

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

### **Subtitle A—Authorization of Appropriations**

#### **Authorization of appropriations (sec. 201)**

This provision would authorize the appropriations for research, development, test, and evaluation activities at the levels identified in section 4201 of division D of this Act.

### **Subtitle B—Program Requirements, Restrictions, and Limitations**

#### **Centers for science, technology, and engineering partner- ship (sec. 211)**

The committee recommends a provision that would amend Chapter 139 of title 10, United States Code, to authorize a program that would enhance the Department of Defense laboratories with innovative academic and industry partners in research and development activities. The provision would enable more effective transfer of laboratory-generated innovations to small businesses and other industry partners to promote their transition into military systems or for development into commercial technologies. The provision would also improve the overall quality of research efforts, while reducing the costs of ownership and maintenance of world-class research infrastructure, and enhance the return on taxpayer investment in facilities and personnel at the laboratories. The provision is modeled on similar authority that has been provided to Department of Defense agencies by Congress under the Center of Industrial and Technical Excellence program. The provision is also supportive of the Department's "Better Buying Power" efforts to "improve the return on investment in Department of Defense laboratories."

The labs have a tradition of partnerships with industry and academia that has led to significant advances in mission areas and technologies ranging from robotics to cyber security to aeronautics. A recent example is the development of the Army Research Laboratory's (ARL's) "Open Campus" initiative, the goal of which is to develop processes and engagements through which the academic community, industry, small business, and other government laboratories can efficiently engage with ARL's specialized research staff and unique technical facilities in a broad range of Army technology mission areas. Another is the Air Force Research Laboratory partnership with the Wright Brothers Institute on the Tec-Edge Innovation and Collaboration Center, which promotes public-private research partnerships in unmanned air systems, advanced sensors, and rapid prototyping of advanced materials. The committee be-

lieves that more can be done to encourage and strengthen these types of activities.

A recent report by the Institute for Defense Analyses indicates that mutually beneficial partnerships between Department of Defense laboratories and academia “are not as abundant as those in the intramural research programs at the Department of Energy.” The committee believes that this provision would support the enhancement of beneficial activities with both academia and the private sector.

**Department of Defense technology offset program to build and maintain the military technological superiority of the United States (sec. 212)**

The committee notes with concern that the United States has not faced a more diverse and complex array of crises since the end of World War II, and that taken together, they constitute the greatest challenge in a generation to the integrity of the liberal world order, which has consistently been underwritten by U.S. military technological superiority. At the same time, the committee is alarmed by the apparent erosion in recent years of this technological advantage, which is in danger of disappearing altogether. To prevent such a scenario and to maintain the country’s global military technological edge, the committee recommends a provision that would establish a new \$400.0 million initiative.

In doing so, the committee notes that the Defense Department is facing an emerging innovation gap. Commercial research and development in the United States now represents 80 percent of the national total, and the top four U.S. defense contractors combined spend only one-quarter of what the single biggest internet company does on research and development. Furthermore, global research and development is now more than twice that of the United States. The committee also notes that defense innovation is moving too slowly—in cycles that can last up to 18 years, whereas commercial innovation can be measured in cycles of 18 months or less.

The committee understands that accessing sources of innovation beyond the Defense Department is critical for national security, particularly in the areas of directed energy, low-cost high-speed munitions, cyber capabilities, autonomous systems, undersea warfare, and intelligence data analytics. However, there are currently too many barriers that limit cooperation with U.S. allies and global commercial firms, posing a threat to the country’s future military technological dominance.

For the past several years, U.S. adversaries have been rapidly improving their own military capabilities to counter our unique advantages. Structural trends, such as the diffusion of certain advanced military technologies, pose new operational challenges to U.S. armed forces. As a result, the dominance of the United States military can no longer be taken for granted. Consequently, the Department of Defense must remain focused on the myriad potential threats of the future and thus maintain technological superiority against potential adversaries.

The committee notes that since 1960, the department has invested more than \$6.0 billion in directed energy science and technology initiatives. The committee is concerned that, despite this

significant investment, the department's directed energy initiatives are not resourced at levels necessary to transition them to full-scale acquisition programs. The committee is encouraged by the Navy's demonstration a 100–150 kilowatt prototype laser and by the Air Force's demonstration of high-powered electromagnetic weapons capabilities. However, the committee is concerned about the future of directed energy technologies as a whole. The committee notes that there is no inter-service entity dedicated to advancing promising directed energy platforms beyond the development point towards acquisition.

The committee is encouraged that the department established a department-wide Defense Innovation Initiative in November 2014 to pursue innovative ways to sustain and advance our military superiority and to improve business operations throughout the department. However, the committee is concerned by the possibility that this initiative is not being implemented in an appropriate and expeditious manner.

In response to these factors, the committee recommends a provision that would establish an initiative within the Department of Defense to maintain and enhance the military technological superiority of the United States. The provision would establish a program to accelerate the fielding of offset technologies, including, but not limited to, directed energy, low-cost high-speed munitions, autonomous systems, undersea warfare, cyber technology, and intelligence data analytics, developed by the department and to accelerate the commercialization of such technologies. As part of this program, the committee expects that the Secretary of Defense would also establish updated policies and new acquisition and management practices that would speed the delivery of offset technologies into operational use.

The provision would authorize \$400.0 million for fiscal year 2016 for the initiative, of which \$200.0 million would be authorized specifically for directed energy technology. Accordingly, the provision would mandate the Secretary to develop a directed energy strategy to ensure that appropriate technologies are developed and deployed at an accelerated pace, and update it every 2 years. The committee expects that this strategy would include a recommendation on rationalizing the roles and authorities of the Joint Technology Office for High Energy Lasers. The provision would further direct the Secretary to submit this strategy to the Senate Armed Services Committee and the House Armed Services Committee no later than 90 days after completing the strategy, and biennially thereafter.

To speed up the development of these vitally needed national security capabilities, the committee directs that the Secretary of Defense shall consider all appropriate flexible acquisition authorities granted in law and in this Act. These should include the management structure and streamlined procedures for rapid prototyping outlined in section 803 of this Act on the middle tier of acquisition for rapid prototyping and rapid fielding, and the procedures and authorities to be considered under section 805 of this Act on use of alternative acquisition paths to acquire critical national security capabilities to include other transactions, rapid acquisition, and commercial item authorities.

The committee expects that the Secretary of Defense would keep the Senate Committee on Armed Services and the House Committee on Armed Services regularly updated on progress of activities under this technology offsets initiative.

**Reauthorization of Defense Research and Development Rapid Innovation Program (sec. 213)**

The committee notes that the Department of Defense (DOD) has established a Rapid Innovation Program to accelerate the fielding of innovative technologies, as authorized in the Ike Skelton National Defense Authorization Act for Fiscal Year 2011 (Public Law 111–383). The committee further notes that the DOD has established a competitive, merit-based process to solicit proposals from interested contractors, review and select projects based on military needs and standardized evaluation criteria, and award contracts to execute program projects. The committee is encouraged that the military services and the congressional defense components participating in the program have practices and tools in place to manage and monitor the execution of projects.

According to the Government Accountability Office, some completed projects have already successfully transitioned technology to acquisition programs and other military users through the Rapid Innovation Program. In addition, the DOD estimates that 50 percent of all fiscal year 2011 funding projects have out-year funding commitments from military users indicating the likelihood that they will transition technologies. The Government Accountability Office assessed projects scheduled to be completed through July 2014 and found that 50 percent successfully transitioned to acquisition programs or other users. Although it is too soon to accurately assess the overall success of the Rapid Innovation Program, the committee is encouraged by the results achieved thus far. The committee notes that the Rapid Innovation Program has been highlighted as a part of the department’s Better Buying Power Acquisition Initiative.

The committee recommends a provision that would reauthorize the Rapid Innovation Program for an additional 5 years. At the same time, the committee recommends that the DOD takes steps to ensure that the selection of projects through the Program is not subject to improper influence outside of the established selection process.

**Reauthorization of Global Research Watch Program (sec. 214)**

The committee notes that since its inception in 2003, the Global Research Watch Program has made significant progress toward its program goals, as outlined in the original authorizing legislation. The committee also notes that the current authorization in section 2365 of title 10, United States Code, will expire on September 30, 2015.

Consequently, the committee recommends a provision that would reauthorize the program for an additional 10 years. The committee further recommends that the program be expanded to include private sector persons as part of its global focus. The definition of “person” is in section 1 of title 1, United States Code, and it in-

cludes corporations, companies, associations, firms, partnerships, societies, and joint stock companies.

