/ultra high frequency (UHF) bands, and does not provide PGL coverage in the high frequency (HF) band, a band being increasingly utilized globally to target and compromise SOF missions. The committee is concerned that traditional geo-location techniques do not provide time-critical, instantaneous, and accurate results, and often require the use of two or more SOF aircraft.

The committee understands that a new technology, called Vector Geo-location (VGL), has been successfully demonstrated in the HF band in a single airborne platform. Although one of the prototypes was capable of operating in a tri-band mode, it has not been demonstrated in the VHF or UHF band due to insufficient development of calibration techniques in those bands. The committee is encouraged by these results and believes that the U.S. Special Operations Command should continue to develop VGL technologies for use in all three bands, including completing development of calibration techniques in the VHF/UHF bands, ruggedizing the system, and completing final flight testing.

## Items of Special Interest

### *Range capabilities for emerging advanced technologies*

The committee recognizes that the Major Range and Test Facility Base (MRTFB) is a critical component to military technological superiority, and key to ensuring U.S. warfighting capability. This designated core set of Department of Defense Test and Evaluation (T&E) infrastructure, and its associated workforce, is a critical capability to be preserved in order to conduct necessary T&E analyses to support the Department's acquisition process. The committee recognizes that the MRTFB must remain sized, operated, and maintained to preserve core, governmental T&E capabilities, but should also be developed over time to meet future technology needs of the Department.

The committee is concerned that due to the increased need for protected airspace, as well as increasingly outmoded range technology, many test facilities are difficult to maintain. For example, the open-air test ranges of the MRTFB are not capable of supporting the full spectrum of development testing required for fifth and sixth generation weapon systems, including testing of hypersonic systems, which have been identified as critically important to the third offset strategy. These systems require significant increases in size of contiguous airspace availability, test tracking and data acquisition capabilities, and threat capabilities that exceed current ranges capabilities.

Across the military services, the gaps in range capabilities to meet evolving requirements are growing rapidly. The military services are under pressure to manage modernization of range capabilities to budgets that do not always account for changing technology needs to meet future requirements. Additionally, it is anticipated that the need for increased use of the MRTFB's ranges with large airspace footprints will continue to increase, to support realistic training environments critical to readiness of operational forces. This presents the ranges with growing scheduling capacity challenges, pitting priorities for operational readiness of today's forces against priorities of fielding new system capabilities required to sustain air dominance into the future.

Therefore, the committee directs the Director of the Test Resource Management Center (TRMC) to provide a briefing to the House Committee on Armed Services by March 1, 2017, on the results of a comprehensive assessment of MRTFB needs and investments to meet testing required for fifth and sixth generation aircraft and air armament, including hypersonic strike weapons. This assessment should include the projected requirements of operational forces and other users dependent upon these ranges. The briefing should also include the estimated costs to implement capabilities required to support current and projected future operations, and a plan for ensuring sufficient capacity through a MRTFB range investment plan. Additionally, the committee encourages the TRMC to use the results of this assessment to inform future budget certifications from the military departments and Department of Defense agencies.

## LEGISLATIVE PROVISIONS

### SUBTITLE A—AUTHORIZATION OF APPROPRIATIONS

#### Section 201—Authorization of Appropriations

This section would authorize appropriations for Research, Development, Test, and Evaluation at the levels identified in section 4201 of division D of this Act.

### SUBTITLE B—PROGRAM REQUIREMENTS, RESTRICTIONS, AND LIMITATIONS

#### Section 211—Laboratory Quality Enhancement Program

This section would require the establishment of a Laboratory Quality Enhancement Program (LQEP) to support the analysis and implementation of current policies, as well as make recommendations for new initiatives to support the improvement and enhancement of the Department of Defense's Science and Technology Reinvention Laboratories. This section would also place responsibility for LQEP under the Assistant Secretary of Defense for Research and Engineering (ASD(R&E)), and would modify section 1114(a)(2)(C) in the Floyd D. Spence National Defense Authorization Act for Fiscal Year 2001 (Public Law 106-398) to align management of the laboratory demonstration program with the ASD(R&E).

