Lewis-Burke Analysis of the Federal Innovation and Economic Development Landscape

Lewis-Burke Associates LLC – September 30, 2021

This document provides an overview of federal innovation, commercialization, and economic development initiatives of interest to the research community.

This memorandum comes at a time of shifting political forces and philosophies regarding the place of the federal government in supporting innovation and economic development. The confluence of the impacts of COVID-19 and the inequalities it exposed, a supportive White House, and intensifying global competition have softened once fierce, partisan debates in Washington over whether the government should directly support specific industries or regions. While general disagreements remain over funding amounts and the directions of some programming, the events of the past few years have stimulated newfound, bipartisan efforts to advance sweeping competitiveness legislation that call for targeted investments in emerging sectors and enhanced support for use-inspired research. In addition to bipartisan proposals, the Biden Administration and congressional Democrats have taken further steps to support federal funding in equitable innovation and economic development. Taken together, these recent actions are poised to fundamentally alter the landscape around the role of federal investments in economic prosperity for years to come, with the research community playing a central part.

In considering the emerging federal priorities outlined in this document, research entities should consider how their current structures could evolve to meet the myriad of potential future opportunities. This includes developing the capacity to pursue large scale, topical awards; reimagining research priorities to address major societal challenges; developing clear partnerships with industry and local governments; considering workforce development needs; and fostering technology-based economic growth with an underlying commitment to lifting underserved populations.

This document serves to provide an overview of this ongoing conversation and some of the core opportunities in this space. The foci of this document are innovation, economic development, and commercialization initiatives with tangential areas like workforce development and infrastructure addressed when they are included in a larger research or economic development initiative.

Specifically, this document provides:
- An update on innovation and economic development priorities of Congress and the Biden Administration;
- Federal agency priorities related to innovation, public-private partnerships, and technology transfer; and
- Detailed analyses of federal funding opportunities to encourage technology transfer and economic development.

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Introduction: Innovation and Commercialization Priorities for Congress and the Administration

Innovation and the Biden Administration

For four years, the general philosophy of the Trump Administration regarding innovation was to seek ways to eliminate barriers to business growth and deprioritize direct federal investments in economic development initiatives in favor of private-sector incentives like Opportunity Zones. Conversely, President Biden's "Build Back Better" campaign initiative viewed the federal government as an important partner in fostering innovation and economic development. This philosophy has been clearly implemented at agencies since President Biden's inauguration, as we've seen significantly more federal interest in stimulating equitable economic revitalization and leveraging large-scale investments in research and development (R&D) to address societal challenges like climate change, and with support from Congress, this trend is likely to continue.

When President Biden took office with a unified government, the Administration's first priority was to rebuild the economy following COVID-19 in a way that promotes equity and global competitiveness in emerging areas. Several of the campaign proposals that called for massive investments in innovation and regional development programming matriculated to a series of directives to Congress to legislate into law. For instance, the Administration's *American Jobs Plan*, which was the basis of the President's infrastructure proposal, called for geographically-diverse regional technology hubs to stimulate growth in support of key industries. In addition, President Biden's first budget request called for a series of programs to advance use inspired-research, including Advanced Research Projects Agencies for Health (ARPA-H) and Climate (ARPA-C), as well as a new Directorate at the National Science Foundation (NSF) for technology, innovation, and partnerships. While several of these proposals built on provisions included in emerging competitiveness legislation, there were new concepts that were left to Congress to further define.

Behind the Administration's proposals to stimulate federal support for innovation and use-inspired research are a series of topical interests, many of which were laid out in the White House's fiscal year (FY) 2023 R&D priorities memo. The memo highlights the importance of federally supported R&D to address societal grand challenges, including climate change, health, prosperity, security, environmental quality, equity, and justice. Additionally, it underscores the Administration's focus on innovation and the translation and commercialization of basic research. The memo also includes specific areas where the U.S. should strive to maintain global economic competitiveness with support from federal investments. Several of these areas are carry-overs from the Trump Administration and include, but are not limited to, artificial intelligence, quantum information science, advanced communications technologies, microelectronics, high-performance computing, biotechnology, robotics, space technologies, and climate-energy technologies.