**Science and technology activities to support business systems information technology acquisition programs (sec. 215)**

The committee recommends a provision that would mandate the establishment of science and technology activities that would help reduce the technical risk and life cycle costs of major information technology acquisition programs. The committee notes that the Government Accountability Office and the Director of Operational Test and Evaluation have repeatedly reported to Congress failures in the acquisition of major information technology business systems programs. Among these are the Expeditionary Combat Support System and the Defense Integrated Military Human Resources System, which spent billions of dollars and delivered no useful capability.

The committee notes that current information technology programs, including those intended to support efforts at achieving audit ability, track pay and personnel records, and manage health care information, are also not performing in a manner that inspires confidence in the delivery of useful technologies within current cost and schedule estimates.

The committee believes that failures of these acquisition programs are the result of myriad causes, one of which is the weakness of the Department of Defense's acquisition workforce in developing and deploying these systems. The Department does not internally employ or have external access to expertise that can develop and technically manage these programs. The Department also does not maintain sufficient expertise to support the modification of antiquated business processes, thereby precluding department-wide organizational support by commercially-available modern information technology products and services. Furthermore, the Department does not have the testing infrastructure or workforce expertise to adequately ensure that systems will perform when deployed.

The committee believes another cause of failure is the expensive and technically complex modification of commercially available software to support perceived departmental needs. The business systems covered in this provision support business functions that are similar to those found in the private sector, such as accounting, contract management, health records, and pay systems. The Department lacks the expertise to modify their antiquated and labor-intensive business processes so that lower-cost, commercially-available solutions can be applied to support departmental operations. Instead, the Department employs contractors to customize commercial software programs with the expectation that they can support existing processes, thereby expending minimal effort or rigor to modify the processes themselves.

Finally, the committee believes these programs are suffering from the same cybersecurity challenges that all private and public sector information technology programs are facing. Given the importance of these systems in supporting departmental operations and deployed forces, they can be inviting targets for cyberattack.

The committee's recommended provision is based on the precepts built into the Weapons System Acquisition Reform Act of 2009 and in the strong tradition of developing technical expertise to improve acquisition outcomes of conventional weapons systems. The provision would require the Department to fund appropriate research, development, and capability-building activities to make it a "smarter buyer" of these programs. Activities under the program would include using industry, academic, and government expertise to: develop technologies and processes that manage the customization of commercial software in a cost-effective manner; control problems when attempting to scale commercial solutions to the scope of the defense enterprise; and secure the networks, computers, and information associated with these programs. The provision would also support the development of smaller-scale information technology prototypes with limited deployments that can then be scaled to full operational capability.

The provision, if implemented, would also spur the Department to engage with industry and academia to address the business process and management issues that currently haunt these programs. The committee notes that there is significant business management expertise resident in academia and the private sector, yet it is rarely engaged to address management challenges facing department and costing taxpayers billions of dollars.

The committee believes that successful implementation of this provision would help build the expertise and tools necessary to develop information technology business systems in the future. The committee also believes that these efforts, when applied to the management of business information technology systems, would improve cost, schedule, and performance outcomes.

**Expansion of eligibility for financial assistance under Department of Defense science, mathematics, and research for transformation program to include citizens of countries participating in the technical cooperation program (sec. 216)**

The committee recommends a provision that would amend section 2192a of title 10, United States Code, to expand the Department of Defense's Science, Mathematics, and Research for Transformation (SMART) program, which awards service-based scholarships to students studying in the fields of science, technology, engineering, and mathematics, to include students from the United Kingdom, Australia, New Zealand, and Canada. The selection of these countries is based on those which are currently parties to the Technical Cooperation Program Memorandum of Understanding of October 24, 1995.

Current authority for the program limits scholarship awards to only U.S. citizens. However, National Science Foundation data indicate that over 50 percent of engineering doctorates are granted to foreign graduate students, with the percentage growing annually. By removing this restriction, the Department can recruit foreign nationals from these four countries to participate in the program, with the goal of bringing on the best and brightest students to defense laboratories. The limited easing of this restriction would

serve as a pilot project for assessing potential future expansion of this authority to other friendly countries.

**Streamlining the Joint Federated Assurance Center (sec. 217)**

The committee recommends a provision that would streamline the structure of the Joint Federated Assurance Center (JFAC).

Section 937 of the National Defense Authorization Act for Fiscal Year 2014 (Public Law 113–66) established JFAC to serve as a joint, department-wide federation of existing capabilities to ensure security in the software and hardware developed, acquired, maintained, and used by the Department of Defense. Section 937 directed the Center for Assured Software of the National Security Agency to coordinate research and development to improve software assurance and the Defense Microelectronics Activity to coordinate research and development to improve hardware assurance. These designations resulted in an unnecessary layer of bureaucracy in the JFAC structure and should be eliminated.

**Limitation on availability of funds for development of the Shallow Water Combat Submersible (sec. 218)**

The committee remains concerned about cost and schedule overruns associated with U.S. Special Operations Command's (SOCOM) undersea mobility acquisition programs generally and, specifically, the Shallow Water Combat Submersible (SWCS) program.

According to the Government Accountability Office, approximately \$677.5 million was expended to develop and procure the Advanced SEAL Delivery System (ASDS) to fill SOCOM's requirement for a dry combat submersible for special operations personnel, more than \$600.0 million over original budget projections. The ASDS program suffered from ineffective contract oversight, technical challenges, and reliability and performance issues. Unfortunately, the SWCS program has experienced many of the same deficiencies as its predecessor.

In June 2014, the SWCS program was re-baselined as a result of significant cost and schedule overruns. Less than a year after this re-baselining, the SWCS program is again 19 percent over budget and 21 percent behind schedule (as of January 2015). Overall, the committee understands the engineering and management development phase of the program is approximately 126 percent over budget and more than a year behind schedule.

The committee has sought to encourage better acquisition oversight of the SWCS program through various legislative provisions and report language in past National Defense Authorization Acts. For example, the National Defense Authorization Act for Fiscal Year 2013 (Public Law 112–239) directed the Assistant Secretary of Defense for Special Operations and Low-intensity Conflict (ASD SOLIC) to provide a report to the congressional defense committees on cost and schedule overruns associated with the SWCS program and efforts to correct such deficiencies. The National Defense Authorization Act for Fiscal Year 2014 (Public Law 113–66) also clarified that the SOCOM Acquisition Executive is subordinate to the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD AT&L) for acquisition matters and directed the USD

AT&L and ASD SOLIC to improve oversight of SOCOM acquisition programs—particularly those special operations-peculiar platforms, like SWCS, that are at greatest risk of incurring delays and additional costs. Lastly, the National Defense Authorization Act for Fiscal Year 2012 (Public Law 112–81) directed increased oversight of SOCOM undersea acquisition programs by the USD AT&L, but exempted the SWCS program from such requirements at the request of SOCOM due to perceived program stability and low technological risk at the time.

Given the concerns outlined above, the committee recommends a provision that would prohibit the expenditure of more than 25 percent of the funds available for the SWCS program for fiscal year 2016 until the USD (AT&L) designates a civilian official within his office responsible for providing oversight and assistance to SOCOM for all undersea mobility programs and, in coordination with the ASD SOLIC, provides the congressional defense committees a report on the SWCS program outlining:

- (1) An analysis of the reasons for cost and schedule overruns associated with the SWCS program;
- (2) The revised timeline for SWCS initial and full operational capability;
- (3) The projected cost to meet the basis of issue requirement;
- (4) A plan to prevent, identify, and mitigate any additional cost and schedule overruns;
- (5) Any opportunities to recover cost or schedule;
- (6) Any lessons learned from the SWCS program that could be applied to future undersea mobility acquisition programs; and
- (7) Any other matters the Under Secretary deems relevant.

**Limitation on availability of funds for distributed common ground system of the Army (sec. 219)**

The committee recommends a provision that would require the amounts authorized to be appropriated for fiscal year 2016 for the Department of Defense by section 201 and available for research, development, test, and evaluation, Army, for the distributed common ground system of the Army (DCGS–A), not more than 75 percent may be obligated or expended until the Secretary of the Army reviews program planning and submits to congressional defense committees, the Select Committee on Intelligence of the Senate, and the Permanent Select Committee on Intelligence of the House of Representatives a report. The report is to address segmentation of software components; identification of commercial software capable of fulfilling DCGS–A system requirements; cost analysis; determination of commercial software compliance relative to guidance in Intelligence Community Technology Enterprise, the Defense Intelligence Information Enterprise, and the Joint Information Environment; identification of software which may be acquired through competitive means; an acquisition plan; and a review of the timetable for the DCGS–A program.

**Limitation on availability of funds for Distributed Common Ground System of the United States Special Operations Command (sec. 220)**

The committee recommends a provision that would limit the availability of research, development, test, and evaluation funds for the distributed common ground system of the U.S. Special Operations Command (SOCOM) until the Commander of SOCOM submits a report to the committee.

