June 28, 2021

The Honorable Jon Tester
Chairman
Subcommittee on Defense
Committee on Appropriations
United States Senate
Washington, DC 20510

The Honorable Betty McCollum
Chairman
Subcommittee on Defense
Committee on Appropriations
U.S. House of Representatives
Washington, DC 20515

The Honorable Richard Shelby
Ranking Member
Subcommittee on Defense
Committee on Appropriations
United States Senate
Washington, DC 20510

The Honorable Ken Calvert
Ranking Member
Subcommittee on Defense
Committee on Appropriations
U.S. House of Representatives
Washington, DC 20515

Dear Chairman Tester, Chairwoman McCollum, and Ranking Members Shelby and Calvert,

As Congress begins the fiscal year (FY) 2022 appropriations process, enclosed please find recommendations from the Coalition for National Security Research (CNSR) for funding levels for the Defense Science and Technology (S&T) program and select program elements (PEs) that drive innovations to ensure continued global U.S. military technological superiority.

CNSR is a coalition with more than 100 members from industry, academia, scientific and professional associations, and non-profits conducting vital scientific research to create new and improve existing technologies and capabilities to support the U.S. Department of Defense (DoD). With nearly 70 percent of Research, Development, Test and Evaluation (RDT&E) conducted extramurally[1], DoD relies on its partners such as CNSR members to perform the RDT&E that will provide the Department the technologies and capabilities it needs to strengthen and ensure our national security.

If the United States military is to maintain its technological advantage during great power competition, it is imperative that we make robust investments in the Defense S&T enterprise, including strengthening the future defense workforce. Many of the technologies that have sustained our military dominance stem from prior Defense S&T investments. These include stealth and counter stealth technologies, night vision, radar, sonar, nuclear propulsion, global positioning technologies and precision munitions among many others. The Defense S&T programs are investing now in artificial intelligence (AI), hypersonics, microelectronics, quantum information sciences, biotechnology, and directed energy to ensure DoD has the technological capabilities to deter adversaries or succeed in future conflicts. *As noted by the*

[1] https://ncses.nsf.gov/pubs/nsf21329

Defense Science Board (DSB), lower funding levels for Defense S&T could threaten the dominance of the U.S. military[2].

FY 2022 Budget Request for the Defense S&T Program

The Biden-Harris Interim National Security Strategic Guidance states that the United States will double down on science and technology investments and support cutting-edge technologies and capabilities that will advance our military and national security in the future[3]. In addition, the National Defense Strategy *(NDS)* calls for establishing an unmatched twenty-first century national security innovation base and sustaining Joint Force military advantages[4]. *Unfortunately, the FY 2022 budget fails to meet the commitment in the Interim National Security Strategic Guidance and request the appropriate resources to implement the NDS.*

While the budget requests the largest Research, Development, Test and Evaluation (RDT&E) top line ever, it simultaneously calls for cutting Defense S&T funding within the larger portfolio by *13%* or more than *$2.1 billion*. The budget also requests cutting defense basic research, the type of research that makes discoveries to enable future technologies and military capabilities, by *14.5%* or more than *$388 million*. Furthermore, even the Office of Management and Budget documents that calculate research and development (R&D) slightly differently than DoD, demonstrate the cuts requested – *1%* cut for defense R&D; *11%* cut for defense basic research and *16%* cut for defense applied research[5]. With China investing three times more annually in R&D than the U.S. and likely to be the world's top R&D performer in the near future[6], now is not the time to cut funding for the DoD's primary programs that create new technologies and capabilities – as well as to help train the next generation defense workforce – to ensure the U.S. military maintains its global dominance.

The FY 2022 budget proposes more than just cutting the Defense S&T program below FY 2021 Congressionally enacted levels, it proposes to cut certain research programs below levels requested in the FY 2021 budget request. More specifically, DoD requested fewer resources compared to its last budget request for overall 6.1 defense basic research; Army University Research Initiatives; Army applied research; Navy basic research; Air Force basic research; Air Force applied research; DTRA Basic Research Initiatives; and Defense-Wide basic research. This de-emphasis on supporting the kind of research that maintains our technological and strategic advantage over adversaries developing advanced capabilities puts the military at a competitive disadvantage. Condoning this proposed budget will have many negative, sustained implications for our national security in the short-term and long-term.

