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Introduction

This edition of the Tufts Washington Update for mid-December includes congressional updates, agency updates, and funding opportunities. Faculty, staff, and researchers are welcome to schedule calls with the Lewis-Burke Tufts team or meet with the team when they visit Washington, DC. Contact Amanda Bruno, Lewis-Burke Associates LLC, at <u>amanda@lewis-burke.com</u> with any questions or comments related to the Update's content, for more information on updates and opportunities, or to add a new recipient to the distribution list.

Congressional Updates

Fiscal Year 2020 Appropriations Update

Please find linked below Lewis-Burke's analysis of the final fiscal year (FY) 2020 appropriations spending packages and the outcome for major research, higher education, and academic medicine programs. Earlier today, the Senate passed the first minibus package, which included eight out of 12 spending bills, on a bipartisan vote of 71-23 and is getting ready to pass the remaining bills later today. This follows the House votes on Tuesday when both spending packages passed, and President Trump is expected to sign them by tomorrow before the current Continuing Resolution expires. Overall, FY 2020 appropriations would boost funding for all federal agencies that support research and most science and technology research and development programs across the federal government would see significant increases. The spending packages also include tax provisions and health care extensions of interest to higher education and the health care community.

Sources and Additional Information:

 Lewis-Burke's analysis of the final fiscal year 2020 appropriations spending packages is available <u>here</u>.

House Passes FY 2020 NDAA; Congress Releases Conference Report

After five months of contentious, painstaking negotiations, the House quickly approved the House-Senate conference agreement for the fiscal year (FY) 2020 *National Defense Authorization Act (NDAA)* in a 377-48 vote on December 11, forwarding the bill to the Senate, which approved it by a vote of 86-8 vote on December 17. President Trump has indicated that intends to sign the NDAA.

The NDAA, which authorizes funding and policies at the Department of Defense (DOD), has been passed before the end of the fiscal year in a bipartisan manner for the last 58 years. However, with Democrats now in charge of the House, Republicans controlling the Senate, and President Trump in the White House, the two parties had to resolve significant disagreements over a number of large issues, including the topline funding for the Department, DOD's ability to transfer funds from other projects to support President Trump's priority of constructing a border wall, the creation of a Space Force, and nuclear weapons modernization and posture, among other major issues.

Ultimately, many of these issues were settled in the conference report. For example, multiple sources note that Democrats and Republicans reached a deal to create a Space Force in exchange for a twelve-week family leave policy for all federal employees. The debate over whether the Department could transfer funds from other projects to construct a border wall was punted to the House and Senate Appropriations Committees, who are currently negotiating spending bills, including the bill that funds DOD.

The bill would authorize DOD to spend \$729.9 billion in discretionary funding, including \$658.4 billion for base functions and \$71.5 billion for Overseas Contingency Operations (OCO), though it is important to note that DOD's budget is approved through a separate defense appropriations bill, which is still being negotiated for FY 2020. The FY 2020 NDAA would authorize \$102.3 billion in research, development, test, and evaluation (RDT&E) funds, an 11.5 percent increase over the FY 2019 level. The

science and technology accounts would see a 4.3 percent increase above FY 2019 appropriations, with a similar increase to the basic research accounts.

As previously reported by Lewis-Burke in the House and Senate versions of the NDAA, the final NDAA bill reflects current congressional priorities for research and development activities with provisions for science and security; building collaborations with minority institutions; and a number of critical technology areas such as artificial intelligence (AI), cybersecurity, fifth-generation wireless (5G), quantum information science, and hypersonics. A summary of relevant provisions to the science community can be found below.

Science and Security

Protecting federally funded research, including topics sensitive to U.S. national security, remains a top science policy priority in Congress. The bill contains language from the *Securing American Science and Technology Act (SASTA)*, originally proposed by Rep. Mikie Sherril (D-NJ), which would develop an interagency working group to protect federally funded research and development from foreign interference, cyberattacks, theft, or espionage and develop recommendations for best practices for federal agencies and grantee institutions. This original bill earned support from a number of organizations within the research community. Another provision included in the NDAA would require DOD to develop, maintain, and share information on Chinese and Russian academic institutions that pose risk for illicit technology transfer of sensitive research. In its explanatory statement, the conference committee, also directed the Secretary of Defense to brief the defense committees on cooperative technology efforts with Russia and China and risks of technology transfer. Finally, another provision would require the Director of National Intelligence (DNI) to submit an annual report to the congressional intelligence committees on foreign entities that pose a threat to sensitive research at institutions of higher education, as well as recommendations for how the intelligence community can collaborate with the academic community to mitigate threats.

DOD Partnerships with Minority Institutions

One of the House's priorities to strengthen outreach and partnerships with Historically Black Colleges and Universities (HBCUs) and Minority Institutions (MIs) was reflected in the conferenced bill. One provision in the NDAA would allow the Secretary of Defense to establish incentives to encourage institutions of higher education to collaborate with HBCUs and MIs, while another would task the National Academies of Sciences, Engineering, and Medicine to conduct a study on the status of defense research at HBCUs and MIs and require DOD to develop an implementation plan in response to the study.