**Subtitle C—Other Matters**

**Assessment of air-land mobile tactical communications and data network requirements and capabilities (sec. 231)**

The committee recommends a provision that would require the Director of Cost Assessment and Program Evaluation (CAPE) to contract with an independent entity to conduct a comprehensive assessment of current and future requirements and capabilities to determine the technological feasibility, achievability, suitability, and survivability of a tactical communications and data network. Subject to the submission of the independent entity's report, the provision would prohibit the Secretary of the Army from obligating more than 50 percent of funds available in Other Procurement, Army (OPA) for the Warfighter Information Network-Tactical (WIN-T), Increment 2.

WIN-T, in its current or previous forms, has been in development for over 10 years with numerous changes in requirements, technology, architecture, and acquisition strategy. Most recently, the committee has received notice from the Secretary of the Army of a Nunn-McCurdy significant breach for WIN-T.

WIN-T is designed to ensure effective and efficient mission command both "at-the-halt" and while "on-the-move." WIN-T's currently fielded configuration, called "Increment 1", was assessed as providing suitable and effective enterprise tactical communications and data networking "at the halt" or while stationary or in fixed sites. Technology improvements planned for WIN-T's next configuration, called "Increment 2", are intended to achieve communications and data networking for forces "on the move." Increment 2, however, faces many challenges.

Given these technical challenges, the committee is concerned about the feasibility of an effective and affordable mobile tactical communications and data network. The budget request included \$783.1 million in Other Procurement, Army (OPA) for WIN-T. The committee recommends a decrease of \$200.0 million in OPA only for WIN-T, Increment 2.

**Study of field failures involving counterfeit electronic parts (sec. 232)**

The committee recommends a provision that would require the Secretary of Defense to task the Joint Federated Assurance Center (JFAC) to conduct a hardware assurance study to assess the presence, scope, and effect on Department of Defense operations of counterfeit electronic parts that have passed through the Department of Defense supply chain and into fielded systems.

In recent years, the committee has expressed concern about counterfeit electronic parts in the Department of Defense supply chain. To address this threat, the committee established JFAC to support the trusted defense system needs of the Department of Defense. At the direction of the committee, both Department of Defense and the Comptroller General of the United States have reviewed and analyzed reports relating to counterfeit or suspect counterfeit electronic parts submitted to the Government Industry Data Exchange Program (GIDEP). While past reports based on GIDEP data have provided insight into counterfeit parts detected in the supply chain, they have not addressed those counterfeit parts that have made it through the supply chain and into fielded systems.

**Demonstration of persistent close air support capabilities (sec. 233)**

The committee recommends a provision that would require the Secretary of the Air Force, the Secretary of the Army, and the Director of the Defense Advanced Research Projects Agency (DARPA) to jointly conduct a demonstration of the Persistent Close Air Support (PCAS) capability in fiscal year 2016. The provision would require that the Air Force use in the demonstration at least two platforms with which the Air Force intends to employ future CAS missions.

The demonstration would require operations featuring multiple tactical radio networks representing diverse ground force user communities; two-way digital exchanges of situational awareness data, video, and calls for fire between aircraft and ground users without modification to aircraft operational flight programs (OFP); real-time sharing of friendly forces, aircraft, and target location data to reduce fratricide risks; and lightweight digital tools, such as tablets and smart phones, based on commercial-off-the-shelf technology for pilots and joint terminal air controllers (JTACs). The provision would require operations in both simple and complex operating environments—the latter to stress the process of synchronization between pilots and JTACs.

The provision would also require the Secretary of the Air Force, the Secretary of the Army, and the Director of DARPA to jointly assess the impact of the demonstrated capabilities on the time required to conduct CAS operations, on friendly force effectiveness in achieving tactical objectives, and on the risk of fratricide and collateral damage; and to estimate the costs that would be incurred in transitioning this technology to the Army and the Air Force.

The committee notes that despite advances in networking, computer processing, and digital displays, close air support has not materially changed in the decades since the introduction of precision-guided munitions. In many cases, pilots and ground controllers still rely on voice communications and paper maps to try to achieve a common understanding to exactly identify and locate desired targets. In complex urban environments, this synchronization process can take up to an hour and still not adequately reduce the risk of fratricide or collateral damage.

This situation has persisted because there are dozens of aircraft that perform close air support (CAS), even more numbers of dif-

ferent types of sensors employed, and a large array of different radios, target designation methods, peripheral equipment, and displays. Additionally, OFPs to update software embedded in aircraft avionics systems are all on different and lengthy upgrade cycles.

In response to this problem, the Joint Requirements Oversight Council, in 2009, in its Close Air Support Capabilities-Based Assessment, recommended that “Platforms should field flexible systems that utilize an improved architecture which migrates the processing of digital messages to a Commercial-off-the-Shelf (COTS) based processor and away from the [aircraft] operational flight programs.”

DARPA has achieved some level of success in implementing that recommendation through its PCAS program, shrinking synchronization time by a factor of five in simple environments and a factor of 10 in more complex situations. DARPA achieved this with off-the-shelf commodity products and radios in lightweight and easily installable form factors, without affecting individual aircraft OFPs.

The Marine Corps and U.S. Special Operations Command (SOCOM) are currently transitioning PCAS into fielded capabilities with over 5,000 and 2,000 users, respectively. The committee is persuaded that DARPA’s approach holds sufficient promise of rapid and affordable improvements in close air support—with the potential to save lives and win on the battlefield—to warrant serious consideration by the Army and the Air Force, the largest consumer and provider of close air support in the Department of Defense.

#### **Airborne data link plan (sec. 234)**

The committee recommends a provision that would require the Under Secretary of Defense for Acquisition, Technology, and Logistics and the Vice Chairman of the Joint Chiefs of Staff to jointly develop a plan, in consultation with the Secretary of the Air Force and the Secretary of the Navy, to enable secure and survivable communications between and among fifth- and fourth-generation fighter aircraft, and the aircraft that support them, in anti-access/area denial environments. The capabilities to be covered by the plan include gateways and direct data links for the reception and dissemination of intelligence from and to low-observable aircraft and fifth-generation fighters of the Air Force, Navy, and Marine Corps.

The provision would require the plan to achieve these communication capabilities with minimal changes to the outer surfaces of the aircraft and to the operational flight programs of these aircraft. The provision would also require that the plan include non-proprietary and open systems approaches that are compatible with the Open Missions Systems initiative of the Air Force Rapid Capabilities Office (AFRCO) and the Future Airborne Capability Environment of the Navy.

Finally, the provision would prohibit the obligation and expenditure of funds on the Talon Hate and Multi-domain Adaptable Processing System interim or bridge solutions to these interoperability problems until the congressional defense committees are briefed on the plan.

The committee is concerned by the Department’s failure to address a critical shortfall with regard to secure and survivable com-

munications among and between advanced and legacy platforms. There is widespread agreement that next-generation air dominance hinges on highly networked “systems of systems,” and yet the Department lacks an integrated plan to securely share national-level intelligence information with combat aircraft, or to receive data from the sophisticated sensors on board those aircraft. The Nation’s premier fifth-generation fighters, built by the same prime contractor, utilize unique proprietary data links that cannot securely communicate with one another, nor with fourth-generation fighters and other supporting aircraft.

The Air Force is expending substantial funds on interim solutions in the form of pods or other gateway solutions on a small fraction of the F-15 fleet, but these are neither robust nor survivable. The Air Force sponsored a promising demonstration called Project Missouri, to link the F-22 and the F-35 via an L-band low-probability of intercept data link using existing common apertures in conformance with the AFRCO Open Mission Systems initiative, but is no longer pursuing the effort. The Office of the Secretary of Defense (OSD) mandated the use of the F-35 Multi-function Advanced Data Link (MADL) on the F-22 and B-2, but the Air Force has refused to comply due to cost and complexity barriers. OSD will not rescind its mandate, thus discouraging innovation and competition.

**Report on the technology readiness levels of the technologies and capabilities critical to the Long Range Strike Bomber aircraft (sec. 235)**

The committee recommends a provision that would direct the Secretary of Defense to submit a report to Congress, not later than 180 days after enactment of this Act, on the technology readiness levels of the technologies and capabilities critical to the Long Range Strike Bomber aircraft. The provision would also direct the Comptroller General of the United States to review the report and provide an assessment to the congressional defense committees of the matters contained in the report.

**Budget Items**

**Army defense research sciences**

The budget request included \$239.1 million in PE 61102A for defense research sciences. The committee notes that the budget request for Army basic research has been reduced across the board by almost 8 percent relative to the amount enacted in fiscal year 2015. Such reductions would likely have a significant negative impact on the Department of Defense’s ability to advance technology development.