Perhaps the Administration's most engrained cross-cutting priority for federal investment is "equity." The Biden Administration believes that COVID-19 showcased various longstanding inequities and on his first day in office, President Biden signed Executive Order 13985, which called for addressing disparities through federal investments across the government. The impact of this order has been clear in subsequent innovation and economic development programs. In the R&D priorities memo, for instance, the Administration directs agencies to prioritize R&D investments in programs "with strong potential to advance equity for all, including people of color and others who have been historically disadvantaged, marginalized, and adversely affected by persistent poverty and inequality." Equity, and specifically

support for underserved populations and geographies, was also elevated to the number one investment priority for the Economic Development Administration (EDA).

Collectively, the Biden Administration's first year in office has displayed a fierce drive to enhance federal support for equity, place-based innovation, and use-inspired R&D that will result in historic investments in the research community. With the White House's stance clearly conveyed, focus now shifts to Congress, where there has been bipartisan support for several of the Administration's priorities. However, it remains to be seen whether they will deliver on the myriad of pending authorization and funding proposals before them.

Congressional Support for Innovation

The 117th Congress has a razor-thin Democratic majority, and so far, there have been fits and starts in bipartisan cooperation to advance innovation policies. The first major piece of legislation for the new Congress was the *American Rescue Plan Act* (ARPA), a $1.9 trillion COVID-19 recovery bill that included several economic development provisions, such as $3 billion for the Economic Development Administration (EDA). The bill passed on a party-line vote. Since then, there has been a growing consensus across the aisle to invest in domestic capacity to better compete with China and other emerging economies in the innovation space, as well as a drive to better distribute economic growth nationwide in the wake of influential reports that the vast majority of the nation's innovation capacity is confined to five metro areas. This led to the bipartisan passage of the Senate's *United States Innovation and Competition Act* (USICA) and subsequent complementary competitiveness bills in the House of Representatives that would authorize billions of dollars in strategic investments to advance economic growth with strong proposed investments in research and development.

At the time of this memo, final consideration of USICA and the complementary House bills is on hold as the Democrats are again seeking to pass a large-scale social spending measure on a party-line vote through the same reconciliation mechanism that was used to pass ARPA. The House committees have marked up their versions of the bill, which contained substantial funding for research and economic development initiatives, including funding for several programs that could be formally authorized under USICA and the House bills. It remains to be seen how the Senate will counter with a one vote majority and moderate Senators objecting to the initial proposed $3.5 trillion price tag. Still, momentum has been building in Congress around innovation and economic development for some time, as USICA was an amalgamation of several key bipartisan measures, and this trend could continue as the nation seeks to rebuild from COVID-19 and compete in emerging economic fields.

Select Innovation and Economic Development Legislation

Included in this section are high-level overviews of some of the key legislation and discussions related to innovation, commercialization, and economic development in Congress as they currently stand. Lewis-Burke will continue to monitor each of these areas and provide timely updates as they emerge.

United States Innovation and Competition Act & Complementary Legislation

In 2021, Congress expressed renewed interest in advancing U.S. domestic competitiveness to strengthen the economy, develop the skilled workforce, and increase national security. Through the Senate's *United States Innovation and Competition Act* (USICA) and several evolving pieces of legislation in the House, Congress has proposed major investments in scientific research agencies to support technology transfer, regional economic development, and innovation across the U.S. The Senate passed USICA on June 8, with a bipartisan vote of 68-32. The House is currently working to develop its companion to USICA through packaging several pieces of legislation together, including the *NSF for the Future Act* and the *Department of Energy Science for the Future Act*. It is expected that at least parts of the House and Senate packages will ultimately become law in 2021, which would authorize substantial new programs at agencies such as the National Science Foundation (NSF), the Department of Commerce (DOC), and the Department of Energy (DOE), among others. Details on some key provisions at relevant agencies are included below.

National Science Foundation (NSF) Provisions
The proposed investments for NSF in both the House and Senate's legislative packages indicate strong support for increased funding for research at the agency. Both House and Senate bills would create a new innovation-focused Directorate that would aim to support more use-inspired research for enhanced competitiveness and economic development. Of note, the Senate's USICA bill, would authorize the following investments in NSF:

- Authorize $81 billion in funding over five years for NSF;
- Prioritize ten key technology focus areas such as artificial intelligence, advanced computing, resilience, advanced communications, wireless research, energy innovation, and biotechnology;
- Authorize $29 billion for a new **Technology and Innovation Directorate** that would fund research in the key technology areas, University Technology Centers, research testbeds, workforce development, and commercialization efforts;
- Dramatically expand the EPSCoR program and create other capacity building programs to diversify the recipients of NSF funding; and
- Direct NSF and DOC to improve STEM education in rural communities.