CNSR urges Congress to reject cuts requested in the FY 2022 budget for the Defense S&T program and increase funding by least 6% consistent with the recommendations from the National Defense Strategy Commission[7]; DSB[8]; National Security Commission on Artificial

[2] https://dsb.cto.mil/reports/1990s/DefenseScienceandTechnologyBaseforthe21stCentury.pdf
[3] https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/03/interim-national-security-strategic-guidance/
[4] https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf
[5] https://www.whitehouse.gov/wp-content/uploads/2021/05/ap_14_research_fy22.pdf
[6] https://ncses.nsf.gov/pubs/nsb20203
[7] https://www.usip.org/sites/default/files/2018-11/providing-for-the-common-defense.pdf
[8] http://www.dtic.mil/dtic/tr/fulltext/u2/a403874.pdf

Intelligence (NSCAI)[9]; National Academies[10]; CNAS[11]; House Armed Services Committee's Future of Defense Task Force[12]; Council on Competitiveness[13]; and American Academy of Arts and Sciences[14].

Defense Basic Research PE Recommendations

For decades, the defense basic research programs have provided the scientific breakthroughs to give the warfighter the weapons and infrastructure needed to succeed. Capabilities that help ensure our national security – such as advances in hypersonics testing, various quantum technologies, semiconductors critical to defense radar systems, solar cell efficiency, laser technologies, stealth capabilities, night vision, GPS, sonar, radar, precision munitions, biosensors, and near-real-time delivery of battlefield information – all derive from defense basic research. If we plan to succeed in this time of great power competition, we cannot underinvest in the long-term basic research that will provide U.S. military with new transformational capabilities.

Unfortunately, the FY 2022 budget request calls for slashing funding for defense basic research. It also requests Congress eliminate important regional capacity building and workforce development programs such as the Defense Established Programs to Stimulate Competitive Research (DEPSCoR). DoD often relies on scientists and engineers on an as-needed basis. It is critical that the Department support communities in states that typically are not involved in defense research -- not doing so could significantly slow down innovation and limit talent development opportunities for future scientists and engineers which are just beginning to emerge. As such, CNSR urges Congress to restore funding for DEPSCoR and other defense basic research programs mentioned in this letter.

University Research Initiatives

The FY 2022 budget request would cut University Research Initiatives (URIs) by more than *20%* which means funding at levels below 2005, adjusted for inflation. Given that universities and colleges perform the majority (55%) of DoD-funded basic research[15], this type of research that creates paradigm shifts in DoD's technological capabilities, cutting URIs this significantly will not only harm defense innovation efforts, but also workforce development since basic research funding often attracts the most creative minds in fields of critical interest to DoD[16].

A program within URIs, the Multidisciplinary University Research Initiative (MURI) regularly produces revolutionary new military technologies and has become an essential skunkworks for create innovation[17]. Domestic semiconductor manufacturing, advances in quantum computing and communication, military drones, nanotechnology, sensors enabling navigation in GPS compromised environments, counter-stealth capabilities, enhanced optical sensing for

[9] https://www.nscai.gov/wp-content/uploads/2021/03/Full-Report-Digital-1.pdf
[10] https://www.nap.edu/catalog/11463/rising-above-the-gathering-storm-energizing-and-employing-america-for
[11] https://www.cnas.org/publications/commentary/sharpening-the-u-s-militarys-edge-critical-steps-for-the-next-administration
[12] https://armedservices.house.gov/_cache/files/2/6/26129500-d208-47ba-a9f7-25a8f82828b0/6D5C75605DE8DDF0013712923B4388D7.future-of-defense-task-force-report.pdf
[13] https://www.compete.org/reports/all/202
[14] https://www.amacad.org/sites/default/files/publication/resources/Perils-of-Complacency_Full-Report_1.pdf
[15] https://ncses.nsf.gov/pubs/nsf21329
[16] https://dsb.cto.mil/reports/2010s/BasicResearch.pdf
[17] https://www.ida.org/idamedia/Corporate/Files/Publications/IDA.../STD/D-5361.pdf

intelligence, surveillance, and reconnaissance (ISR) missions, biological detection capabilities and explosive detection capabilities all stem from MURI-sponsored university basic research.

Unfortunately, the FY 2022 budget request proposes to fund MURIs at levels below FY 2005, adjusted for inflation. This will only exacerbate the fact that the program is already dramatically underfunded. *According to DoD, the MURI program received 365 proposals in FY 2020 but was only able to make 26 awards – leaving 339 proposals unfunded including 32 potentially game-changing research projects that were determined to be worthy of funding but were not due to a lack of appropriations.* Not funding potentially revolutionary defense scientific research will hurt our ability to maintain global military technological superiority.