The committee notes that basic research activities focused in technical areas of interest to Department missions lay the foundation upon which other technology development and new defense systems are built. These programs fund efforts at universities, small businesses, and government laboratories. These investments also serve to help train the next generation of scientists and engineers who may work on defense technology problems in government, industry, and academia.

To help address the significant reduction in basic research funding, the committee recommends an increase of \$40.0 million in PE 61102A. The committee directs that these funds be awarded through well-established and competitive processes that already exist for defense research sciences.

### **High-performance computing modernization**

The budget request included \$177.2 million in PE 63461A for the high-performance computing modernization program. The committee notes that the budget request in this program has been reduced by over \$40.0 million relative to the amount enacted in fiscal year 2015. The committee believes, however, that greater efforts could be made to take advantage of commercially-available technology, which is often as sophisticated, if not more sophisticated, than technology developed by the Department of Defense. The committee believes that additional savings could be found by engaging more comprehensively with the private sector and the Department of Energy national labs. Therefore, the committee recommends a program decrease of \$10.0 million in PE 63461A.

### **Infantry support weapons**

The budget request included \$74.1 million in PE 64601A for infantry support weapons of which \$20.3 million would be for small arms improvement and \$3.1 million would be for the common remotely operated weapons station (CROWS). The committee recommends an increase of \$2.5 million in PE 64601A of which \$1.5 million would be for small arms improvement and \$1.0 million would be for CROWS.

### **Integrated personnel and pay systems for Army and Air Force**

The budget request included \$136.0 million in PE 65018A for Integrated Personnel and Pay System—Army (IPPS–A) and \$69.7 million in PE 65018F for AF Integrated Personnel and Pay System (AFIPPS). These two integrated personnel and pay systems are Enterprise Resource Planning (ERP) business system intended to replace legacy human resource systems used by the Army and Air Force.

The committee is concerned that the current life-cycle costs for IPPS–A and AFIPPS are now \$2.0 billion and \$1.8 billion respectively.

The committee believes the Army and Air Force should each restructure their versions of integrated pay and personnel systems to achieve a low-risk, low-cost improvement to human resource challenges. Doing so would allow the Army and Air Force greater resources to address its combat readiness and modernization needs.

The committee directs the Secretaries of the Army and Air Force, in coordination with the Deputy Chief Management Officer, to develop alternatives to the current integrated personnel and pay system strategy of ERP implementation. These alternative strategies should:

- (1) Reduce errors for pay and benefits for servicemembers, including reserve component servicemembers;

(2) Provide accurate, timely, and reliable information about pay and benefits accessible by servicemembers and auditors (as appropriate);

(3) Reduce costs for the Department in administering pay and benefits with a significant return on investment (ROI) of less than 2 years;

(4) Provide accurate financial information with strong internal controls that is retrievable, traceable, and reproducible for financial statement audits; and

(5) Leverage the existing investment and capabilities of the Defense Finance and Accounting Service (DFAS) for military and civilian pay.

The committee notes that these strategies will not be limited to the implementation or improvement of a business system solution only but must also address the business processes of the Army and the Air Force for their respective human resource activity.

As a result of this restructuring, the committee recommends a decrease of \$50.0 million for research and development of IPPS-A and a decrease of \$45.4 million for AFIPPS.

Further, the committee directs the Army and Air Force to provide an interim report on its restructure alternatives by March 30, 2016 and a final report by September 30, 2016.

#### **Common infrared countermeasures**

The budget request included \$77.6 million in PE 65035A for common infrared countermeasures (CIRCM). The committee recommends an increase of \$24.0 million in PE 65035A for CIRCM. Additional funding for CIRCM system development was included on the Chief of Staff of the Army's unfunded priorities list.

#### **Aircraft survivability development**

The budget request included \$18.1 million in PE 65051A for aircraft survivability development. The committee recommends an increase of \$60.0 million in PE 65051A for common missile warning system. Additional funding for common missile warning system development was included on the Chief of Staff of the Army's unfunded priorities list.

#### **Joint Tactical Radio System**

The budget request included \$13.0 million in PE 65380A for the Joint Tactical Radio System (JTRS) of which \$6.8 million would be for the Small Airborne Link 16 Terminal (SALT) radio. The committee notes that the Army is installing an already available Link 16 capability onto its attack helicopter fleet and may reevaluate whether SALT will be the objective capability for Army aviation. The committee recommends a decrease of \$6.8 million in PE 65380A only for the SALT radio.

The committee directs that not later than 180 days after the dates of the enactment of this Act, the Secretary of the Army shall submit to the congressional defense committees a report on the Link 16 Terminals, which are currently being installed onto its attack helicopter fleet and the Army's plan for communication and data interoperability with ground forces. The committee directs that not later than 60 days after the report of the Secretary, the

Comptroller General of the United States shall review the report and submit to the congressional defense committees an assessment of the matter contained in the report.

#### **Munitions Standardization, Effectiveness and Safety**

The budget request included \$32.6 million in PE 65805A for munitions standardization, effectiveness, and safety. Due to unexecuted prior years' funds, the committee recommends a decrease of \$8.0 million in PE 65805A for munitions standardization.

#### **Stryker modification and improvement**

The budget request included \$257.6 million in PE 23735A for the combat vehicle improvement program of which \$105.8 million would be for Stryker improvement.

The committee notes that Army deployments in Iraq and Afghanistan placed a strain on its combat vehicle fleets prompting a significant investment in the force protection and survivability of the Stryker family of wheeled combat vehicles in order to protect soldiers against rocket propelled grenades, anti-armor grenades, and improvised explosive devices (IED). In this regard, the committee commends the Army for the success of the double-V hull modification to the Stryker providing improved protection from under belly IED blasts.

The committee understands that these high priority often operationally urgent vehicle modifications for force protection and survivability resulted in the deferral of lower priority investments for improved vehicle lethality.

The committee has also learned that the Army has recently approved an operational needs statement requesting a significant lethality upgrade for some, but not all Stryker infantry carrier and reconnaissance vehicles. The committee is aware that the Army is considering the delivery of such a Stryker lethality upgrade, when identified and proven feasible and suitable, to its forward stationed Stryker brigade.

The committee supports the Army's efforts to improve Stryker lethality and recommends an increase of \$40.0 million in PE 23735A only for development and testing of Stryker lethality upgrades.

#### **Navy defense research sciences**

The budget request included \$451.6 million in PE 61153N for defense research sciences. The committee notes that the budget request for Navy basic research has been reduced across the board by almost 10 percent relative to the amount enacted in fiscal year 2015. Such reductions would likely have a significant negative impact on the department's ability to advance technology development.

The committee notes that basic research activities focused in technical areas of interest to Department of Defense missions lay the foundation upon which other technology development and new defense systems are built. These programs fund efforts at universities, small businesses, and government laboratories. These investments also serve to help train the next generation of scientists and

engineers who may work on defense technology problems in government, industry, and academia.

To help address the significant reduction in basic research funding, the committee recommends an increase of \$55.0 million in PE 61153N. The committee directs that these funds be awarded through well-established and competitive processes that already exist for defense research sciences.

#### **Undersea warfare applied research**

The budget request included \$123.8 million in PE 62747N for research, development, test, and evaluation of undersea warfare applied research. The committee notes the promise of developing systems in the following areas: remote detection of ocean acoustic fields using light detection and ranging (LIDAR), upper ocean acoustic structure, high strain materials for sonar applications, surface decluttering, and novel anti-submarine warfare detection methods. As a result, the committee recommends an increase of \$18.6 million to this program.

#### **Capable manpower, enablers, and sea basing**

The budget request included \$258.9 million in PE 63673N for future naval capabilities advanced technology developments. The activities listed under this program element include capable manpower, enterprise and platform enablers, and sea basing. The committee believes that the work plans for fiscal year 2016 on these activities do not warrant the level of funding included in the budget request, and is concerned about the ability of the activities to absorb the requested funds. In addition, the committee notes that many of the technologies being developed under these programs are also in development by the private sector and savings could be extracted through increased external collaboration. Consequently, the committee recommends an aggregate decrease of \$10.0 million in PE 63673N to be distributed appropriately from capable manpower, enterprise and platform enablers, and sea basing.

#### **Advanced submarine system development**

The budget request included \$87.2 million in PE 63561N for research, development, test, and evaluation of advanced submarine system development. The committee notes the promise of the fleet modular autonomous unmanned vehicle (FMAUV) and submarine launched unmanned aerial system (UAS). The committee understands additional funding could be used to accelerate getting both capabilities to the fleet. As a result, the committee recommends an increase of \$11.0 million to this program.