The House's companion to USICA's NSF provisions, the *NSF for the Future Act,* passed the chamber at the end of June with a bipartisan vote of 345-67. The bill demonstrates the House Science, Space, and Technology Committee's vision for NSF, which differs in scale from the investments called for in USICA. The *NSF for the Future Act* would:

- Authorize $73 billion for NSF over five years;
- Authorize $13.2 billion for a new **Directorate for Science and Engineering Solutions** (SES) to address societal grand challenges through collaborative, use-inspired, and translational research;

- Direct a 50 percent increase to the Mid-Scale Research Infrastructure program, which would include development of a roadmap to address the growing need for advanced computing capabilities;
- Authorize a 50 percent increase in funding over five years for key STEM education programs;
- Increase support for minority serving institutions (MSIs) and other emerging research institutions; and
- Expand data collection on the STEM workforce.

The *NSF for the Future Act* includes several requirements to increase research accessibility, accountability, and security. There are also several provisions related to specific areas of research, including: climate change; violence; social, behavioral, economics; food-energy-water; sustainable chemistry research and education; risk and resilience; and support for biological research collections.

It is important to note that both USICA and the *NSF for the Future Act* are authorizing bills; funding for the proposed programs would need to come from the annual appropriations process or via the reconciliation infrastructure package currently being worked on by Democrats in Congress. Although neither bill has been signed into law as of this writing, NSF is already preparing for a new Directorate focused on technology transfer and support for innovation. We anticipate NSF to continue to play a key role in the national conversation around fostering domestic competitiveness.

Lewis-Burke's comparative analysis of USICA and NSF for the Future Act provisions is available [here](#).

Department of Energy (DOE) Provisions
DOE and its National Laboratory system have always played a pivotal role in advancing U.S. innovation and technology development and are crucial components to the competitiveness legislation moving through the House and Senate. In the Senate, USICA would authorize $16.9 billion for DOE over five years starting in fiscal year (FY) 2022 for research and development (R&D) initiatives and supply chain activities focused on artificial intelligence, advanced computing, resilience, advanced communications, wireless research, energy innovation, and biotechnology. A key amendment passed with USICA would create a Foundation for Energy Security and Innovation (FESI), a nonprofit foundation that would channel private-sector and philanthropic investments to help support the creation, development, and commercialization of next generation clean energy technologies to aid in meeting ambitious climate goals. The House introduced similar legislation in July ([H.R. 4863](#)). In alignment with the Biden Administration's government-wide initiative to promote equity, USICA requires that 20 percent of the funds allocated to DOE, as well as NSF, go to EPSCoR states to help achieve a more equitable distribution of R&D funds.

On June 28, the House passed on a vote of 351-68 the *[DOE Science for the Future Act](#)* to complement various USICA provisions. This legislation would authorize $57 billion for the DOE Office of Science over the next five years. Most of the funding is dedicated to support fundamental research and the construction of world-class science facilities and instruments. The bill also expands programs that support broadening participation of underrepresented groups in STEM. Most relevant to commercialization activities, the bill would establish a new public-private partnership program to advance fusion energy reactor plant designs.

In addition, the *[Regional Innovation Act](#)*, which was introduced in the House, would establish regional clean energy innovation hubs in different parts of the country. DOE would establish five hubs, each funded at $10 million a year over five years and would be led by a consortia of research universities,

national labs, nonprofit organizations, and industry. Also, in July, the House introduced the *Energizing Technology Transfer Act*. The bill would formally establish a Chief Commercialization Officer for DOE, who would also lead the Office of Technology Transitions. Further, the bill creates new or significantly expands technology transfer and commercialization programs at DOE, including a national clean energy incubator program, a clean energy technology university prize competition, the lab-embedded entrepreneurship program, and the small business voucher program. The House plans to incorporate many of these provisions in a final innovation package negotiated with the Senate.

In August 2021, the Senate also passed the bipartisan *Infrastructure Investment and Jobs Act*, which includes $73 billion over four years for energy infrastructure and clean energy demonstration projects at DOE. Most of the funding would support industry- and national lab-led projects, but research universities would be eligible to partner and, in some cases, lead projects. In particular, the legislation would establish a new Office of Clean Energy Demonstrations to help demonstrate, deploy, and commercialize new energy technologies. The goal would be to expand public-private partnerships with academia, national laboratories, private industry, and state and local governments to fund cost-shared clean energy technology projects. The House has not yet voted on the bipartisan infrastructure package.