Artificial Intelligence

The bill includes a number of provisions pertaining to artificial intelligence (AI), demonstrating Congress' continued interest in and prioritization of advancing research and development (R&D) in AI. Provisions in the NDAA would require the Department to develop an AI education strategy for military service members and extend the authorization of the National Security Commission on AI, which was established in the FY 2019 NDAA, until March 1, 2021. The NDAA would also provide the Joint Artificial Intelligence Center (JAIC) additional authorities to recruit science and engineering experts and require the JAIC to submit biannual reports to the Defense Committees on its ongoing efforts. Lastly, the Conference Committee would direct DOD to brief Congress on explainable AI, as well as comparative capabilities in AI between China and the US.

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Cybersecurity

Congress continues to raise concerns regarding cybersecurity and the risks posed to DOD and the defense industrial base. Among many provisions pertaining to cybersecurity, the NDAA retained provisions from the Senate's bill requiring the Under Secretary of Defense for Research and Engineering (USD(R&E)) to complete a roadmap regarding cybersecurity research needed to fulfill the Department's technical needs, and to establish one more consortia of universities to advise the Secretary of Defense on cybersecurity issues. The bill would also require the Secretary of Defense to provide a report to the defense committees on the Department's framework of efforts to strengthen the cybersecurity of the defense industrial base.

Fifth-Generation Wireless (5G)

The NDAA also partially reflects one of the Senate's priorities to advance the RDT&E efforts around 5G. The bill would require the Secretary of Defense to develop a strategy to advance DOD's 5G capabilities including DOD's science and technology needs, as well as plans to strengthen engagement with industry, academia, federal agencies, and other partners. Another provision would establish a 5G testbed at the Nevada Test and Training Range and at least one other location. However, another provision to establish 5G research testbeds for electromagnetic spectrum sharing between the Department and non-federal systems was excluded from the NDAA following opposition from the wireless industry.

Quantum Information Science

The bill modifies the previous *Defense Quantum Information Science And Technology Research And Development Program* by authorizing the Secretary of each Service branch to designate a DOD lab or establish a collaboration with academic and private sector organizations to lead a Quantum Information Science Research Center, which is counter to DOD previous investment strategy.

Space Force

The NDAA would establish a new Space Force, a key victory for the Administration and long-time congressional champions including Chairman of the House Armed Service Committee (HASC) Subcommittee on Strategic Forces Chairman Jim Cooper (D-TN) and Rep. Mike Rogers (R-AL). The Space Force would be responsible for protecting U.S. interests in space, deterring aggression by adversaries in space, and conducting space operations. The long-running debate over proposals to establish a Space Force stems from calls by policymakers to protect U.S. commercial and military assets in space following aggressive actions by other nations, such as the Chinese anti-satellite missile test in 2007.

The Space Force will be housed within the Department of the Air Force, somewhat analogous in structure to the Marine Corps' existing as a service within the Department of the Navy. This is contrary to President Trump's original request to create an independent space branch on equal footing with the Navy, Army, or Air Force, although Vice President Mike Pence and other administration officials noted it could eventually become its own independent service. The NDAA would authorize the Secretary of the Air Force to transfer military and civilian personnel from the Air Force to the Space Force. The NDAA would also establish a number of new positions and organizations within the Space Force, including:

• A **Chief of Space Operations (CSO)**, who would be appointed by the President and confirmed by the Senate as the commander of the Space Force, reporting directly to the Secretary of the Air Force.

- A Space Acquisition Council chaired by a newly established Assistant Secretary of the Air Force for Space Acquisition and Integration with oversight of the Space Rapid Capabilities Office, the Space and Missile Systems Center, and the Space Development Agency.
- An Assistant Secretary of Defense for Space Policy, within the Office of the Secretary of Defense (OSD).

Other provisions included from the House's bill would:

- Establish a Joint Hypersonics Transition Office that would coordinate technical priorities across the Department and direct the Department to enter into agreements with institutions of higher education to support basic and applied research, as well as workforce development expertise. This effort will most likely be led by the newly created Assistant Director for Hypersonics-- a position currently occupied by Mr. Mike White. The Department recently released an request for information (RFI) for University and Academic Hypersonics Expertise;
- Establish a research program to better understand foreign malign influence operations, under the Department's university research programs.
- Create a process to continually update emerging technology priorities as the rate of scientific and technical progress increases;
- Develop a pilot program to improve civics education. This would be led by a school under DOD's Education Activity or that hosts a Junior Reserve Officers' Training Corps unit;
- Require the Department to develop a master plan for how DOD will use its authorities to modernize the workforce and capabilities of Department science and technology (S&T) reinvention laboratories;
- Require the Secretary to develop a plan for infrastructure modernization needs of DOD labs and test facilities;
- Require the Department to submit a report to relevant congressional committees on the implementation of the Global Health Security and the National Biodefense Strategies;
- Direct DOD to establish an academic center for acquisition innovation at a college or university; and
- Require the Director of National Intelligence to establish a Climate Security Advisory Council to ensure that the intelligence community is adequately prioritizing data collection and analysis of climate change and its impact to U.S. national security.