#### **USS *Gerald R. Ford* full ship shock trials**

The budget request included \$48.1 million in PE 64112N for research, development, test, and evaluation of the USS *Gerald R. Ford*-class nuclear aircraft carrier. The committee notes the Department of Defense is reviewing the Navy decision to delay full ship shock trials from CVN-78 to CVN-79. The committee urges the Department of Defense to restore full ship shock trials to CVN-78. As a result, the committee recommends an increase of \$79.1 million to this program.

**LX(R)**

The budget request included \$46.5 million in PE 64454N for research, development, test, and evaluation of LX(R), which is expected to functionally replace LSD-41 and LSD-49 class ships. The committee notes accelerating the delivery of LX(R) class ships to the fleet will enable the Navy to meet a greater amount of combatant commander demand for amphibious warships. As a result, the committee recommends an increase of \$29.0 million for this program.

**Unmanned Carrier-Launched Airborne Surveillance and Strike System**

The budget request included \$134.7 million in PE 64501N for the Unmanned Carrier-Launched Airborne Surveillance and Strike (UCLASS) system. The committee notes the directed pause in the program during the Department of Defense's Intelligence, Surveillance, and Reconnaissance (ISR) Strategic Portfolio Review, which will inform the Department's fiscal year 2017 budget submission. Therefore, the committee recommends a decrease of \$134.7 million due to excess fiscal year 2015 funds that may be used to wholly offset fiscal year 2016 budget requirements.

The committee looks forward to reviewing the results of the Department of Defense ISR Strategic Portfolio Review and also the report directed in section 217 of the Carl Levin and Howard P. "Buck" McKeon National Defense Authorization Act for Fiscal Year 2015.

**Submarine tactical warfare systems development**

The budget request included \$48.2 million in PE 64562N for research, development, test, and evaluation of submarine tactical warfare systems development. The committee notes that additional funding would enable acceleration of the Fleet requested "Attack In a Minute" capability, support Torpedo Advanced Processor Build (APB) 5+ upgrade, and cybersecurity and information assurance capability improvements. As a result, the committee recommends an increase of \$12.0 million to this program.

**F-35B/C engineering and manufacturing development**

The budget request included \$537.9 million in PE 64800M for F-35B engineering and manufacturing development, and \$504.7 million in PE 64800N for F-35C engineering and manufacturing development. The committee recommends a decrease of \$12.5 million in each PE, \$25.0 million total, due to funding early to need for Block 4 software development.

**Submarine acoustic warfare development**

The budget request included \$3.9 million in PE 11226N for research, development, test, and evaluation of submarine acoustic warfare development. The committee notes the Compact Rapid Attack Weapon is a rapid development project to address emerging Fleet capability needs. Additional funding would provide the Navy with an advanced countermeasure for submarines. As a result, the committee recommends an increase of \$0.8 million to this program.

**Mk-48 ADCAP**

The budget request included \$42.2 million in PE 25632N for research, development, test, and evaluation of Mk-48 ADCAP torpedo. The committee notes that additional funding would enable hardware and software upgrades to the weapon system and accelerate implementation, validation, and verification of advanced weapon performance models. As a result, the committee recommends an increase of \$5.5 million to this program.

**Air Force defense research sciences**

The budget request included \$329.7 million in PE 61102F for defense research sciences. The committee notes that the budget request for Air Force basic research has been reduced across the board by almost 12 percent relative to the amount enacted in fiscal year 2015. Such reductions would likely have a significant negative impact on the department's ability to advance technology development.

The committee notes that basic research activities focused in technical areas of interest to Department of Defense missions lay the foundation upon which other technology development and new defense systems are built. These programs fund efforts at universities, small businesses, and government laboratories. These investments also serve to help train the next generation of scientists and engineers who may work on defense technology problems in government, industry, and academia.

To help address the significant reduction in basic research funding, the committee recommends an increase of \$45.0 million in PE 61102F. The committee directs that these funds be awarded through well-established and competitive processes that already exist in defense research sciences.

**Nanostructured and biological materials**

The budget request included \$125.2 million in PE 62102F for materials, of which \$8.7 million was requested for nanostructured and biological materials, and \$16.5 million for sensing technologies. The committee believes that while such work is of scientific importance, these are areas in which significant savings could be gained through closer collaboration and interaction with the private sector and other government agencies. Particularly during a time of constrained budgets and vigilance for overlapping efforts, the committee believes that such work can be coordinated more fully to reduce costs. Accordingly, the committee recommends a decrease of \$10.0 million in PE 62102F for nanostructured and biological materials and for sensing technologies.

**Long range strike—bomber**

The budget request included \$1.2 billion in PE 64015F for the Long Range Strike Bomber. The committee recommends a decrease of \$460.0 million in PE 64015F due to availability of unobligated prior year funds.

**F-35A engineering and manufacturing development**

The budget request included \$589.5 million in PE 64800F for F-35A engineering and manufacturing development. The committee

recommends a decrease of \$25.0 million in PE 64800F due to funding early to need for Block 4 software development.

**KC-46 aerial refueling tanker aircraft program**

The budget request included \$602.4 million in PE 65221F for KC-46A tanker development and \$2.4 billion in Aircraft Procurement, Air Force (APAF) for 12 KC-46A tanker aircraft. The KC-46 tanker aircraft is being developed and procured to replace the aging Department of the Air Force KC-135 aerial refueling tanker fleets.

The committee continues its long-standing support of the KC-46A tanker aircraft program, and believes that the KC-46A tanker aircraft is necessary to meet current and future warfighter requirements for aerial refueling and airlift. However, the Government Accountability Office (GAO) identified \$200.0 million of funds authorized and appropriated for fiscal year 2015 for KC-46A development that are excess to need because engineering change orders planned for fiscal year 2015 have not occurred, and these funds could be used to meet fiscal year 2016 requirements. The GAO has also identified \$24.0 million of fiscal year 2015 KC-46A procurement funds that are excess to need for a similar reason. Department of the Air Force KC-46A program officials agree with the GAO determination.

The committee understands that the reduction of funds in fiscal year 2016 will not impact the program delivery schedule of the KC-46A tanker aircraft.

Therefore, the committee recommends a decrease of \$200.0 million in PE 65221F and \$24.0 million in APAF due to availability of unobligated prior year funds.

**F-15 capability upgrades**

The budget request included \$186.5 million in PE 27171F for Research, Development, Test, and Evaluation, Air Force. The committee recommends an increase of \$28.0 million for nonrecurring engineering in support of Advanced Display/Core Processor II (ADCP II) upgrades, and an increase of \$1.5 million for flight test support. The total recommended increase in PE 27171F is \$29.5 million.

**Budget request realignment**

At the Air Force’s request, the committee recommends the realignment in the following table to correct an error in the budget request for Research, Development, Test, and Evaluation, Air Force (RDTEAF), and Aircraft Procurement, Air Force (APAF).

**AIR FORCE REQUESTED REALIGNMENT**

(In millions)

Item	Account	Line Item	Amount
NATO AGS .....	RDTEAF	216	– \$59.1
NATO AWAC .....	SAPAF	79	+\$59.1

**Logistics information technology**

The budget request included \$112.3 million in PE 78610F for Logistics Information Technology to develop a software system as a follow-on to the Expeditionary Combat Support System (ECSS). The committee recommends a decrease of \$31.0 million to this program. The committee notes that the significant growth in this program has not been justified given that the program schedule has been delayed and that the Department has requested funding be transferred out of this program in a recent reprogramming action. The committee also notes that the independent assessment of the program required by the Carl Levin National Defense Authorization Act for Fiscal Year 2015, Senate Report 113–176, has not yet been delivered to the Congress.

**Applied research for the advancement of science and technology priorities**

The budget request included \$48.2 million in PE 62251D8Z for applied research for the advancement of science and technology priorities. The committee appreciates the need for this program and the importance of creating communities of interest to identify gaps in collaborative funding. However, the committee notes that only 24 percent of the enacted funds for fiscal year 2014 have thus far been expended, and none of the enacted funds for fiscal year 2015, calling into question the efficiency of the activities under this program. Accordingly, the committee is concerned that the program will be unable to incorporate the large increase in funds requested for fiscal year 2016. Consequently, the committee recommends a general program decrease of \$15.0 million for PE 62251D8Z. Furthermore, the committee recommends that the Assistant Secretary of Defense for Research and Engineering continue to focus on existing activities to demonstrate the effectiveness of this program.

**Multi-azimuth defense fast intercept round engagement system**

The budget request included \$314.6 million in PE 62702E for tactical technology, of which \$17.7 million was requested for the multi-azimuth defense fast intercept round engagement system. The committee notes that this request for the engagement system represents an almost 50 percent increase in funding above the amount enacted in fiscal year 2015, and is concerned about the ability of this activity to grow at such a fast rate. In addition, the committee is concerned about transition potential for this technology, particularly two years into the program. Accordingly, the committee recommends a decrease of \$5.0 million in PE 62702E for multi-azimuth defense fast intercept round engagement system.