In addition, the situation is similar for the Defense University Research Instrumentation Program (DURIP), which provides infrastructure and equipment support to build universities' capacity to conduct defense-relevant research. The FY 2022 budget request proposes to fund DURIP at levels below FY 2010, adjusted for inflation, further underfunding this program. *According to DoD, the DURIP program received 724 proposals in FY 2020 but was only able to make 172 awards – leaving a staggering 552 proposals unfunded including 229 critical infrastructure and equipment projects that were determined to be worthy of funding but were not funded due to a lack of appropriations.* If universities and colleges do not have the infrastructure and equipment necessary to do unique defense research, the DoD will potentially lose its biggest source of support for developing new capabilities.

Minerva Research Initiative

The Minerva Research Initiative is DoD's signature social science basic research program that funds university-led teams to address problems of strategic importance to U.S. national security. As noted by DoD officials, because many national security challenges impact or are driven by complex social dynamics, Minerva is an important source of new ideas to better understand social, behavioral, cultural, and political considerations that are inherent to our security and stability. Despite its importance, the FY 2022 budget request cuts funding for Minerva from $17 million to only *$4 million* within the Defense-Wide Basic Research Initiatives PE.

This cut is shortsighted for two main reasons. First, Minerva's research is aligned with and critical to carrying out the *NDS* in support of Department-wide priorities. Recently funded Minerva projects, such as "Russian Disinformation and Propaganda Campaigns" and "Empirical Analysis for Meeting Great Power Challenges" have given DoD unique insights that help shape future national security policies and better position the warfighter to navigate a complex global environment. Second, Minerva is another underfunded defense basic research program. *According to DoD, in FY 2019, Minerva received 180 applications but only funded 15 – at least 6 projects were determined to be worthy of funding but were not funded due to a lack of appropriations.*

Defense Applied Research PE Recommendations

Basic scientific research is just the first step in creating new or improving existing military technologies. Researchers, scientists, and engineers must apply the fundamental knowledge learned from basic research to solve complex military problems and develop the systems and components for potential solutions. To that end, we propose to highlight the success of the Defense-Wide Manufacturing Science & Technology PE, which the FY 2022 budget requests

cuts of *45%*. This PE provides DoD's contributions to the Manufacturing USA Institutes that help move discoveries from the nation's universities and research laboratories to the defense industrial base while strengthening the U.S. workforce. For example, DoD-funded institutes have demonstrated enhanced heat exchange capabilities for additive manufacturing, addressed cybersecurity supply chain issues, reduced weight of armor for military ground vehicles, and developed a first-of-its-kind advanced functional fiber to enable underwater communications[18]. In FY 2019, the Manufacturing USA Institutes conducted 561 major applied research and development projects of high priority to broad industry sectors. In addition, the network had more than 32,000 workers and students participate in education and workforce development activities. The Manufacturing USA Network is an example of a program supporting implementation of the *NDS* to enhance the domestic manufacturing and the defense industrial base.

Defense Advanced Research Projects Agency (DARPA) Recommendations

DARPA's ability to create truly revolutionary new capabilities is well documented. AI, microelectronics, speech recognition, touchscreen displays, unmanned aerial vehicles, and advanced wireless capabilities all stem from DARPA-funded research. DARPA has worked with the academic community to create the Internet, computer chips critical to AI systems, self-driving cars, stealth technologies, metamaterials, and neuro-prosthetics. More recently, DARPA's research was partially responsible for developing RNA-based vaccines, which have been critical in the global response to COVID-19[19]. It is safe to say that the world would be a different place without DARPA-enabled research. CNSR strongly supports robust funding for DARPA.

Defense Medical Research Recommendations

In order to maintain a strong military, the U.S. must have healthy individuals, families, and soldiers. Therefore, it is imperative for DoD to continue its contribution to preventions, treatments, and cures for diseases that affect the women and men in the military, their families, veterans, and the broader public. Additionally, defense medical research advances in battlefield medicine also contribute to civilian medical practices including in the areas of regenerative medicines, vaccine developments, and emergency field treatments. For all these reasons, CNSR is particularly supportive of the Congressionally Directed Medical Research Programs (CDMRPs), which fund high-risk, high-impact research that is complementary but not duplicative of efforts at other federal agencies. *Unfortunately, in FY 2019, these programs provided highly competitive as CDMRPs had an average success rate of just 15% - leaving more than 5,900 proposals unfunded*[20].