Regional Tech Hubs
Promoting investments in economic growth that represent geographic diversity is a major goal for Congress and the Administration. The President's American Jobs Plan called for an investment of billions of dollars for regional innovation hubs to support public-private partnerships in key technology areas to be situated around the country. Congress has followed suit with recent competitiveness legislation. In the Senate, USICA proposed around $10 billion for a minimum of 18 hubs (three in each EDA region) that would position communities to be global centers for research, development, workforce training, entrepreneurship, and manufacturing. USICA proposed that the Hubs focus on technology and innovation sectors critical to national and economic security, including but not limited to artificial intelligence; quantum; high performance computing; robotics; disaster mitigation; advanced communications; biotechnology; data storage and cybersecurity; advanced energy and industrial efficiency technologies; and advanced materials science. The House's *Regional Innovation Act* was less prescriptive over topic areas and would provide around $7 billion for a minimum of 10 hubs. If passed into law, the ensuing hubs will be among the largest investments in regional innovation in US history.

Manufacturing Provisions
USICA includes multiple manufacturing provisions, including:

- $1.4 billion over fiscal years (FY) 2022 to 2026, tripling the program's funding to support small- and medium-sized manufacturers;
- $1.2 billion over FY 2022 to FY 2026 to fund the Manufacturing USA program;
- Creation of an Office of Manufacturing and Industrial Innovation Policy Act at the White House;
- Establishment of a Department of Commerce supply chain resiliency program; and
- $10 billion for government/industry research, to collaboratively develop the next generation of semiconductor technologies in the U.S., including manufacturing of semiconductors

Other innovation provisions in USICA draw from ideas that were originally included in the *Innovation Centers Acceleration Act*, which was introduced in March 2021 and proposed launching a national competition for U.S. metropolitan areas to become Innovation Centers. The bill called for "investing $80

billion in federal funds over nine years in selected Innovation Centers while supporting private sector-led growth."

<u>CHIPS Act</u>
As part of the fiscal year (FY) 2021 *National Defense Authorization Act* (NDAA), Congress passed the *Creating Helpful Incentives to Produce Semiconductors (CHIPS) for America Act* to authorize a $15 billion initiative to establish a cutting-edge, domestic microelectronics industry. Most of the authorized funding is directed at expanded or new R&D efforts at the Department of Defense (DOD), NSF, and DOE to ensure U.S. leadership in semiconductor technology and innovation. The CHIPS Act is largely driven by competitiveness with China and addressing its technology roadmap "Made in China 2025."
Key provisions in the FY 2021 NDAA for the CHIPS Act include:

- Form a subcommittee under the National Science and Technology Council focused on microelectronics, which would be tasked with developing a National Strategy on Microelectronics research;
- Require DOD to assess the need of establishing a national laboratory with a commercial incubator "exclusively focused on the research and development of microelectronics to serve as a center for Federal Government expertise in high-performing, trusted microelectronics and as a hub for Federal Government research into breakthrough micro-electronics technologies;"
- Establish a new manufacturing institute focused on microelectronics; and
- Establish an Industrial Advisory Committee with representatives from industry, academia, and federal laboratories.

While CHIPS was authorized in the FY 2021 NDAA, it still requires funding to be allocated by Congress. USICA included $52 billion for emergency mandatory spending to immediately implement the CHIPS Act.

USICA funding for the CHIPS Act would provide $52 billion for microelectronics over five years. This would include:

- $39 billion over five years for the Department of Commerce (DOC) to establish incentives to "build, expand, or modernize commercial semiconductor fabrication, assembly, testing, advanced packaging, and R&D facilities" (Sec. 9902 of the NDAA, found here). This would be funded at $19 billion in FY 2022 and $5 billion each year following through FY 2026.
- $10.5 billion over five years ($5 billion in FY 2022) for R&D programs authorized at DOC (Sec. 9906 of the NDAA, relevant programs found here).
    - This includes funding a National Semiconductor Technology Center, microelectronics research at the National Institute of Science and Technology (NIST), and the creation of a Manufacturing USA Institute focused on microelectronics, among other efforts.
- $2 billion for R&D programs authorized at DOD (Sec. 9903 of the NDAA, which can be found here) including a National Network for Microelectronics Research and Development, among other efforts.

Reconciliation

In August, House and Senate Democrats passed a budget resolution that tasked 12 Senate Committees and 13 House Committees with drafting a spending package by September 15 that could total up to $3.5 trillion and pass both the House and Senate with a simple majority rather than the 60 votes usually

required in the Senate. In September, the 13 House Committees advanced their spending bills to be included in the reconciliation package on party-line votes. House leadership and the Budget Committee is now tasked with reworking the spending bills into one larger package for a full House vote. The final price tag is expected to be pared down to appease moderate Members.

