Coalition for
National Security Research

July 23, 2018

The Honorable John McCain
Chairman
Committee on Armed Services
United States Senate
Washington, DC 20510

The Honorable Mac Thornberry
Chairman
Committee on Armed Services
House of Representatives
Washington, DC 20515

The Honorable Jack Reed
Ranking Member
Committee on Armed Services
United States Senate
Washington, DC 20510

The Honorable Adam Smith
Ranking Member
Committee on Armed Services
House of Representatives
Washington, DC 20515

Dear Chairmen McCain and Thornberry, and Ranking Members Reed and Smith,

On behalf of the Coalition for National Security Research (CNSR), a 97-member broad-based coalition of industry, academia, scientific and professional associations, and non-profits, I write to commend you for your leadership in moving the fiscal year (FY) 2019 National Defense Authorization Act (NDAA) (S. 2987 and H.R. 5515) through your respective chambers. CNSR appreciates the committees rejecting some of the FY 2019 budget request's cuts to the Defense Science and Technology (S&T) program in both pieces of legislation. As negotiations begin to reconcile differences between the two bills, below please find recommendations to strengthen the defense scientific research enterprise in the FY 2019 NDAA Conference Agreement.

Defense S&T Funding Authorization Recommendations

The Defense S&T program invests in and develops capabilities that advance the technical superiority of the U.S. military to counter new and emerging threats. In FY 2016, CNSR members conducted more than $5.2 billion in U.S. Department of Defense (DOD)-sponsored research to sustain our technological edge over adversaries.[1] Stealth technology, GPS, satellite communications, directed energy capabilities, sonar, unmanned aerial vehicles, and many other commonly used military technologies and capabilities taken for granted today stem from the Defense S&T program, and CNSR members have played integral roles in their development. In the future, Defense S&T funding will be critical as we work to create the next generation of military capabilities in areas such as quantum computing and communications, artificial intelligence, photonics materials, additive manufacturing, hypersonics, and directed energy systems.

We appreciate that the House and Senate bills authorize additional resources above the President's FY 2019 budget request for Defense S&T. However, the authorization levels would result in substantial cuts relative to FY 2018 enacted levels. H.R. 5515 would reduce overall basic research funding for the Army, Navy, Air Force and Defense-Wide accounts. Both bills include sizable percentage cuts to critical programs such as the Army's University and Industry Research Centers, National Defense Education Program, and Defense-Wide Manufacturing S&T Program. Furthermore, each bill authorizes funding drastically below the recommendations from the National Academies of Sciences, Engineering, and Medicine. Specifically, authorized funding in H.R. 5515 for Defense S&T is $4 billion below recommended levels, and basic research is approximately $1.3 billion below.[2] Authorization levels in S. 2987 for Defense S&T are $3.5 billion below recommended levels, and basic research is $1.2 billion below.

[1] https://ncsesdata.nsf.gov/herd/2016/
[2] https://www.nap.edu/catalog/11463/rising-above-the-gathering-storm-energizing-and-employing-america-for

We are seriously concerned by the funding levels for University Research Initiatives (URIs). H.R. 5515 would reduce URIs across all the military Services by nearly 9 percent and S. 2987 by more than 10 percent. The Multidisciplinary University Research Initiatives (MURI) program, a key URI program, has sponsored university research that has consistently produced revolutionary new military technologies. Nanotechnology, foundations for military drones, biological detection capabilities for anthrax, handheld and robotic systems for explosive detection, material foundations for military armor including force protection for tactical vehicles, and sensors able to detect stealth aircraft and unmanned aerial vehicles all stem from MURI sponsored scientific research[3]. Only slightly more than 20 MURI proposals are funded on average each year. As a result, approximately 60 proposals are not funded. These unfunded proposals could be game-changing scientific research that will help the military maintain its technical superiority.

As conferees consider FY 2019 Defense S&T authorization levels, CNSR urges the conference agreement to follow the recommendations from *Innovation: An American Imperative*, a statement signed by the CEOs of Northrop Grumman, Lockheed Martin, Boeing, and Microsoft, and endorsed by over 500 other leading organizations from industry, academia, and science and engineering. ***The recommendations call for at least a 4 percent increase for basic scientific research at DOD.*** We also urge the conferees to provide additional resources for the MURI program to address the large number of unfunded proposals and continue to support a program that has a proven track record of producing paradigm shifts in military capabilities.