In closing, thank you in advance for your commitment to a robust Defense S&T program in FY 2022. Please do not hesitate to contact me if CNSR can be of any service to you.

Sincerely,

John Latini
Chairman

[18] https://www.nist.gov/publications/manufacturing-usa-20192020-highlights-report
[19] https://www.appropriations.senate.gov/imo/media/doc/Tompkins%20Statement%20For%20The%20Record.pdf
[20] https://cdmrp.army.mil/pubs/annreports/2020annrep/2020annreport.pdf

CNSR FY 2022 Appropriations Priorities

FY 22 PBR Line	PE Number	Agency - RDT&E	Program Element (PE) *($ in Thousands)*	FY21 PBR	FY21 Enacted	FY22 PBR	CNSR FY22 Request
			DOD RDT&E	***########***	***########***	***$ 111,964,188***	***N/A***
			DOD 6.1 Basic Research	***$ 2,319,126***	***$ 2,671,477***	***$ 2,282,934***	***N/A***
			DOD 6.2 Applied Research	***$ 5,391,069***	***$ 6,446,089***	***$ 5,508,884***	***N/A***
			DOD 6.3 Advanced Technology Development	***$ 6,331,410***	***$ 7,755,595***	***$ 6,893,460***	***N/A***
			DOD Science & Technology (S&T)	***$ 14,041,605***	***$ 16,873,161***	***$ 14,685,278***	***N/A***
			Army Basic Research Program Elements (PEs)				
1	601102A	Army	Defense Research Sciences	$303,257	$367,457	$297,241	$389,504
2	601103A	Army	University Research Initiatives	$67,148	$97,148	$66,981	$102,977
3	601104A	Army	University and Industry Research Centers	$87,877	$121,877	$94,003	$129,190
4	601121A	Army	Cyber Collaborative Research Alliance	$5,077	$5,077	$5,067	$5,382
5	601601A	Army	Research	N/A	N/A	$10,183	N/A
			Army Basic Research	***$ 463,359***	***$ 591,559***	***$ 473,475***	***N/A***
			Army Applied Research Program Elements (PEs)				
8	602141A	Army	Lethality Technology	$42,425	$108,925	$64,126	General Support
10	602143A	Army	Soldier Lethality Technology	$125,435	$204,435	$105,168	General Support
11	602144A	Army	Ground Technology	$28,047	$154,047	$56,400	General Support
12	602145A	Army	Next Generation Combat Vehicle Technology	$217,565	$265,565	$172,166	General Support
42	603461A	Army	High Performance Computing Modernization	$188,024	$228,024	$189,123	General Support
			Army Applied Research	***$ 920,881***	***$ 1,525,381***	***$ 914,288***	***N/A***
			Advanced Technology Development	***$ 1,203,590***	***$ 1,960,925***	***$ 1,297,437***	***N/A***
			Army Science & Technology (S&T)	***$ 2,587,830***	***$ 4,077,865***	***$ 2,685,200***	***N/A***
			Navy Basic Research Program Elements (PEs)				
1	601103N	Navy	University Research Initiatives	$116,816	$144,816	$117,448	$153,505
3	601153N	Navy	Defense Research Sciences	$467,158	$489,984	$484,421	$519,383
			Navy Basic Research	***$ 603,087***	***$ 653,913***	***$ 601,869***	***N/A***
			Navy Applied Research Program Elements (PEs)				
6	602131M	Navy	Marine Corps Land Force Technology	$50,623	$55,623	$51,112	General Support
7	602235N	Navy	Common Picture Applied Research	$48,001	$43,703	$51,477	General Support
8	602236N	Navy	Warfighter Sustainment Applied Research	$67,765	$116,255	$70,547	General Support
9	602271N	Navy	Electromagnetic Systems Applied Research	$84,994	$92,994	$85,157	General Support
10	602435N	Navy	Ocean Warfighting Environmental Applied Research	$63,392	$80,284	$70,086	General Support
13	602750N	Navy	Future Naval Capabilities Applied Research	$167,590	$170,724	$173,356	General Support
22	603680N	Navy	Manufacturing Technology Program	$60,122	$60,122	$57,263	General Support
90	604536N	Navy	Advanced Undersea Prototyping	$115,858	$89,812	$58,473	General Support
			Navy Applied Research	***$ 953,175***	***$ 1,182,581***	***$ 975,915***	***N/A***