At the crux of this large-scale spending measure is President Biden's Build Back Better Initiative aimed at rebuilding the U.S. economy and promoting equitable economic development, as well as creating resilient supply chains. Included in this package are major investments in research infrastructure and research and development programs at the National Science Foundation (NSF) and the Department of Energy (DOE), funding for Department of Commerce-led Regional Technology Hubs, and new funding opportunities for underserved colleges and universities. While proposed allocations are expected to be pared back, the initial reconciliation measures would include the following key provisions:

- **$9 billion to the Department of Commerce (DOC)** to support planning and establishment of regional innovation initiatives. This is likely for the creation of new Regional Technology Hubs with funding coming from two committees that share jurisdiction over DOC.
- **$1.5 billion for the Economic Development Administration's (EDA)** flexible Economic Adjustment Assistance (EAA) and Public Works programs that supports a variety of construction, non-construction, innovation, and/or workforce development projects. Of the $1 billion, $500 million is set aside to assist energy and industrial transition communities and $50 million is for technical assistance support with grant-making and planning, primarily for undeserved communities.
- **$4 billion for a Recompete Pilot program at EDA** to support areas with low prime age employment.
- **$17.5 billion** was set aside **for the Small Business Committee**, including:
  - $400 million for the Growth Accelerator Competition over 10 years to provide minimum awards of $100,000, which is $50,000 over the standard award amounts. The program aims to expand the capabilities of growth accelerators to assist small businesses focused on technology, research, and development.
  - $675 million to build out a national innovation support ecosystem network, of which $525 million would be for universities and other innovation partners to address the needs of eligible businesses to advance the pipeline of innovative startups, and $150 million would be to facilitate STEM fellowships and internships, prioritizing underrepresented individuals from undergraduate to post-doctoral levels.
- **$7.55 billion to NSF** for research, scholarships, and fellowships, including funding to support the new Technology, Innovation, and Partnerships (TIP) Directorate and STEM education.
- **$3.2 billion to DOE** for research, development, and demonstration activities, including $2 billion for new Office of Science initiatives in quantum computing, inertial and other forms of fusion energy, low-dose radiation research and an expansion of the Computational Science Graduate Fellowship program; $1.1 billion for renewable energy and energy efficiency demonstration projects, including in wind, solar, geothermal, water power, vehicles, bioenergy, and building technologies; $52 million for a nuclear reactor research infrastructure program; and $20 million for DOE's Office of Economic Impact and Diversity to support diversity, equity, and inclusion programs across the applied energy offices.
- **$2 billion to the National Institute of Standards and Technology (NIST)** for manufacturing, including $1 billion for the Hollings Manufacturing Extension Partnership (MEP) and $1 billion for advanced manufacturing research, development, and testbeds.

- **$1.2 billion to NIST** for research including artificial intelligence, cybersecurity, quantum, biotechnology, communications technologies, advanced manufacturing, resilience to natural hazards including wildfires, and greenhouse gas reduction and other climate-related activities. However, most of this funding would likely be to support R&D at NIST facilities.

At the time of writing this, the Senate has started drafting but has not yet advanced any spending bill and is still unknown how its bills will counter with moderate Senators objecting to the high cost of the package. To accelerate the process, the Senate plans to bypass consideration of each bill through the Committees and instead plans to vote on a full package on the Senate floor. While many of the spending levels and the scope of investments included in a final package are likely to change, the breadth of the House package demonstrates the Administration's commitment to strengthening the U.S. research and economic development initiatives, a theme that will persist in future legislation.

National Defense Authorization Act (NDAA)

The NDAA is an annual authorizing bill that dictates funding levels and programs for the Department of Defense (DOD). The FY 2022 edition will likely contain many provisions supporting the Biden Administration's new [industrial strategy]. However, given the general delay in negotiations, the FY 2022 NDAA is not expected to be signed into law until the end of the year. At the time of this writing, the House has passed its version of the FY 2022 NDAA, and the Senate plans to debate its version in mid-October 2021.