Other provisions included from the Senate's bill would:

- Require the Secretary to develop a program for blue carbon capture and direct air capture R&D in coordination with the Department of Energy (DOE) and the Department of Homeland Security (DHS);
- Establish a technology and national security fellowship program to integrate civilians with STEM expertise into relevant positions in DOD and Congress;
- Require USD(R&E) to develop a long-term energetics R&D plan;
- Direct the Defense Science Board (DSB) to carry out a study on emerging biotechnologies and their current and future national security applications. The Senate's bill originally directed DOD to establish an emerging biotechnologies research program;
- Preserve the funding and resources of the Army Medical Research and Materiel Command (MRMC) as it is placed under the Defense Health Agency until 2022;

- Enact changes to the National Institute of Standards and Technology's (NIST) Manufacturing USA program, to enhance capacity and capabilities for high performing institutes, increase interagency collaborations, and facilitate the development of standards-based certifications; and
- Reauthorize the Economic Development Administration's (EDA) popular Regional Innovation Program at a funding level of \$50 million per year through 2024, compared to its FY 2019 level of \$23.5 million.

The following provisions were not included in the final bill:

- Two provisions from the House's bill pertaining to support for Chinese language training. One provision would have required the Secretary of Defense to develop transition plans for institutions of higher education who previously hosted a Confucius Institute and were limited from receiving DOD funding for language training. The Conference Committee noted it was appreciative of DOD's efforts to ensure that institutions of higher education were eligible to receive funds from DOD for Chinese language instruction;
- A provision from the House expressing the Sense of Congress on the importance of coordinating studies and analysis research across the Department, the conferees noted that this already falls under the purview of USD(R&E);
- A provision from the House establishing a musculoskeletal research program.
- A provision from the House requiring DOD to develop a plan to ensure access to qualified STEM personnel. The Conferees instead urged DOD to quickly replace STEM personnel as they retire to ensure DOD's skills and knowledge base does not erode.

Conference Report of the National Defense Authorization Act, FY 2020

As reported by the House Armed Services Committee

December 9, 2019 (In thousands of \$)											
	FY 2019 Enacted	FY 2020 SASC	FY 2020 HASC	FY 2020 NDAA	NDAA v. SASC	NDAA v. HASC	NDAA v. Enacted				
RDT&E, total	91,727,403	104,053,113	100,706,668	102,309,846	1,743,267 (1.7%)	1,603,178 (1.6%)	10,582,443 (11.5%)				
S&T, Total	13,952,988	14,459,561	14,466,911	14,558,462	98,901 (0.7%)	91,551 (0.6%)	605,474 (4.3%)				
6.1 <i>,</i> Total	2,330,706	2,364,019	2,382,019	2,430,019	66,000 (2.8%)	48,000 (2.0%)	99,313 (4.3%)				
6.2 <i>,</i> Total	5,178,879	5,397,527	5,457,027	5,508,027	110,500 (2.0%)	51,000 (0.9%)	329,148 (6.4%)				
6.3 <i>,</i> Total	6,443,403	6,698,015	6,627,865	6,620,416	77,599 (1.2%)	7,449 (0.1%)	177,013 (2.7%)				
Army RDT&E	9,961,550	12,344,126	12,025,021	11,857,473	486,653 (3.9%)	167,750 (1.4%)	1,895,923 (19.0%)				
Army 6.1	463,395	466,980	466,980	483,980	17,000 (3.6%)	17,000 (3.6%)	20,585 (4.4%)				

Army 6.2	944,609	938,490	940,490	964,290	25,800 (2.7%)	23,800 (2.5%)	19,681 (2.1%)
Army 6.3	1,083,198	1,148,564	1,166,564	1,192,564	44,000 (3.8%)	26,000 (2.2%)	109,366 (10.1%)
Navy	18,384,533	20,061,759	19,796,158	19,674,604	387,155	121,554	1,290,071
RDT&E					(1.9%)	(0.6%)	(7.0%)
Navy 6.1	622,378	615,978	615,978	635,978	20,000 (3.2%)	20,000 (3.2%)	13,600 (2.2%)
Navy	912,491	955,453	1,006,453	1,006,953	51,500	500	94,462
6.2	-	-			(5.4%)	(0.01%)	(10.4%)
Navy 6.3	790,296	741,210	772,560	769,237	28,027 (3.8%)	3,323 (0.3%)	21,059 (2.7%)
Air	40,677,937	46,335,775	44,027,784	45,584,743	751,032	1,556,959	4,906,806
Force RDT&E					(1.6%)	(3.5%)	(12.1%)
Air	522,819	529,761	529,761	534,761	5,000	5,000	11,942
Force					(0.9%)	(0.9%)	(2.3%)
6.1	1 256 942	1 442 126	1 460 626	1 497 626	45 500	27.000	120 784
Force	1,330,842	1,442,120	1,400,020	1,487,020	45,500	27,000	(9.6%)
6.2					(0.270)	(1.070)	(0.070)
Air	857,297	1,066,153	879,153	985,153	81,000	106,000	127,856
Force					(7.6%)	(12.1%)	(14.9%)
6.3							
Defense	22,471,474	25,060,253	24,636,505	24,971,825	88,428	335,320	2,500,351
					(0.4%)	(1.4%)	(11.1%)
Defense	722 114	751 300	769 300	775 300	24 000	6 000	53 186
Wide	,,	, 51,500	, 00,000	110,000	(3.2%)	(0.8%)	(7.4%)
6.1							· · ·
Defense	1,964,937	2,061,458	2,049,458	2,049,158	12,300	300	84,221
Wide					(0.6%)	(0.0%)	(4.3%)
6.2	0 740 640			2 672 462	CO COC	100.100	22.452
Defense	3,/12,612	3,742,088	3,809,588	3,673,462	68,626 (1.9%)	136,126	39,150
6.3					(1.0%)	(5.0%)	1.170
Defense						25,000	59,058
Health	673,215	732,273	757,273	732,273		(3.3%)	(8.8%)
R&D							