			Navy Advanced Technology Development	***$ 760,396***	***$ 838,028***	***$ 777,788***	***N/A***
			Navy Science & Technology (S&T)	***$ 2,316,658***	***$ 2,674,522***	***$ 2,355,572***	***N/A***
			Air Force Basic Research Program Elements (PEs)				
1	601102F	Air Force	Defense Research Sciences	$315,348	$325,348	$328,303	$344,869
2	601103F	Air Force	University Research Initiatives	$161,861	$196,861	$162,403	$208,673
3	601108F	Air Force	High Energy Laser Research Initiatives	$15,085	$15,085	$0	$15,990
			Air Force Basic Research	***$ 492,294***	***$ 537,294***	***$ 490,706***	***N/A***
			Air Force Applied Research Program Elements (PEs)				
4	602102F	Air Force	Materials	$140,781	$238,281	$113,460	General Support
7	602202F	Air Force	Human Effectiveness Applied Research	$115,222	$134,122	$136,273	General Support
8	602204F	Air Force	Aerospace Sensors	$211,301	$233,301	$174,683	General Support
13	602605F	Air Force	Directed Energy Technology	$128,113	$130,613	$121,869	General Support
14	602788F	Air Force	Dominant Information Sciences and Methods	$178,668	$215,668	$169,110	General Support
15	602890F	Air Force	High Energy Laser Research	$45,088	$29,208	$0	General Support
			Air Force Applied Research	***$ 1,409,749***	***$ 1,563,685***	***$ 1,312,490***	***N/A***
			Air Force Advanced Technology	***$ 778,548***	***$ 1,002,082***	***$ 733,986***	***N/A***
			Air Force Science & Technology (S&T)	***$ 2,680,591***	***$ 3,103,061***	***$ 2,537,182***	***N/A***
			Space Force Funding				
			Space Force Applied Research	***$ 130,874***	***$ 216,874***	***$ 175,796***	***N/A***
			Space Force Advanced Technology	***$ 0***	***$ 0***	***$ 76,653***	***N/A***
			Space Force Science & Technology (S&T)	***N/A***	***N/A***	***$ 252,449***	***N/A***
Defense-Wide Ba		**Defense-Wide Basic Research Program Elements (PEs)**					
1	601000BR	Defense-Wide	DTRA Basic Research Initiatives	$14,617	$14,617	$11,828	$15,494
4	601110D8Z	Defense-Wide	Basic Research Initiatives	$35,565	$75,565	$39,828	$80,099
6	601120D8Z	Defense-Wide	National Defense Education Program	$100,241	$137,241	$112,195	$145,475
			Defense-Wide Basic Research	***$ 760,386***	***$ 888,711***	***$ 716,884***	***N/A***
Defense-Wide Ap		**Defense-Wide Applied Research Program Elements (PEs)**					
18	602668D8Z	Defense-Wide	Cyber Security Research	$15,255	$25,255	$15,380	General Support
50	603680D8Z	Defense-Wide	Defense-Wide Manufacturing S&T Program	$93,817	$245,817	$134,022	$260,566
			Defense-Wide Applied Research	***$ 1,976,390***	***$ 1,957,568***	***$ 2,130,395***	***N/A***
			Defense-Wide Advanced Technology Dev.	***$ 3,588,876***	***$ 3,954,560***	***$ 4,007,596***	***N/A***
			Defense-Wide Science & Technology (S&T)	***$ 6,325,652***	***$ 6,800,839***	***$ 6,854,875***	***N/A***
			DARPA Program Elements (PEs)				
		Defense-Wi	***DARPA Total***	***$ 3,566,348***	***$ 3,501,484***	***$ 3,528,729***	***$ 3,711,573***
			Medical Research Program Elements (PEs)				
25	602787A	Army	Medical Technology	$95,496	$102,496	$91,720	General Support
26	603002A	Army	Medical Advanced Technology	$38,896	$89,896	$43,804	General Support
62	603807A	Army	Medical Systems Advanced Development	$28,520	$34,020	$22,071	General Support
		DHP	Research, Development, Test and Evaluation Research	$8,913	$8,913	$9,091	General Support
		DHP	Exploratory Development	$73,984	$73,984	$74,024	General Support
		DHP	CDMRPs	$0	$1,763,900	$0	$1,869,734

To learn more or contact the Coalition for National Security Research (CNSR), please visit https://cnsr4research.org or email [cnsr.dodresearch@gmail.com.](mailto:cnsr.dodresearch@gmail.com)