Though negotiations between the House and Senate still need to take place, the FY 2022 [House NDAA], passed on September 23, includes several provisions related to innovation and commercialization of note. For instance, the bill aims to improve access to innovative technologies by authorizing the Secretary of Defense to expand the Defense Innovation Unit's (DIU) engagement in underserved and economically disadvantaged regions by fostering more collaboration between DIU, private-sector industry, and those communities. The House version would also improve the transition of science and technology (S&T) to market with pilot programs providing technical assistance for full scale implementation of S&T projects to technology producers and for military departments to transition Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs through entrepreneurial innovation projects. Additionally, the Senate Armed Services Committee (SASC)'s [version], which is yet to be passed at the time of this writing, includes provisions requiring that additional data to be collected on certain SBIR and STTR program awards. Lewis-Burke's most recent analysis of the House and Senate NDAAs can be found [here].

National Security Commission on Artificial Intelligence

In March 2021, the congressionally chartered National Security Commission on Artificial Intelligence (NSCAI) released its final report following a two-year study of how the U.S. should position itself to dominate the global artificial intelligence (AI) race. The report outlines several recommendations toward taking a whole-of-government approach to AI, which includes consideration of the industry's contributions to economic development. The report is expected to be a part of the overall conversation around the NDAA.

Of note, the NSCAI report recommends the creation and funding of a consortium on AI competitiveness, the integration of AI research and development (R&D) into national economic and industrial policy, and better protection of U.S.-owned innovations in science and technology against our adversaries. One

common refrain across all the recommendations was developing STEM talent across the country, from K-12 to continuing adult education. In all industries of the future touched on in the NSCAI report, STEM and career technical education (CTE) serve as the backbone for developing skilled American workforces to meet the commercial needs of the Commission's envisioned AI, innovation, and technology industry.

As of this writing, how the Biden Administration and the 117th Congress will respond to these recommendations is still to be seen. However, the Senate Armed Service Committee's markup of the FY 2022 NDAA included in their executive summary a recommendation to adopt an unknown number of the suggestions made by the NSCAI, including accelerating adoption of AI capabilities by DOD. It is likely that at least some of the recommendations from the Committee will be acted on by Congress in the NDAA or future measures.

21st Century Cures 2.0

Representative Diana DeGette (D-CO) and Representative Fred Upton (R-MI) released the bipartisan discussion draft for *21st Century Cures 2.0* (Cures 2.0). Unlike the *21st Century Cures Act* signed into law in December 2016, this discussion draft does not include any additional funds to support the Innovation account at the National Institutes of Health (NIH), authorization for which expires in fiscal year (FY) 2026. The draft legislation would include provisions related to research, public health, healthcare delivery and authorize the creation of the Advanced Research Projects Agency for Health (ARPA-H).

The discussion draft would launch several new public health initiatives in preparation for future pandemics, including the development of a National Testing and Response Strategy to assess and develop best practices for testing, vaccine administration, medical supply readiness, domestic drug manufacturing, and data sharing infrastructure. The discussion draft also calls for the Food and Drug Administration (FDA) to report to Congress on how the agency is fostering greater collaboration and alignment within the agency with respect to the regulation of digital health technologies. It also includes a section requiring improved communication between FDA and the Center for Medicare and Medicaid Services (CMS) with regard to breakthrough therapies, fast-tracked products, or products eligible for accelerated approval.

ARPA-H
As noted, the legislation would also authorize the creation of ARPA-H, a signature Biden Administration initiative designed to drive transformational innovation in health and biomedical research. The draft bill details the agency's mission to fund projects that could tackle research challenges that require large-scale and sustained coordination across sectors; create new technologies, models, and capabilities; overcome market failures; support high-risk high-reward research; and complement NIH's existing portfolio and mission. No additional details are included beyond this high-level description of ARPA-H; rather, Representatives DeGette and Upton included with their draft bill a request for information (RFI) asking stakeholders to provide input on seven key issues and questions, including:

- How should ARPA-H work with the private sector?
- What activities, topics, and areas should ARPA-H focus on? Are there topics it should avoid?
- What is the best way to organize the structure of ARPA-H?
- How should ARPA-H coordinate with other federal agencies?
- How should Congress ensure that funding for ARPA-H is balanced with investments in fundamental research at the NIH?

ARPA-H has received support from both sides of the aisle and Congress is very invested in establishing ARPA-H for FY 2022. In late July the House Appropriations Committee approved and the full House passed its Labor, Health and Human Services, and Education (Labor-HHS-ED) spending bill for FY 2022. The Labor-HHS-ED bill would provide $3 billion within NIH (available for use through FY 2024) to establish ARPA-H, provided that Congress enacts legislation to authorize the new agency. Representatives DeGette and Upton are pushing for this legislation to be included in the CURES 2.0 bill but there is also interest from several members of the House Energy and Commerce Committee in crafting a standalone bill to authorize the new agency.