Sources and Additional Information:

- Lewis-Burke's earlier analysis on the House and Senate bills can be found at <u>https://www.lewis-burke.com/sites/default/files/congressional_update_-</u>
 <u>sasc_and_hasc_approve_fy_2020_ndaa.pdf</u>.
- The text of the FY 2020 *National Defense Authorization Act* can be found at <u>https://docs.house.gov/billsthisweek/20191209/CRPT-116hrpt333.pdf</u>.
- The Conference Committee's joint explanatory statement can be found at <u>https://docs.house.gov/billsthisweek/20191209/116hrpt333-JointExplanatoryStatement.pdf</u>.

- The Conference Committee's summary of the bill can be found at <u>https://rules.house.gov/sites/democrats.rules.house.gov/files/CRPT-116hrpt333-summary.pdf</u>.
- The RFI for University and Academic Hypersonics Expertise is available at <u>https://govtribe.com/opportunity/federal-contract-opportunity/request-for-information-rfi-</u> <u>sources-sought-university-and-academic-hypersonics-expertise-n0016419snc39</u>.

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Senate Passes and President Trump Signs the FUTURE Act and FAFSA Simplification

On December 5, the U.S. Senate passed the *Fostering Undergraduate Talent by Unlocking Resources for Education (FUTURE) Act* (H.R. 2648), which reauthorizes the *Higher Education Act's* (HEA) Title III, Part F programs indefinitely at the current level of \$225 million per year. The Title III, Part F programs, whose funding had expired at the end of FY 2019, provide institutional aid from the U.S. Department of Education to historically black colleges and universities (HBCU) and other minority-serving institutions (MSI), including the Hispanic-Serving Institution STEM grant program.

Prior to passage, the Senate amended the *FUTURE Act* to include the *Faster Access to Federal Student Aid Act of 2018*, a bill from the previous Congress that would require the Internal Revenue Service (IRS) to disclose certain tax information to the U.S. Department of Education (ED) for the purposes of more easily verifying students' income and eligibility for federal student financial aid. According to Senate Health, Education, Labor, and Pensions (HELP) Committee Chairman Lamar Alexander (R-TN), this change would allow for the elimination of 22 questions from the Free Application for Federal Student Aid (FAFSA), one of his long-time top priorities. Chairman Alexander, who is retiring at the end of 2020, had previously blocked the *FUTURE Act* from passing in the Senate in order to maintain leverage for his stripped-down HEA reauthorization bill, the *Student Aid Improvement Act of 2019*.

Of note, the bill also increases the mandatory funding available for the Pell Grant program to \$1.455 billion in fiscal year (FY) 2020 and \$1.17 billion in FY 2021 and beyond. However, this change does not currently affect the maximum individual Pell Grant award amount.

The U.S. House of Representatives approved the amended version of the *FUTURE Act* passed by the Senate and President Trump signed the bill into law.

Sources and Additional Information:

- The Senate amended version of the FUTURE Act is available at <u>https://www.congress.gov/bill/116th-congress/house-bill/2486</u>.
- A press release from Senator Alexander on the Senate's passage of the *FUTURE Act* is available at https://www.alexander.senate.gov/public/index.cfm/pressreleases?ID=B7971BF7-252A-424A-971F-30C2620F75BA.

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Agency Updates

<u>NIH Advisory Committee to the Director Grapples with Sexual Harassment, Intersection of Medicine</u> and Artificial Intelligence

National Institutes of Health (NIH) Director Francis Collins opened his remarks to the December 12-13 meeting of the Advisory Committee to the Director (ACD) by addressing the major challenges facing the NIH research enterprise and the steps the agency is taking to improve the research environment and scientific rigor. The ACD is an external stakeholder group that is intended to represent a broad cross-section of the biomedical research community and provide input to the Director in the interest of supporting and promoting the agency and its research enterprise.

Over the past year, multiple issues have been elevated that threaten research integrity such as the pervasiveness of sexual harassment in research culture and the threats posed by foreign influence in the nation's research ecosystem. Much of the meeting was devoted to these priorities and the sections below summarize the conversations and expected impacts on the research community on these topics, among others.

Combating Sexual Harassment

The ACD Working Group on Changing the Culture to End Sexual Harassment presented its final report to the Committee, including its findings on the state of harassment culture and recommendations for improvements. NIH's Acting Chief of Staff and Associate Director for Science Policy and Working Group Co-chair Dr. Carrie Wolinetz led the discussion and presentation, reinforcing the Working Group's mission statement "We can do better. We must do better."