**Materials and biological technology**

The budget request included \$220.1 million in PE 62715E for materials and biological technology. The committee notes that this request represents an almost 50 percent increase in funding relative to the amount enacted in fiscal year 2015, and includes several programs which do not show much promise for transition. While the Defense Advanced Research Projects Agency is well-positioned to focus on these activities and drive technological develop-

ments, the committee is concerned about the Agency's ability to use fully such a large increase in funds within 1 year, and about transition opportunities. Accordingly, the committee recommends a decrease of \$10.0 million in PE 62715E to decrease program growth.

#### **Science and technology analytic assessments**

The budget request included \$14.6 million in PE 63288D8Z for science and technology analytic assessments. The committee supported the establishment of this program in fiscal year 2015, believing that the need to develop innovative capabilities to counter emerging threats should be a top priority for the Department of Defense. At the same time, the committee believes it is too early to make an assessment on the impact and success of the activities in this program, and that providing an increase in funds is thus premature. The committee is particularly concerned about the slow progress in the area of anti-access/area denial environments. Consequently, the committee recommends a general decrease of \$5.0 million in PE 63288D8Z. The committee expects the Department to focus on demonstrating the utility and effectiveness of this program.

#### **Joint capability technology demonstration**

The budget request included \$141.5 million in PE 63648D8Z for joint capability technology demonstration. The committee notes that the request represents an increase of over \$20.0 million relative to the amount enacted in fiscal year 2015, and also notes that the program is supporting several activities that appear to have limited potential for transitioning into service programs of records. As a result, the committee recommends a general decrease of \$10.0 million in PE 63648D8Z. The committee further recommends that the Department use this program to emphasize and prioritize prototypes that have greater potential for transition.

#### **Network-centric warfare technology**

The budget request included \$452.9 million in PE 63766E for network-centric warfare technology. The committee is encouraged by the focus that the Defense Advanced Research Projects Agency is placing on advanced technology development, the umbrella budget activity for this program element. Addressing high-payoff opportunities to develop and rapidly mature advanced technologies, as well as transition them to appropriate services or the private sector, is of prime importance in developing and maintaining the technological advantage of the United States.

At the same time, the committee is concerned that the Agency appears to be developing this technology independently. Given the vast expertise on network-centric technology in the United States and abroad, the committee would expect that development of network-centric technologies would take advantage of the significant commercial technologies that may already be available. The committee is further concerned that efforts to work with traditional defense industry contractors to develop system of systems architecture are not likely to transfer successfully to the military services. The committee believes that costs in this program can be reduced through more aggressive interaction and engagement with the pri-

vate sector. Consequently, the committee recommends a general decrease of \$20.0 million in PE 63766E.

### **Quick Reaction Special Projects**

The budget request included \$90.5 million in PE 63826D8Z for Quick Reaction Special Projects (QRSP). The committee notes that QRSP is intended to invest in technology opportunities that might arise during the execution of the fiscal year 2016 budget. The committee further notes that this program has not fully executed its appropriated funds for fiscal year 2014 or 2015 to date, and that many other programs in the Department of Defense are similarly intended to accelerate research program advances into deployable systems. Therefore, the committee recommends a reduction of \$20.0 million for this program. The committee recommends the Department fully fund research efforts to assure the trust of hardware and software systems used in defense systems, which are supported within this program.

### **Advanced sensor application program**

The budget request included \$18.3 billion for Research, Development, Test and Evaluation, Defense-wide, of which \$15.9 million was for PE 0603714D8Z for the Advanced Sensor Application Program (ASAP).

This represents a reduction from the level funded in fiscal year 2015 of \$19.5 million.

The committee believes that this reduction will cause the program to postpone important testing and experiments. The committee additionally believes that these efforts are too important to postpone or cancel.

Accordingly, the committee recommends an increase of \$4.0 million for PE 0603714D8Z for the Advanced Sensor Application Program (ASAP).

### **Corrosion control and prevention funding increase**

The budget request included \$6.8 billion in Research, Development, Test, and Evaluation (RDT&E) for Advanced Component Development & Prototypes, of which \$1.5 million was for the PE 604016D8Z Department of Defense Corrosion Program.

The committee continues to be concerned that the Department has consistently underfunded the DOD Corrosion Program since fiscal year 2011. The Department estimates that the negative effects of corrosion cost approximately \$20.8 billion annually to prevent and mitigate corrosion of its assets, including military equipment, weapons, facilities, and other infrastructure.

Accordingly, the committee recommends an increase of \$10.0 million in RDT&E, PE 604016D8Z, for the Department of Defense Corrosion Program.

### **Global Combat Support System—Joint**

The budget request included \$15.2 million in PE 65018A for the Global Combat Support System—Joint (GCSS–J). The committee believes this funding should be realigned to support high priority readiness requirements. According, the committee recommends a decrease of \$10.0 million to this program.

**Systems engineering**

The budget request included \$37.7 million in PE 65142D8Z for Systems Engineering. In the interest of increasing efficiencies within the Department of Defense, the committee elsewhere in this Act is recommending the repeal of several reporting requirements regarding systems engineering. In addition, the committee believes that further efficiencies can be found within these activities. Taken together, the committee recommends a general decrease of \$5.0 million in PE 65142D8Z.

**MQ-9 Unmanned Aerial Vehicle**

The budget request included \$18.2 million in Research, Development, Test, and Evaluation, Defense-wide (RDTEDW), for the development, integration, and testing of special operations-unique mission kits for the MQ-9 Unmanned Aerial Vehicle (UAV). U.S. Special Operations Command (SOCOM) is responsible for the rapid development and acquisition of special operations capabilities to, among other things, effectively carry out operations against terrorist networks while avoiding collateral damage.

The committee understands that the budget request only partially addresses technology gaps identified by SOCOM on its fleet of MQ-9 UAVs. Therefore, the committee recommends an additional \$5.0 million in RDTEDW for the MQ-9 UAV.

The committee strongly supports SOCOM's efforts to accelerate fielding of advanced weapons, sensors, and emerging technologies on its fleet of MQ-9 UAVs. The committee has authorized additional funds above the budget request in each of the last 3 years to enhance these efforts and understands that SOCOM has successfully developed and acquired a number of new capabilities, including improved weapon effectiveness, target location and tracking, image resolution, and video transmission during that time.

**C-130 terrain following/terrain avoidance radar**

The budget request included \$35.5 million in Procurement, Defense-wide (PDW), to field terrain following/terrain avoidance (TF/TA) radar with associated controls and displays to fulfill special operations-peculiar requirements for MC-130J aircraft. During the development phase of the existing program of record, U.S. Special Operations Command (SOCOM) identified significant concerns with the TF/TA radar performance and ability meet defined user requirements. After conducting a comprehensive programmatic assessment, SOCOM recently decided to revise its acquisition strategy and adapt an alternative TF/TA capability to meet operational needs. Therefore, at the request of SOCOM, the committee recommends a transfer of \$15.2 million to Research, Development, Test, and Evaluation, Defense-wide (PE 1160403BB) for the development of a TF/TA radar for its MC-130J fleet. The remaining funds requested for TF/TA radar procurement have been identified by SOCOM as excess to requirements and, elsewhere in this bill, the committee recommends re-purposing such funds for high priority airborne intelligence, surveillance, and reconnaissance capabilities.

### **Intelligence, Surveillance, Reconnaissance Payload Technology Improvements Program**

The budget request included \$1.3 million in Research, Development, Test, and Evaluation, Defense-wide (RDTEDW), for the development, integration, and testing of special operations-unique intelligence, surveillance, and reconnaissance (ISR) sensor technologies on tactical unmanned aerial vehicles. U.S. Special Operations Command (SOCOM) is responsible for the rapid development and acquisition of special operations capabilities to, among other things, effectively carry out operations against terrorist networks while avoiding collateral damage.

The committee understands that the budget request only partially addresses ISR sensor technology gaps identified by SOCOM on its fleet of tactical UAVs. Therefore, the committee recommends an additional \$2.0 million in RDTEDW for the ISR Payload Technology Improvements Program.