#### Section 212—Mechanisms to Provide Funds for Defense Laboratories for Research and Development of Technologies for Military Missions

This section would modify the authorities set forth by section 219 of the Duncan Hunter National Defense Authorization Act for Fiscal Year 2009 (Public Law 110-417), as amended by section 262 of the National Defense Authorization Act for Fiscal Year 2014 (Public Law 113-66), to set the level of funding at 3 percent of funds available; eliminate the termination date for this authority; and allow certain federally funded research and development centers to utilize this authority.

#### Section 213—Notification Requirement for Certain Rapid Prototyping, Experimentation, and Demonstration Activities

This section would require the Secretary of the Navy to provide written notification to the congressional defense committees within 10 days before initiating a rapid prototyping, experimentation, or demonstration activity using funds from PE 63382N.

#### Section 214—Improved Biosafety for Handling of Select Agents and Toxins

This section would direct the Department of Defense to implement several improvements for handling of select agents and toxins, as recommended from an

Army 15-6 investigative report on the individual and institutional accountability for the shipment of viable Bacillus Anthracis from Dugway Proving Ground. This section would require the Department to implement a quality assurance and quality control program for any facility producing biological select agents and toxins, and for the Secretary of Defense to submit a report to the congressional defense committees by February 1, 2017, on the potential consolidation of facilities that work with biological select agents and toxins. This section would also require the Comptroller General of the United States to submit a report to the congressional defense committees by September 1, 2017, on the effectiveness and completeness of the Department of Defense's actions taken to address the findings and recommendations of the Army 15-6 investigation.

#### Section 215—Modernization of Security Clearance Information Technology Architecture

This section would require the Secretary of Defense to develop and sustain a new security clearance information technology architecture to replace the legacy system of the Office of Personnel Management. Further, this section would require the Secretary of Defense, Director of National Intelligence, and Director of the Office of Personnel Management to issue a governance charter to delineate responsibilities between organizations, as well as to review and revise as necessary the executive orders, statutes, and other authorities related to personnel security. This section would also require quarterly notifications to designated congressional committees until September 30, 2019.

#### Section 216—Prohibition on Availability of Funds for Countering Weapons of Mass Destruction System Constellation

This section would prohibit the Department of Defense from obligating or expending any funds in fiscal year 2017 for research, development, and prototyping of the countering weapons of mass destruction situational awareness information system, known as "Constellation." This section would also require the Chief Information Officer of the Department of Defense, in consultation with the Director of the Defense Information Systems Agency, to submit a report to the congressional defense committees by February 1, 2017, on the requirements and program plan for the Constellation system.

#### Section 217—Limitation on Availability of Funds for Defense Innovation Unit Experimental

This section would limit the amount of authorized funds available to be obligated or expended for the Defense Innovation Unit Experimental (DIUx) until the Secretary of Defense provides a report to the congressional defense committees on the charter for and the use of funds to establish and expand DIUx.

The committee is aware of the Department of Defense's efforts to increase outreach to and collaboration with sources of commercial innovation throughout the United States. The committee recognizes that commercial innovation is not only a significant driver for the economy, but also provides significant contributions to national security. The committee has been supportive of mechanisms for tapping into the nontraditional defense contractor community, which includes commercial start-ups and other companies that have not typically focused on the defense market. The committee notes that the administrative and regulatory barriers that are in place within the acquisition system often act as moats to keep these innovation players out, rather than a bridge into the national security sector.

The committee believes DIUx to be a helpful step in bridging those communities, but is concerned by the pinpoint focus on one geographic region, as well as the dedication of significant funding at such a nascent period in the development of this organization and the concept on which it was founded. The committee is concerned that outreach is proceeding without sufficient attention being paid to breaking down the barriers that have traditionally prevented nontraditional contractors from supporting defense needs, like lengthy contracting processes and the inability to transition technologies. Furthermore, the committee is concerned that the focus on this initiative is occurring without sufficient guidance, oversight, and coordination with and into the various laboratories, engineering centers, and existing state and local innovation centers that by necessity must also bridge into this community. The committee believes that focusing on laying a solid foundation for DIUx and its interaction with communities and the Department of Defense enterprise is critical to ensuring effectiveness, especially if such initiatives will be expanded to include other locations.