To demonstrate ongoing efforts, Dr. Wolinetz highlighted that in 2018 NIH reviewed 232 harassment allegations from the intramural community and 28 from the extramural community, but through 2019, NIH has reviewed 271 allegations internally and 105 externally, while also increasing the number of corrective actions taken. In addition, 102 anti-harassment trainings have been administered to the NIH intramural staff.

Recommendations from the Working Group focused on four major themes:

- 1. Increase Transparency and Accountability in Reporting of Professional Misconduct, especially Sexual Harassment;
- 2. Establish Mechanisms for Restorative Justice;
- 3. Ensure Safe, Diverse, and Inclusive Research and Training Environments; and
- 4. Create System-wide Change to Ensure Safe, Diverse, and Inclusive Research Environments.

Each theme contained a number of specific recommendations and proactive measures to reduce the prevalence of harassment in the NIH workforce, but perhaps the most significant recommendation made by the Working Group is that NIH create a process to treat professional misconduct, including sexual harassment, as seriously as research misconduct. This would include establishing a process requiring institutions to report findings of professional misconduct by grant personnel within two weeks of the determination or findings. Additional recommendations include creating incentives and funding opportunities to help restore the careers of individuals affected by sexual harassment and creating new

funding mechanisms that allow research awards to be given directly to trainees, among others. The comprehensive report also included an outline of ongoing initiatives that NIH has undertaken to combat sexual harassment including enhanced training, easier reporting pathways, and more transparent investigation processes.

Foreign Influence on Biomedical Research Integrity

The Foreign Influence on Research Integrity ACD Working Group submitted its final report to the committee in December 2018. However, the NIH, along with other federal research funding agencies, continues to face mounting pressure from Congress to address this issue. NIH Deputy Director for Extramural Research Dr. Mike Lauer stressed that there is a need to encourage and support international collaboration, while also striving to change the elements that have enabled a handful of individuals to engage in egregious behavior and the theft of time, ideas, and intellectual property.

To address the issue of research integrity, NIH has worked with outside groups including collaborating with the Office of Science and Technology Policy's (OSTP) Joint Committee on the Research Environment (JCORE) to increase awareness of the need to disclose foreign sources of funding. In his presentation, Dr. Lauer stressed that NIH is working with the National Science Foundation (NSF) to harmonize new reporting requirements related to the need to protect the security of the research enterprise.

Dr. Lauer indicated that over the past 18 months, NIH has further investigated over 70 institutions regarding specific instances of wrongdoing by approximately 140 NIH-funded investigators. Despite these numbers representing a small fraction of the total amount of NIH-funded investigators and institutions, Dr. Lauer stressed that the federal government does not yet know the full extent of the problem and will continue to investigate and mitigate these issues, while striving to implement the Working Group's recommendations.

Next Generation Research Initiative (NGRI) Update

In his presentation providing an update on the NGRI, Dr. Lauer noted that the number of early stage investigators (ESI) that NIH has been able to support has substantially increased since 2013, nearly doubling from approximately 600 in 2013 to over 1,200 in 2019. In addition, the agency has made several policy changes to support the career development of ESIs, including allowing for a one-year extension of ESI status due to childbirth.

Dr. Lauer also announced a new award focused on ESIs, the Stephen I. Katz Award, named in honor of Dr. Stephen Ira Katz, Director of the NIH's National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS), who passed away unexpectedly in 2018 and was a strong advocate for high-risk, high-reward research. The new award mechanism will be limited to ESIs and will not allow preliminary data with the intent of encouraging ESI researchers to pursue boundary-pushing high-risk, high-reward research ideas. The award, expected to roll out sometime in 2020, will be an R01 and come with five years of funding.

Artificial Intelligence and Biomedicine

The ACD Working Group on Artificial Intelligence and Biomedicine presented their recommendations on how NIH should be leveraging artificial intelligence (AI), machine learning (ML), and deep learning (DL) to advance biomedical research and improve healthcare cost and delivery. The Working Group's draft report and associated presentation affirmed the significant opportunities associated with AI and ML

including the ability to accelerate the pace of fundamental biomedical research and improve personalized medicine and clinical care. However, the report noted several challenges that must be overcome before NIH and the research community can unlock these significant opportunities. These challenges include a lack of ML-ready data—many available large datasets lack critical metadata and were originally collected for a narrow purpose. Some datasets may also have prohibitive access restrictions and may include inadvertent sampling biases. In addition, there are significant gaps between the norms in the biomedical research community and the ML research community regarding participant informed consent and data access.

The Working Group made several recommendations to guide the NIH's AI investment in three primary areas—data, ethics, and workforce. Importantly, the Working Group noted that it is not recommending that NIH invest in fundamental ML research, as this is best left to other agencies with different research missions. The Working Group also indicated that while it is not explicitly recommending that NIH invest in the continued use of ML tools on existing biomedical datasets, it assumes that these types of research activities will continue to happen across the NIH, typically consistent with the programmatic priorities of each Institute.