### **Unmanned Combat Air System Demonstration and prototyping**

The budget request included no funding in PE 64402N for research, development, test, and evaluation of unmanned combat air vehicle advanced concept/prototype development. The committee notes the Navy Unmanned Combat Air System Demonstration (UCAS-D) successfully demonstrated the first unmanned aircraft operation in conjunction with manned aircraft aboard an aircraft carrier in 2014 and the first unmanned aerial refueling in 2015. The committee believes the two UCAS-D aircraft, Salty Dog 501 and Salty Dog 502, should continue development and risk reduction that will benefit the Unmanned Carrier-Launched Strike and Surveillance (UCLASS) program, including: carrier launch and recovery operations, carrier airspace operations, carrier flight deck handling, automated aerial refueling, and UCLASS mission architecture and common control station integration. As a result, the committee recommends an increase of \$350.0 million to the Defense-wide Research, Development, Test, and Evaluation account and directs the Secretary of Defense to accomplish this testing in fiscal year 2016 to the fullest extent possible. In addition, any contractual arrangements executed with this funding shall ensure that the Department has sufficient technical data rights to support competitive prototyping follow-on development efforts.

Moreover, using the lessons learned from the UCAS-D program, including the fiscal year 2016 extension, the Department of Defense shall conduct such a competitive prototyping of at least two follow-on air systems that move the Department toward a UCLASS program capable of long-range strike in a contested environment. As a result, the committee recommends an increase of \$375.0 million to the Defense-wide Research, Development, Test, and Evaluation, account and directs the Secretary of Defense accomplish this competitive prototyping in fiscal year 2017 to the fullest extent possible.

To speed up the development of this vitally needed national security capability, the committee directs that the Secretary of Defense shall consider all appropriate flexible acquisition authorities granted in law and in this Act. These should include the management

structure and streamlined procedures for rapid prototyping outlined in section 803 of this Act on the middle tier of acquisition for rapid prototyping and rapid fielding, and the procedures and authorities to be considered under section 805 of this Act on use of alternative acquisition paths to acquire critical national security capabilities. In addition, any contractual arrangements executed with this funding shall ensure that the Department has sufficient technical data rights to support a subsequent level of competitive prototyping follow-on development or future multiple sourced production efforts.

Overall, the committee recommends an increase of \$725.0 million to this program.

### **Items of Special Interest**

#### **Advancement in radar technologies**

The committee notes that substantial advances have been made in the field of radar technologies, allowing for the design of multi-function phased array radars that will be able to track both weather patterns and aircraft simultaneously. The committee considers the development of these new radars a critical enabler for the Department of Defense. The committee supports the ongoing efforts by the Air Force and expects to be kept updated on current radar research and capabilities. This includes efforts by the Air Force Research Laboratories to create radar technologies for multi-mission capability.

#### **Advancements in Antenna Research and Capabilities**

The committee notes that, over the past several years, there have been substantive advances in antenna research to include conformal phased array, which have resulted in dramatic leaps forward in the aerodynamic capability of aircraft and the potential for reducing the size and weight of both manned and unmanned aircraft. The committee also notes that these antenna advances can provide higher performance for communications and electronic warfare missions. The committee believes these capabilities are critical to future air operations in congested, contested, and aerial denial environments.

The committee expects the Air Force to keep the committee updated on current antenna research and capabilities to include advance antenna technologies on manned and unmanned aircraft. Accordingly, the committee urges the Secretary of the Air Force to incorporate advancements developed through this research into legacy and future aircraft, and expects the Secretary to keep the committee updated on these efforts.

#### **Air Force seismic activity research**

The committee notes with concern the continuing threat of nuclear proliferation. The committee also notes and authorizes the Air Force's request for \$7.5 million for the Air Force Research Laboratory's seismic technologies program. The committee supports the laboratory's efforts to develop seismic technology to improve the capability of the United States to monitor nuclear tests. The com-

mittee expects the Air Force to continue to keep the committee updated on the efforts of the seismic technologies program.

### **Conditions and Capabilities of the Undersea Warfare Test Capabilities**

The committee is concerned about the state of readiness and modernization of test ranges that support undersea warfare missions. The committee notes that in September of 2012, the Commander of the Submarine Force for the U.S. Pacific Fleet noted that capabilities at one range had deteriorated, stating, "Materiel conditions at Pacific Missile Range Facility Barking Sands Tactical Underwater Range have been deteriorating over several years and risk loss of a critical capability here in the Pacific." The committee notes that the Navy is attempting to refurbish these facilities as resources permit, but is concerned that test capabilities in this critical mission area are still not on a path to meet Navy requirements in the future.

The committee expects the Secretary of the Navy, in conjunction with the Undersecretary of Defense for Acquisition, Technology, and Logistics, to keep the committee updated on the current condition of the undersea warfare test range capabilities. Updates should include data and analyses on the current use and future needs for underwater test range capabilities, and plans for updating and maintaining range equipment and capabilities.

### **Cost estimate for a land-based electromagnetic railgun program**

The committee is aware that the efforts within the Navy to develop an electromagnetic railgun have been successful in demonstrating early capabilities for naval applications. Further, the committee recognizes that the Navy's initial success has spawned investments within the Strategic Capabilities Office of the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics to pursue development of a land-based electromagnetic railgun to support missile defense.

Recognizing that such investments are still in the demonstration phase, the committee believes it is important to do as much as possible to plan concurrently for how to proceed with railgun technology to improve the possibility of transition into a program of record. Therefore, the committee directs the Director of Cost Assessment and Program Evaluation (CAPE) to conduct a cost estimate for a land-based electromagnetic railgun program, and provide the results to the Senate Armed Services Committee and the House Armed Services Committee by January 1, 2016. As part of the cost estimate briefing, CAPE should examine the potential costs for the projected life cycle of the railgun system, as well as comparison of those costs against current systems and other systems supporting missile defense missions projected to be fielded in the next 10 years.

### **Database on Department of Defense research grants**

The committee recognizes the value of transparency and the ability of publicly available information to drive effective and accountable government. Further, the committee believes that increased

transparency regarding the Department of Defense's external grants will improve the coordination of efforts department-wide. Consistent with the Administration's Open Government Initiative, the committee directs the Secretary of Defense to establish a publicly-available, searchable database of the Department's active grants. The committee also directs the Secretary of Defense to ensure that currently active grants remain in the database after the completion of the grant, and that all future grants are added. The database shall be searchable by a variety of codes, such as type of research grant, the research entity managing the grant, the Department of Defense program, and the area of interest. The committee notes that the National Science Foundation has already established an award search database (the "NSF Funding Opportunities search page"), and directs the Department to use that database as a model for its own, including maintaining accurate data in the same categories of information, at a minimum. The committee expects that this database would only be used to aggregate information on grants whose publication would not violate any procedures for handling sensitive information.

#### **Entrepreneurial sabbatical for Department of Defense laboratory scientists**

The Committee directs the Department of Defense to expand an authorized program for government scientists, specifically scientists at defense laboratories, to take an "entrepreneurial sabbatical" to work for a private sector firm. The committee notes that the department's Developmental Opportunities Program (DOP) currently allows scientists to pursue further education by attending business school or a war college, for example, but does not explicitly allow for pursuing opportunities in the private sector. The committee also notes that the Air Force Research Laboratory is implementing guidance for its entrepreneurial leave program, which may be a good model for an expanded program across the defense research enterprise.

The committee notes that the guidance by the Air Force Research Laboratory explicitly defines an approval process for entrepreneurial sabbatical at the directorate level, and establishes a multi-phase program for a sabbatical of between six months and two years. The committee notes that the Air Force guidance allows for a scientist to be paid by the directorate for up to one year, with further funding provided at the discretion of the directorate. The committee expects that in carrying out this mandate, all conflict-of-interest and other administrative issues would be addressed by the defense laboratories in a manner consistent with department guidelines.

In mandating this expansion, the committee notes the success of entrepreneurial leave programs established by the Department of Energy. For example, 145 employees have taken advantage of the Department of Energy's Sandia National Lab Entrepreneurial Separation to Technology Transfer program since its enactment in 1994. The committee is encouraged that forty percent of these participants have started new businesses, and sixty percent have expanded existing businesses. Overall, the scientists in the program created 49 new companies and positively impacted 99 others.

The committee notes that the benefits from an entrepreneurial sabbatical program to the country, the Department of Defense, and defense research laboratories could be significant, and could energize technology transfer from within the department to the regional and national economy and ultimately to the warfighter. This committee believes this would increase the department's ability to competitively recruit top talent, and both create and grow high-tech startups and small businesses. The committee also believes that the resulting direct interaction between Department of Defense scientists and the private sector would increase the amount of valuable technologies that are placed into operational systems, thereby benefiting both national security and economic prosperity.

The committee directs the Secretary of Defense to report on the department's progress and success in implementing an entrepreneurial sabbatical program, including levels of employee participation, and contributions of Department of Defense technologies to the formation or growth of private sector companies. The committee further directs that this report be submitted to the Senate Committee on Armed Services and the House Committee on Armed Services no later than 1 year after the enactment of this Act, and annually thereafter.