#### Section 218—Limitation on Availability of Funds for Tactical Combat Training System Increment II

This section would limit the obligation or expenditure of 20 percent of the funds for the Tactical Combat Training System (TCTS) Increment II program until the Secretary of the Navy and Secretary of the Air Force comply with section 235 of the National Defense Authorization Act for Fiscal Year 2016 (Public Law 114-92).

Public Law 114-92 required the Secretary of the Navy and the Secretary of the Air Force to submit a detailed report to the congressional defense committees by January 29, 2016, on the baseline and alternatives to the TCTS Increment II program of the Navy. The report was to include cost estimates and schedule comparisons, as well as a review of joint Department of the Air Force and Department of the Navy investment in live, virtual, constructive, advanced air combat training. The committee notes that failure to comply with this reporting requirement in a timely manner has impacted the committee's ability to conduct needed oversight on this program's acquisition strategy. The committee is aware the Navy expects to award an engineering and manufacturing development contract for TCTS Increment II in fiscal year 2016. The committee expects this award will be

executed through full and open competition in order to allow for the maximum number of proposals.

#### Section 219—Restructuring of the Distributed Common Ground System of the Army

This section would require the Secretary of the Army to discontinue development efforts for any component of the Distributed Common Ground System (DCGS) of the Army after Increment 1 where commercial software exists that is capable of fulfilling at least 80 percent of the system requirements. This section would also require a review of the acquisition strategy to ensure commercial software procurement is the preferred method to meet program requirements. This section would also prohibit the development of any capability for DCGS if such capability is available for purchase in the commercial market.

#### Section 220—Designation of Department of Defense Senior Official with Principal Responsibility for Directed Energy Weapons

This section would require the Secretary of Defense to designate a senior official already serving within the Department of Defense as the official with principal responsibility for the development and demonstration of directed energy weapons for the Department, as well as any other responsibilities set forth by the Secretary.

### SUBTITLE C—REPORTS AND OTHER MATTERS

#### Section 231—Strategy for Assured Access to Trusted Microelectronics

This section would require the Secretary of Defense to develop and implement a strategy for developing and acquiring trusted microelectronics from various sources by 2020. This section would further require the Secretary to submit such a strategy to the congressional defense committees not later than 1 year after the date of the enactment of this Act. The Secretary of Defense would also be required to certify by September 30, 2020, that the Department has implemented the recommendations of the strategy, and has created an assured means of accessing sufficient supply of trusted microelectronics.

#### Section 232—Pilot Program on Evaluation of Commercial Information Technology

This section would require the Defense Information Systems Agency to establish a pilot program to evaluate commercially available information technology tools to better understand and characterize their potential impact on Department of Defense networks and computing environments through prototyping, experimentation, operational demonstration, military user assessment, or other means to get quantitative and qualitative feedback on the commercial item.

Section 233—Pilot Program for the Enhancement of the Laboratories and Test and Evaluation Centers of the Department of Defense

This section would allow the Assistant Secretaries of the Army, Navy, and Air Force to jointly carry out a pilot program to demonstrate methods for the more effective development of research, development, test, and evaluation functions.

Section 234—Pilot Program on Modernization of Electromagnetic Spectrum Warfare Systems and Electronic Warfare Systems

This section would allow the Secretary of Defense to carry out a pilot program on the modernization of spectrum warfare systems and electronic warfare systems.

Section 235—Independent Review of F/A-18 Physiological Episodes and Corrective Actions

This section would require the Secretary of the Navy to establish an independent review team to review the Navy's data on, and mitigation efforts related to, the increase in F/A-18 physiological events since January 1, 2009. This section would also require the Secretary to submit a report to the congressional defense committees by December 1, 2017, on the findings of the review team.

Section 236—Study on Helicopter Crash Prevention and Mitigation Technology

This section would require the Secretary of Defense to enter into a contract with a federally funded research and development center to conduct a study on technologies with the potential to prevent and mitigate helicopter crashes.

Section 237—Report on Electronic Warfare Capabilities

This section would require the Under Secretary of Defense for Acquisition, Technology, and Logistics, acting through the Electronic Warfare Executive Committee, to submit to the congressional defense committees a report by April 1, 2017, on future electronic warfare concepts and technologies.