The Working Group's major recommendation is that NIH create a program of ambitious flagship projects that generate large-scale experimental data for ML analysis addressing key biomedical research questions or challenges. Importantly, these projects would involve biomedical and ML researchers and the peer review process would involve experts from both communities. Research teams funded under this new program would be required to make the generated datasets immediately and freely available to the scientific community and should include components that promote the rapid exchange of ideas and progress as it relates to the core biomedical research problem being addressed.

In addition, the Working Group recommended that NIH develop and publish criteria for evaluating biomedical datasets based on their value for ML-based analysis (e.g. clear provenance and metadata; accessibility; multimodal; etc.) and that NIH develop and publish ethical principles for the use of AI and ML in biomedicine, with a focus on standards for obtaining informed consent from human participants as well as criteria for data access. Finally, the Working Group recommended that NIH develop new training approaches and curricula for attracting and training experts who want to work at the intersection of AI, ML, and biomedicine.

Sources and Additional Information:

• The webcast of the ACD meeting and all the reports and associated slide presentations from the Working Groups are available at https://acd.od.nih.gov/meetings.html.

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Department of Defense Releases Notice of Intent for Synthetic Biology Manufacturing Institute

The Department of Defense (DOD) released a Notice of Intent (NOI) December 2 to announce its competition for a ninth Manufacturing Innovation Institute (MII) for synthetic biology (SynBio). The NOI signals the Department's intent to release a formal solicitation in late February 2020 for a new institute that will "foster an end-to-end 'ecosystem' in the U.S. for Synthetic Biology including cohesive scale-up manufacturing and downstream processing capabilities, integrated test & evaluation capacity, and data operationalized for design for manufacturing, all coupled with workforce development and a focus on

ethics and biosecurity." The NOI follows a DOD request for information (RFI) released on September 30. Proposers days, which provide an opportunity to learn more about the DOD's plans for the new institute and ask questions about the competition, are planned after the solicitation's release in mid-to-late March 2020.

As previously reported by Lewis-Burke, the institute will scale up critical bio-manufacturing processes and related biotechnologies in partnership with industry and academia. The NOI specifically notes that the institute will "enable universities and small to medium enterprises to participate in and benefit from the MII's manufacturing advances." The institute is expected to create new opportunities for U.S. manufacturers due to the applicability of SynBio manufacturing to both defense priorities and the commercial potential of such innovations in food, agriculture, fuel, pharmaceuticals, and other consumer products. The MII should be structured to address both DOD and commercial applications, with a focus on maturing the technology from Technology Readiness Level (TRL) 4, which means component-level technology validated in a laboratory, to TRL 7, a system prototype demonstration in an operational environment.

Sources and Additional Information:

- The DOD Notice of Intent (NOI) to announce its competition for a ninth Manufacturing Innovation Institute is available at <u>https://beta.sam.gov/opp/f87127393cb84157b8da1957ec686d16/view?keywords=FA8650-20-</u> S-5028&sort=-relevance&index=&is_active=true&page=1.
- The DOD Request for Information (RFI) released on September 30 is available at https://www.manufacturingusa.com/news/dod-announces-request-information-new-manufacturing-innovation-institute-dedicated-synthetic.
- Lewis-Burke's write-up of the DOD RFI for Synthetic Biology Manufacturing Institute is available at <u>https://www.lewis-burke.com/sites/default/files/agency_update-</u> dod announces rfi for synthetic biology manufacturing institute.pdf.

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Funding Opportunities

Department of Energy Releases Biological and Environmental Research Funding Opportunities

The Department of Energy (DOE) released the third and fourth funding calls of the fiscal year under its Biological and Environmental Research (BER) program:

Computational Tool Development for Integrative Systems Biology Data Analysis

The third BER funding call is the first for the biological program and is a \$5 million funding opportunity announcement (FOA) for "Computational Tool Development for Integrative Systems Biology Data Analysis." The goal of the FOA is to develop new computational approaches that can integrate large, disparate data types from multiple and heterogeneous sources generated by DOE's systems biology research. The research will focus on data from plants and microbes relevant to DOE missions in energy and environment, including laying the scientific groundwork for cost-effective production of biofuels and bioproducts as well as enhancing understanding of the biological dimensions of nuclear and radiological environmental cleanup.

The funding call is open to research universities and nonprofit research institutions. National laboratories can be considered as partners but not primary recipients of funds. DOE expects to make between five and 10 awards that will range from \$100,000 to \$350,000 per year over three years. Pre-applications are due **January 31, 2020** at 5:00 PM Eastern Time and are required. Pre-application responses are due February 19, 2020, and applications are due April 9, 2020 at 11:59 PM Eastern Time.

Earth System Model Development and Analysis

DOE released the fourth funding call under its biological and environmental research program and the third for its environmental program. The \$7 million funding opportunity announcement is for "Earth System Model Development and Analysis" aimed at improving the predictive power of Earth system modeling. The research efforts are focused in three main areas: general improvements to model software especially for DOE's Energy Exascale Earth System Model (E3SM), better representation of cloud and aerosol interactions within the models, and improved approaches to model initialization. Applicants are highly encouraged to use machine learning techniques. Applications are open to universities and nonprofit research institutions. Non-DOE government labs and other federal agencies can be collaborators.