**Expedited approval for attendance at conferences in support of science and innovation activities of Department of Defense and the National Nuclear Security Administration**

The committee directs the Secretaries of Defense and Energy to establish respective expedited approval processes for scientists and engineers to attend science and technology conferences. The committee notes with concern that since the two departments implemented updated conference policies, in response to requirements from the Office of Management and Budget, attendance at such conferences by department personnel has reduced dramatically. According to a report from the Government Accountability Office in March 2015, conference attendance from the Army Research Laboratory declined from about 1300 attendees in 2011 to about 100 attendees in 2013. A similar drop in attendance was reported from Sandia National Laboratories. The report highlights that such a drop in attendance risks a decline in the quality of scientific research, difficulty in recruiting and retaining qualified scientists and engineers, and a diminished leadership role for the two departments within the global science and technology community. The report also notes that the new departmental policies are not meeting the needs of personnel requesting approval to travel to conferences.

Given the importance of conference attendance for an active exchange of scientific information and for recruiting and retaining high-quality technical talent, the committee is concerned that the conference attendance approval policies are undermining the science and technology missions of both departments and undermining the ability of personnel to engage in cutting-edge research, development, testing, and evaluation. The committee believes that technical conference participation is especially important to keep program managers aware of new trends in technology, so that they may make better informed decisions on behalf of taxpayers.

To maintain global technology awareness and to support retention of technical staff, the committee believes that the Departments should strive to follow the best practices of innovative private and academic institutions in developing management and oversight practices for conference participation. The committee is concerned that in specific technical fields of interest to defense, such as hypersonics and cybersecurity, the lack of participation in conferences is ceding U.S. leadership to competitor nations.

In response to these findings and concerns, the committee directs the Secretaries of Defense and Energy to establish processes within the Department of Defense and National Nuclear Security Administration, respectively, whereby requests for scientific conference attendance are adjudicated within 1 month, and approvals are granted as appropriate within 1 month. Further, the committee directs the Secretaries of Defense and Energy to ensure that any decisions to disapprove conference attendance through these processes are made if and only if the appropriate officials determine that the disapproval would have a net positive impact on research and development and on program management quality, and not simply default disapprovals necessitated by a bureaucratic inability to make a timely decision. In addition, the committee directs that these approval processes be implemented no later than 90 days after the enactment of this act.

The committee recommends that, as part of these new approval processes, laboratory and test center directors be given the authority to approve conference attendance, provided that the attendance would meet the mission of the laboratory or test center and that sufficient laboratory or test center funds are available.

The committee directs the Secretaries of Defense and Energy each to report to the Senate Armed Services Committee and the House Armed Services Committee with an assessment of the expedited process and its benefits and drawbacks, along with a recommendation on continuing their use. The committee further directs that this report be submitted no later than 1 year after the establishment of the approval process.

### **High Power Microwave Counter-electronics Capabilities**

The committee notes the development of promising new high-powered microwave technologies that can be used to disable and destroy the electronics of threat systems. The committee notes that the Air Force is currently investing in a research program to develop a counter-electronics, high-power microwave advanced missile, following from a successful joint capabilities technology demonstration in October 2012. The committee supports efforts to develop an operational prototype of a high-power microwave weapons system, and expects the Air Force to keep the committee updated on progress towards this goal.

### **Improved turbine engine program**

The budget request included \$51.2 million in PE 67139A for the improved turbine engine program (ITEP). The committee supports the Army and its plans to competitively develop, test, qualify, and integrate a next generation turboshaft engine for the Blackhawk and Apache combat helicopters. The committee notes that funding

continues to support at least two engine developers over the next few years and through completion of the technology-development phase. The committee further notes recent public statements by Army civilian and military leadership expressing their commitment to reduce risk, achieve appropriate technology maturity, and set the conditions for ultimate program success. The committee recommends full funding as requested for ITEP and encourages the Army to maintain stability and therefore momentum in the program as resources and technical progress allow.

### **Improvised Explosive Device Detection Systems**

The committee understands that improved stand-off hyperspectral imaging (HSI) technologies may offer improved detection of Improvised Explosive Devices (IEDs) and the explosive constituent chemicals and other materials used in the manufacture of IEDs, such as nitrates, nitrites, phosphates, and ammonia.

The committee notes that the goal of these efforts is to develop technologies that provide the fastest possible detection, with the longest ranges and sensitivities, as well as lowest false alarm rate. To achieve this goal, the committee notes the importance of spectral imaging technologies and real time detection hardware and software.

The committee expects the Undersecretary of Defense for Acquisition, Technology, and Logistics to keep the committee updated on current HSI technologies employed by the Department of Defense to counter IEDs, including HSI technologies that are commercially-available, and DOD's plan for ensuring DOD is employing the best technologies available.

### **Market survey of active protection systems**

The committee notes that technologies related to active protection systems for armored combat and tactical vehicles may have matured since the Director of Operational Test and Evaluation conducted live fire demonstrations at Aberdeen Proving Ground, Maryland in 2010. Accordingly, the committee directs that the Director, Operational Test and Evaluation, supported by the Under Secretary of Defense for Acquisition, Technology, and Logistics, and in consultation with the Assistant Secretary of the Army for Acquisition, Logistics, and Technology, conduct a comprehensive market survey to assess, to the extent practical, the current state of the art with respect to active protection systems for armored and tactical vehicles. The survey should include those U.S. and international active protection systems that are fielded, in development with prototypes having completed or undergoing operational tests, or otherwise demonstrating or showing evidence of technology readiness levels that the Director deems relevant or appropriate. The Director shall report the findings of this market survey to the congressional defense committees not later than May 1, 2016. The Director's report shall include an assessment and recommendation as to whether or not there has been sufficient technological progress in active protection systems since and related to the live fire demonstration in 2010 to justify another live fire demonstration in the near future.

### **Medical evaluation of Anthropomorphic data on vehicle blast testing**

The committee remains concerned with serious injuries and deaths that often result from improvised explosive device (IED) attacks and the subsequent vehicle flight and rollover events. The committee supports the Army's future ground vehicle development and testing initiatives designed to mitigate these often fatal injuries. As the Army continues evaluating emerging technologies, the committee recommends that medical research using anthropomorphic testing be included in ongoing Cooperative Research and Development Agreement testing between the commercial sector and the Army on new sensors and active protective technologies.

### **National Defense Education Program**

The budget request included \$49.5 million in PE 61120D8Z for the National Defense Education Program, of which \$3.0 million for the P-12 military child STEM educational pilot program consistent with section 233 of the Carl Levin and Howard P. "Buck" McKeon National Defense Authorization Act for Fiscal Year 2015 (Public Law 113-291) and the Further Continuing Appropriations Act, 2015. The committee notes that this program supports competitive awards to programs that improve the effectiveness of educational activities in science, technology, engineering, and mathematics focused primarily on military children. The committee further notes that military children face additional challenges relative to their peers due to frequent relocations, the stress of parental deployments, and sometimes underperforming schools in the vicinity of military installations. The committee continues to believe that the Department of Defense has a distinct obligation for the education of military children. Moreover, the committee recognizes the importance of STEM education and its contribution to the technical workforce on which the defense industrial base, in particular, depends. As such, the committee believes the Department has a unique interest in fostering a robust pipeline of qualified individuals and its promotion of STEM education programs will provide both short and long term advantages to military children and the nation.

### **Training Range Upgrades**

Training operational forces is one of the most important missions for which the military services are directly responsible. The committee also notes that the military services have traditionally allocated limited resources to research and development initiatives, including modeling and simulation, or to modernizing training range capabilities to support this mission area. The committee believes that modernization of training capabilities will both increase operational effectiveness of military forces and potentially reduce costs by displacing legacy training techniques and systems with more advanced approaches enabled by new technology.

The committee believes that the Central Test and Evaluation Investment Program, administered by the Director of the Department of Defense Test Resource Management Center, has proven to be an effective approach to prioritize and fund the development and de-

ployment of advanced test capabilities at the test ranges. Similarly, the Test and Evaluation Science and Technology program has provided funds to support next generation test capabilities. The committee believes that these approaches may also benefit the modernization of training range capabilities.

The committee directs the Undersecretary of Defense for Personnel and Readiness and the Undersecretary of Defense for Acquisition, Technology, and Logistics to develop jointly a strategic plan to assess and modernize overall training costs, with the goal of improving overall training range and training systems effectiveness and efficiency. The plan should also address policy options that can: enable enhanced leveraging of science and technology programs, including those of the Defense Advanced Research Projects Agency and the services; increase access to experts and new technologies from industry and academia, including through the use of Small Business Innovation Research programs and technology prizes; and revise management, resourcing, range charge practices, personnel practices, and acquisition practices.