In addition to the funding provided in the appropriations measure, the House Energy and Commerce Committee included $3 billion to establish APRA-H in its bill for the larger budget reconciliation package. The Senate Appropriations Committee has not started work on its version of the FY 2022 Labor-HHS-ED bill, and final appropriations levels for ARPA-H are yet to be determined.   This indicates that Congressional interest in funding ARPA-H in some capacity remains strong, even if the exact vehicle for providing this funding is to be determined.

The *CURES 2.0* legislation is due sometime this fall with the goal of passing the bill by the end of year so ARPA- H can begin to operate as soon as possible.

Drug Pricing Measures

Changes to federal intellectual property (IP) laws and regulations have often been proposed in the context of lowering prescription drug prices. Many of those proposals, including those most relevant to commercialization and technology transfer, have targeted the "march-in rights" included in the Bayh-Dole Act. This legislation, which created the framework allowing research institutions to retain patent rights to discoveries made with federal funding, included a provision allowing the federal government to revoke patent exclusivity in cases where supply or availability of the patented product was not being met at a level to guarantee safety, health, or security of the nation.

Patient advocacy groups have previously petitioned the National Institutes of Health (NIH) to invoke the march-in rights and license production of certain high-cost pharmaceutical drugs, arguing that the high prices have effectively restricted availability for large portions of the population. However, NIH has rejected these arguments every time, stating that the statute does not provide the authority to exercise the march-in rights over issues of cost, only in cases where supply is restricted. To date, march-in rights have never been exercised. Several policy stakeholders have advocated for an expansion of march-in rights to explicitly include pricing as an allowable reason to exercise march-in rights.

Another common proposal involves "compulsory licensing," a process by which the federal government can manufacture, import, or use a patented product without permission from the patent holder, provided the government pays reasonable compensation. Compulsory licensing is often used in the defense and national security world. Compulsory licensing has been included by Congress in bills both as the primary mechanism to lower drug prices as well as an enforcement provision for bills including other direct mechanisms. For example, legislation introduced in the 116th Congress would have allowed the Center for Medicare and Medicaid Services (CMS) to negotiate drug prices with pharmaceutical manufacturers. Under the legislation, the federal government would have had the authority to compel the patent holder to license the patent to another manufacturer in the event an agreement could not be reached. This legislation failed to advance before the end of the Congress, and no major legislation has been introduced since that includes this mechanism.

Other drug pricing proposals that present a reduced threat to IP protections include drug pricing transparency requirements, use of an international pricing index, authorization of importation of certain pharmaceuticals from other countries, allowing Medicare negotiation of drug prices without compulsory licensing as an enforcement mechanism, and improving the pipeline of generic prescription drugs.

Resilient Manufacturing Task Force Act

In January 2021, the *Resilient Manufacturing Task Force Act* was re-introduced in the House to "strengthen domestic supply chains and help the economy better withstand future disease outbreaks, cyber-attacks, natural disasters, and other emergencies." The legislation would secure vulnerabilities in U.S. supply chains and create the following three new initiatives, capitalizing on existing national resources including Manufacturing USA, Manufacturing Extension Partnership Centers, as well as industry consortia:

- "A National Manufacturing Guard, comprised of industry experts that will be trained to manage the nation's supply chains, logistics infrastructure, and workforce resources in times of crisis;
- An open source platform which will support the National Manufacturing Guard with real-time, centralized information and run simulations to determine inventory, capacity, and resources on a national scale to prevent bottlenecks of critical supplies and equipment during an emergency to immediately address supply chain needs; and
- A Technology Corps, which will serve as a workforce pipeline that prioritizes manufacturing skills determined by the Resilient Supply Chain Task Force and National Manufacturing Guard to be essential to U.S. economic security."

Federal Agency Priorities Related to Innovation and Economic Development

This section provides context for how each agency supports commercialization and innovation activities; more detailed information on specific programs for each agency is included in the following section. Information on the cross-agency Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs is also included in the next section.

National Science Foundation – The National Science Foundation's (NSF) capacity to drive innovation and domestic competitiveness has received increased attention as Congress and the federal government look for ways to compete with China and other international competitors. NSF supports a range of programs and activities to encourage the maximum impact of the research it funds and catalyze technology transfer towards commercialization. Programs range from individual student and investigator awards to large center funding, as well as support for entrepreneurship training, workshops, and instrumentation awards. NSF also participates in several interagency initiatives to support technology transfer and commercialization. Most of the NSF programs that support NSF innovation, entrepreneurship, and technology transfer reside in the Directorate for Engineering's Division of Industrial Innovation and Partnerships (IIP). However, as described below, many of the IIP programs will move to the new NSF Directorate in the coming months.