DOE expects to make between six and 13 awards ranging from \$450,000 to \$900,000 over three years. Pre-applications are due **February 14, 2020** at 5:00 PM Eastern Time and are required. Pre-application responses are due February 21, 2020, and applications are due March 31, 2020 at 11:59 PM Eastern Time.

Sources and Additional Information:

- The Computational Tool Development for Integrative Systems Biology Data Analysis funding opportunity announcement is available at <u>https://science.osti.gov/-</u> /media/grants/pdf/foas/2020/SC_FOA_0002217.pdf.
- The Earth System Model Development and Analysis funding opportunity announcement is available at https://science.osti.gov/-/media/grants/pdf/foas/2020/SC_FOA_0002230.pdf.

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Department of Energy Plans to Release Vehicle Technologies Research and Development Solicitation in February 2020

On December 11, the Department of Energy (DOE) announced its plans to release its annual vehicle technologies research and development funding opportunity announcement in February 2020. In FY 2019, DOE awarded \$59 million to 43 projects. Based on projected FY 2020 Congressional appropriations for renewable energy research, a similar amount of funding is expected to be available in FY 2020. The "Fiscal Year 2020 Advanced Vehicle Technologies Funding Opportunity Announcement (FOA)" is managed by DOE's Vehicle Technologies Office (VTO) within the Office of Energy Efficiency and Renewable Energy. VTO's research and development portfolio includes advanced batteries, electric drive systems, smart charging technologies, energy efficient mobility technologies and systems, advanced combustion engines and fuels, materials for vehicle light-weighting, technology integration, and transportation and energy analysis.

The FY 2020 funding call is likely to fund 15 research topics:

- 1. Lithium-Ion batteries using silicon-based anode;
- 2. Low cost electric traction drive systems using no heavy rare earth materials;
- 3. Utility managed smart charging;
- 4. Platinum group metals (PGM) content reduction to enable cost-effective aftertreatment for gasoline and diesel engines;
- 5. Improved efficiency of medium- and heavy-duty natural gas and propane (LPG) engines;
- 6. Energy-efficient off-road technologies directly applicable to agriculture and/or other off-road vehicles;
- 7. Lightweight and high-performance fiber-reinforced polymer composites for vehicle applications;
- 8. Improving transportation system efficiency through better utilization;
- 9. Enabling vehicle and infrastructure connectivity;
- 10. Improving mobility, affordability, and energy efficiency through transit;
- 11. Gaseous fuels technology demonstration projects;
- 12. Alternative fuel proof-of-concept in new communities and fleets;
- 13. Electric vehicle and charging community partner projects;
- 14. Technology integration, such as auxiliary school/transit bus heating systems for electric vehicles and innovative compressed natural gas fuel tank business models; and
- 15. Transportation and energy analysis, such as developing and validating modeling approaches capable of estimating the potential energy impacts of emerging potential mobility modes (e.g., bike share and scooters).

The Notice of Intent provides more detailed information on each research topic and is linked below. Cost sharing of between 20 and 50 percent, depending on research topic is typically required. However, research universities and nonprofit organizations are exempt from cost share requirements in FY 2020. Section 108, "Short-Term Cost-Share Pilot Program" of the Department of Energy Research and Innovation Act (RIA), Pub. L. 115-246, amended EPACT 2005 section 988, included a two-year pilot program (which is in effect until September 2020) exempting institutions of higher education and non-profit organizations from the minimum 20 percent cost share requirement for research and development activities. Cost-sharing is still recommended, especially when collaborating with industry partners on specific projects, and improves chances of success, but not required for DOE to consider an application.

In FY 2019, funding awards ranged from \$600,000 to \$7.5 million to support projects from two to five years. The graphic below shows the distribution of funding in FY 2019.



For faculty interested but unfamiliar with DOE's VTO and its research and development portfolio, volunteering to participate in VTO's 2020 annual merit review on June 1-4, 2020 (usually held in the Washington, DC area) is a unique opportunity to learn in detail about VTO's current projects, meet with DOE program managers and potential industry partners, and have DOE review future applications more favorably. In general, faculty that have served on peer reviews have had a higher level of success on future proposals. DOE selects reviewers from a diverse set of backgrounds, including current and former members of the vehicles industry, academia, national laboratories, and government. Each reviewer evaluates a set of projects based on how much they contribute to or advance DOE's missions and goals. The reviewer also considers the project's breadth, depth, appropriateness, accomplishments, and potential. The reviewers then draft and submit findings and recommendations to VTO in the Annual Merit Review Report. Interested faculty can contact a VTO program manager directly with his or her interest in serving as a peer reviewer.

Sources and Additional Information:

• The Notice of Intent is available at https://www.grants.gov/web/grants/search-grants.html?keywords=de-foa-0002222.

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Department of Energy Launches Plastics Innovation Challenge and First Research and Development Funding Calls

On November 21, the Department of Energy (DOE) launched a Plastics Innovation Challenge. The purpose is to address plastic waste and leverage DOE's fundamental and applied research capabilities to develop energy-efficient plastics recycling technologies. The lead DOE offices will be the Office of Energy Efficiency and Renewable Energy (EERE) and the Office of Science (OS). DOE will release requests for information and host workshops in the next several months to engage with research universities, national laboratories, and industry to identify current barriers to plastic recycling technologies, needed research and development to drive innovation, and bring new technologies to market.