Legislative Provision Recommendations

In no priority order, below please find legislative provisions contained in H.R. 5515 and S. 2987 that are of interest to CNSR. The national security innovation base is the most effective and innovative in the world; enhancing legislative authorities will help secure our national security against the numerous emerging threats. We respectfully request the conferees consider the coalition's comments.

Protecting National Security Academic Research

Sec. 1283 of H.R. 5515 provides the Secretary authority to restrict individuals who are participating in foreign talent recruitment programs from conducting defense research.

Colleges and universities are committed to help ensure the nation's national security. One of the most important ways they do so is by leading the world in innovation, particularly in creating new technological capabilities for the military. As noted by the National Academies, "The United States gained and maintained its preeminence in science and engineering in part by embracing the values of openness and by welcoming students and researchers from all parts of the world to America's shores.[4] With the national security landscape rapidly changing, we must find the right balance between openness and appropriate security measures so we do not harm the innovation ecosystem that has helped provide the military with unmatched technological capabilities and prowess.

As written, CNSR is concerned that Sec. 1283 is overly broad and that it will have unintended and adverse consequence for the conduct of DOD research including by retrospectively restricting certain legitimate U.S. researchers from working on important DOD-sponsored scientific research.

CNSR supports the Cornyn-Cotton amendment that was filed in the Senate during consideration of the FY 19 NDAA. This amendment would authorize DOD to create a forum where universities can engage with DOD and other national security agencies to discuss the latest threats, and through collaboration and information sharing develop sound policies to put in place appropriate safeguards to address emerging national security threats on university campuses, and to further protect sensitive scientific research efforts.

[3] https://www.ida.org/idamedia/Corporate/Files/Publications/IDA.../STD/D-5361.pdf
[4] https://www.nap.edu/catalog/11463/rising-above-the-gathering-storm-energizing-and-employing-america-for

Cybersecurity Assistance
Sec. 1626 of S. 2987 directs DOD to provide a variety of cybersecurity assistance to small- and medium-sized manufacturers in the industrial supply chain. The section requires DOD to conduct outreach and transfer cybersecurity technology to protect unclassified information among other requirements.

While small- and medium-sized manufacturers are an important part of the defense industrial base, colleges and universities also play vital roles in helping DOD meet its mission and have a unique role within the defense industrial base and supply chain. Colleges and universities perform approximately 30 percent of all DOD-sponsored scientific research and nearly 50 percent of all DOD-sponsored basic research, which ultimately creates new military technologies and capabilities needed to maintain our technological superiority.[5] Despite the importance of the DOD-university partnership, there are very few open lines of communication between DOD officials and university leadership. Furthermore, colleges and universities are facing a variety of foreign threats including cyber network intrusions and often lack the resources to ensure compliance with federal cybersecurity guidelines and policies.[6]

CNSR urges the conferees to expand sec. 1626 to include colleges and universities as eligible entities for cybersecurity assistance from DOD.

Advanced Manufacturing
Sec. 327 of H.R. 5515 authorizes the Army to establish a Center of Excellence for Advanced and Additive Manufacturing at an arsenal. Sec. 216 of S. 2987 authorizes the Under Secretaries for Acquisition & Sustainment and Research & Engineering to establish at least three activities to demonstrate advanced manufacturing capabilities at depot-level or military arsenal facilities.

Working collaboratively with industry, academia is at the forefront of advancing the science behind advanced manufacturing. Specifically related to additive manufacturing (AM), components have been printed for the V-22 Osprey, UH-60 Blackhawk helicopter and the CH-53 helicopter. While there is much scientific research still to be done on AM, lessons learned could help DOD arsenals manufacture components more efficiently and effectively than traditional methods, which will ultimately lower sustainment costs and enhance readiness. The more opportunities for partnerships with DOD the greater impact we can have on containing operation and maintenance costs.

CNSR supports both provisions in the House and Senate related to advanced and additive manufacturing but we recommend an educational and training component be added to help provide for opportunities to train the next generation of scientists and engineers for DOD. However, if conferees decide to reconcile the provisions, we respectfully request using the Senate language as the template as it allows for more potential partnership opportunities but include in the FY 19 NDAA Conference Agreement a specific authorization for DOD to establish Centers of Excellence.