The Plastics Innovation Challenge, and the framework for future requests for information and workshops, is focused on addressing five major goals over the next 10 years:

- 1. **"Collection**: Develop novel collection technologies to prevent plastics from entering the ocean.
- 2. **Deconstruction**: Develop biological and chemical methods for deconstructing plastic waste, including from rivers and oceans, into useful chemical streams.
- 3. **Upcycling**: Develop technologies to upcycle waste chemical streams into higher-value products, which reduces energy intensity and encourages further recycling.
- 4. **Design for recyclability**: Develop new plastics that are recyclable-by-design and can be scaled for domestic manufacturability.
- 5. **Commercialization**: Support a domestic plastics upcycling supply chain for U.S. companies to scale and deploy new technologies in domestic and global markets."

DOE also plans to release funding opportunities to support research and development. To date, DOE has released two funding solicitations and a notice of intent for a third in this topic area, including:

- Energy Frontier Research Centers (EFRC) for Chemical Upcycling of Polymers. Chemical upcycling of polymers is a new topic in the current EFRC competition. DOE plans to fund up to five new EFRCs in this topic area, each \$2 million to \$4 million per year over four years. The research priorities are based on the most recent Basic Energy Sciences workshop, "Roundtable on Chemical Upcycling of Polymers." Pre-applications are due by January 16, 2020.
- Helping U.S. Manufacturers Increase the Recovery, Recycling, Reuse, and Remanufacturing of Plastics. In November, DOE announced a \$12 million funding opportunity to support up to 18 exploratory and full-scale research and development projects and up to eight education and workforce development projects through its Reducing Embodied Energy and Decreasing Emissions (REMADE) Manufacturing Institute. The goal is to create new, energy-efficient methods for U.S. manufacturers to recover, recycle, and remanufacture used consumer products with plastic. A letter of intent was due on November 14.
- January 2020 Funding Call on Bio-Optimized Technologies to Keep Thermoplastics out of Landfills and the Environment (BOTTLE). On December 10, DOE released a Notice of Intent to issue a \$10 million to \$15 million funding opportunity in January 2020 to fund about a dozen projects over three years. The BOTTLE Program would be jointly funded by the Bioenergy Technologies Office (BETO) and Advanced Manufacturing Office (AMO).

Specifically, BOTTLE would "develop novel polymers, create innovative deconstruction pathways, and establish a framework for evaluating carbon and energy efficiency." To achieve this, BOTTLE is expected to include the following topic areas:

- Highly Recyclable or Biodegradable Bio-Based Plastics;
- Novel Methods for Deconstructing and Upcycling Existing Plastic Waste; and
- BOTTLE Consortium Collaborations to Tackle Challenges in Plastic Waste.

Applicants will be required to coordinate research efforts with the newly established, national lab-led BOTTLE consortium.

Sources and Additional Information:

- The Roundtable on Chemical Upcycling of Polymers summary is available at <u>https://science.osti.gov/-/media/bes/pdf/BESat40/Polymer_Upcycling_Brochure.pdf</u>.
- The EFRC funding opportunity announcement is available at https://science.osti.gov/bes/Funding-Opportunities.
- More information on the scope and requirements of the REMADE call for proposals to address challenges in plastics recycling is available at https://www.energy.gov/eere/articles/energy-department-manufacturing-institute-announces-call-proposals-address-challenges.
- The Notice of Intent for BOTTLE can be found at <u>https://eere-</u> <u>exchange.energy.gov/Default.aspx#Foald3dd8c32e-b349-4193-b79f-f1c0d7ccbb4c</u>.

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Department of Energy Plans to Release Bioenergy Funding Call in January 2020 and Announces Future Research and Development Topics

The Department of Energy (DOE) released future research topics in bioenergy for its FY 2020 funding opportunity announcement it plans to release in January 2020. The Notice of Intent (NOI) with more detailed information is linked below. DOE plans to fund research and development in the "FY20 Bioenergy Technologies Multi-Topic FOA" in the following areas:

- Scale up of bench applications from lab-scale to engineering-scale unit operations for biofuel and bioproduct production;
- Waste to energy strategies for the bioeconomy, such as converting wet waste, such as food waste, to energy;
- Algae bioproducts and CO2 direct-air-capture and efficiency;
- Biomass to restore natural resources, such as new methods to quantify the environmental and economic benefits associated with growing energy crops, with a focus on restoring water quality and soil health;
- Efficient wood heaters; and
- U.S.-Canadian-Mexican multi-university partnerships for biopower and bioproducts research and education to manage urban and suburban wastes, with a major focus on using plastic waste to make products and using wastes to produce low-cost biopower.

In FY 2019, DOE issued a \$73 million funding call in bioenergy and made 35 project awards ranging from \$700,000 to \$5 million to support research and development activities ranging from two to five years. In FY 2020, DOE is expected to issue at least a \$50 million funding call, but is contingent on final congressional appropriations for DOE's bioenergy office.

Sources and Additional Information:

• The Notice of Intent is available at <u>https://eere-exchange.energy.gov/</u> under DE-FOA-0002203.

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