National Security Commission on Artificial Intelligence
Sec. 1050A of H.R. 5515 establishes an independent commission to review and make recommendations on the advances in artificial intelligence (AI) and machine learning. Chairs and Ranking Members of certain Congressional committees, DOD and the U.S. Department of Commerce, would select members of the commission.

While industry is now playing an important role in advancing AI, academic researchers first demonstrated that AI was possible in the 1950s. Since then, academia has been at the forefront of developing AI for

[5] https://ncsesdata.nsf.gov/fedfunds/2015/
[6] https://www.fbi.gov/file-repository/higher-education-national-security.pdf/view

military applications. Whether it is autonomous vehicles such as drones and unmanned undersea vehicles or developing algorithms to track terrorists, academia is a strong partner with DOD in advancing AI capabilities.

CNSR supports establishing a commission on artificial intelligence. However, given academia's long history of developing AI, and the fact that college and universities are the forefront of AI research, ***we respectfully request that at least one seat on the commission be reserved for academia.***

Mechanisms for Expedited Access to Technical Talent and Expertise at Academic Institutions
Sections 215 and 224 of S. 2987 make changes to the authorization in the FY 2018 NDAA to provide DOD with an expedited mechanism to work with academic institutions. Specifically, these sections expand topic areas for collaboration, direct the Secretary to implement mechanisms and extend the sunset of the authority.

The National Academies states that universities are the primary source of new knowledge and talent driving American innovation[7]. University-based innovations has driven scientific breakthroughs of importance to DOD such as radar, penicillin, the computer, jet propulsion, lasers, global-positioning systems, bar codes, transistors, and the atomic bomb. Further strengthening the partnership between DOD and academia is vital to assuring that we maintain our technological superiority. ***CNSR supports sections 215 and 224 of S. 2987 be included in the FY 2019 NDAA Conference Agreement.***

Air Force Research Laboratory (AFRL) Open Campus Program
Sec. 220C of H.R. 5515 authorizes the Secretary, acting through the Commander of the Air Force Research Laboratory (AFRL), to develop and implement an Open Campus program similar to the program administered by the Army Research Laboratory (ARL).

ARL's Open Campus program seeks to build a science and technology ecosystem that will encourage groundbreaking advances in basic and applied research areas of relevance to the Army. According to Congressional testimony, the program is meeting its goals. ARL reports that it now has over 130 agreements with academia and industry, leveraged more than $16 million with partners, and had more than 500 participants collaborating on-site in ARL laboratories.[8] As a result of the program, collaborative research is being undertaken in traumatic brain injury protection, extreme batteries, semiconductors, and unmanned aircraft system propulsion technologies among others. While AFRL has some collaborative initiatives underway, none of them is as expansive as ARL's Open Campus program.

CNSR supports authorizing an Open Campus program at AFRL. We recommend language stating that the Secretary "shall" implement a program rather than "may" implement.

Cyber Institutes at Institutions of Higher Education
Sec. 1635 of S. 2987 authorizes the Secretary to establish Cyber Institutes at institutions of higher education that host a ROTC program. The Cyber Institutes must accelerate and focus on the development of foundational expertise in critical cyber operational skills for future military and civilian defense leaders.

According to the National Academies, the field of computer science is currently experiencing a surge in undergraduate degree production and course enrollment.[9] This surge is causing strain on college and

[7] https://www.nap.edu/catalog/13396/research-universities-and-the-future-of-america-ten-breakthrough-actions
[8] https://docs.house.gov/meetings/AS/AS26/20160224/104518/HHRG-114-AS26-Wstate-MillerM-20160224.pdf
[9] https://www.nap.edu/catalog/24926/assessing-and-responding-to-the-growth-of-computer-science-undergraduate-enrollments

university resources.[10] Providing DOD support to sustain and expand computer science programs through Cyber Institutes can help grow the cyber military and civilian defense workforce.

CNSR strongly supports authorizing DOD to establish Cyber Institutes at colleges and universities. Further, we recommend that the FY 2019 NDAA Conference Agreement state that the Secretary "shall" carry out a program to establish Cyber Institutes rather than "may."

Defense Manufacturing Communities
Sec. 863 of S. 2987 authorizes the Secretary to designate and support consortiums as defense manufacturing communities in order to strengthen the national security innovation base. This section enables the Secretary to make long-term investments in critical skills, infrastructure, research and development, and small business support.

According to a Manufacturing Institute study, over the next decade, there will be 2 million unfilled jobs in the manufacturing industry.[11] This skills gap has tremendous implications for the U.S. to manufacture the military equipment needed to maintain our technological superiority. Recent public-private partnerships have experienced success in addressing manufacturing workforce challenges. In FY 2016 alone, the Manufacturing USA Institutes have engaged 28,000 individuals in workforce development training programs and over 3,000 individuals have completed certificate, apprenticeship or other institute-led training programs. ***Consequently, CNSR supports authorizing Defense Manufacturing Communities consortia to address workforce shortages but also to provide for additional partnership opportunities for scientific research with DOD in the FY 2019 NDAA Conference Agreement.***

Human Factors Modeling and Simulation Activities
Sec. 214 of S. 2987 authorizes the Secretary of the Army to carry out activities to support human factors modeling and simulation research and development for the purposes of enhancing capabilities for human performance, human-systems integration, and training for the warfighter.

Despite having the most technologically advanced military in history, human factors issues remain the foundation of many of the challenges facing our armed forces. Understanding human behaviors, human-machine interactions, and simulating human activities are all vital to a variety of DOD missions, particularly the Army – the single largest active duty Service of the U.S. military. ***CNSR supports authorizing the Army to advance research and development of human factors modeling and simulation to enhance our effectiveness in all battlefield domains in the FY 2019 NDAA Conference Agreement.***

Quantum Information Science and Technology Research and Development Program
Sec. 222 of S. 2987 directs the Secretary to carry out a quantum information science and technology research and development program. Ultimately, this provision would help establish a broad-based framework for the ongoing investments in quantum S&T.

In the unclassified arena, the Office of Naval Research (ONR), AFRL, ARL, Defense Advanced Research Projects Agency (DARPA) and Intelligence Advanced Research Projects Activity (IARPA) have quantum scientific research programs. Requiring coordination across DOD and intelligence community quantum research efforts could help advance quantum scientific research. ***CNSR supports establishing a unified quantum research and development program at DOD in the FY 2019 NDAA Conference Agreement.***

[10] Ibid
[11] http://www.themanufacturinginstitute.org/~/media/827DBC76533942679A15EF7067A704CD.ashx

Partnerships for Next Generation Hypersonics Capabilities
Sec. 231 of H.R. 5515 expresses a sense of Congress that the Secretary of the Air Force should consider long-term partnerships with institutions of higher education to conduct research and education for next generation hypersonics capabilities.

As noted by the National Academies of Sciences, Engineering and Medicine, the primary source of new knowledge and talented individuals driving American innovation are the nation's universities.[12] In order to stay ahead of adversaries in hypersonics development, it would be wise for the Air Force to consider long-term research partnerships with academia. ***CNSR supports including Sec. 231 in the FY 2019 NDAA Conference Agreement.***

I-Corps Program for Defense Laboratories
Sec. 220D of H.R. 5515 authorizes the Secretary to carry out an Innovation Corps (I-Corps) program at the Defense laboratories. The purpose of the I-Corps program would be to help provide defense scientists and engineers with entrepreneurship and commercialization education, training and mentoring.

The I-Corps program began as an initiative of the National Science Foundation (NSF). According to NSF, over 450 companies have developed out of I-Corps trained teams and collectively raised over $250 million in seed capital.[13] Providing entrepreneurship and commercialization training to defense laboratory personnel may result in new spin off companies that could strengthen the industrial base among numerous other benefits. ***CNSR supports authorizing an I-Corps program for the defense laboratories.***

Micro-purchase Threshold
Sec. 822 of H.R. 5515 and sec. 813 of S. 2987 would raise the micro-purchasing threshold from $5,000 to $10,000. ***CNSR supports raising the micro-purchasing threshold as a way to reduce burden and compliance costs while ensuring proper stewardship of federal funds.***

In closing, thank you for the opportunity to share CNSR's FY 2019 NDAA conference priorities. If we can be of any assistance as the conferees work towards the conference agreement, please do not hesitate to contact us at cnsr.dodresearch@gmail.com.

Sincerely,

John Latini
Chairman
Coalition for National Security Research (CNSR)

[12] https://www.nap.edu/catalog/13396/research-universities-and-the-future-of-america-ten-breakthrough-actions
[13] https://www.govinfo.gov/content/pkg/CHRG-115hhrg27679/pdf/CHRG-115hhrg27679.pdf