New activities:
- *The President's budget request, as well as both the U.S. House of Representatives and Senate NSF reauthorization bills, include the creation of a new Directorate at NSF focused on technology and innovation. While final details for the new Directorate have yet to be ironed out, the new [Directorate](#) is expected to focus on key areas of interest to the government, solving national problems, promoting the translation of research, and supporting use-inspired research and education pathways.*
  - *The Directorate would be encouraged to pursue collaboration both within NSF and with external partners such as academia, non-profits, and industry stakeholders.*
  - *NSF plans that the new Directorate will operate in partnership with other NSF Directorates to accelerate the transition to market for innovations across all NSF areas of investment.*
  - *Potential areas of focus for the new Directorate include advanced communications, climate change, biotechnology, STEM education and workforce, artificial intelligence (AI), cybersecurity, and quantum.*
  - *The new Directorate is expected to house the Convergence Accelerator program and support lab-to-market programs previously housed in the Directorate for Engineering (ENG), such as Partnerships for Innovation (PFI), Innovation-Corps (I-Corps), Small Business Innovation Research (SBIR), and Small Business Technology Transfer (STTR) programs.*
  - *The new Directorate will launch the new "Regional Innovation Engines," which according to early frameworks, could provide up to $10 million per year for ten years to support "use inspired, solutions-oriented research and innovation in a range of technology areas."*
  - *Note that the Industry-University Cooperative Research Centers (IUCRC) program would stay in the Directorate for Engineering under the Engineering Education and Centers Division.*

Economic Development Administration – The Economic Development Administration (EDA) is the only federal agency that solely focuses on economic development. The agency provides funding to support regional innovation and collaboration efforts that encourage job creation and revitalization. EDA investments align with local strategies and strengths to build capacity for sustained economic growth, including fostering private investments and leveraging the discoveries, facilities, and workforce based at universities and research organizations. EDA has seen its profile significantly rise in recent years with the realization among policymakers that the agency's flexible programming could support swift, regional investments in economic recovery projects following major disruptive events, including natural disasters and COVID-19. Although EDA normally has an operating budget of $346 million, it has been tapped to manage hundreds of millions of emergency dollars in disaster relief grants, as well as nearly $4.5 billion in grants to help communities build more resilient economies following COVID-19.

Since the formation of the Office of Innovation and Entrepreneurship (OIE) under the Obama Administration, EDA has established itself as a leader for federal investments in flexible, technology-based economic development. For example, OIE launched the popular Build to Scale program (B2S, formerly "Regional Innovation Strategies") that supports the development of seed capital funds and the creation of proof of concept and commercialization centers. There has been bipartisan interest among the Biden Administration and Congress to greatly expand EDA's presence in the innovation and entrepreneurship space. Of note, the bipartisan competitiveness legislation in the House and Senate would position EDA as a leader of nationwide multi-billion-dollar regional hubs that would provide workforce training, regional strategies, business activity related to domestic supply chain, attraction of investments, manufacturing development, commercialization, and entrepreneurship support to advance key technology or innovation sectors. If authorized, the hubs program would be the largest ever managed by the agency and another major milestone in EDA's recent ascent toward becoming a core component in the federal government's domestic economic agenda.

Following the large funding opportunities to address COVID-19, such as the Build Back Better Regional Challenge, and potential regional tech hubs competitions, EDA will likely have a larger profile in the future, as these programs will lead to a boom in regional innovation planning (even among unsuccessful applicants), and the agency is well-positioned to provide additional support for scaling through its programming. As EDA assumes a larger role in national economic development efforts, it remains a uniquely bottom-up agency. Each state has at least one economic development contact to support applicants with questions about funding opportunities and to provide general assistance. Those interested in funding from EDA are strongly encouraged to reach out to their state's contact when applying for any award from the agency. Maintaining this connection is a key element to successfully competing for EDA funding.

New activities:
- *President Biden's fiscal year (FY) 2022 budget requested $433.1 million for EDA, which would be a 25 percent increase over FY 2021 appropriations. The House Appropriations Committee matched this request in their FY 2022 bill. The request marks a stark reversal from the previous Administration, which routinely proposed the outright elimination of EDA in their budget requests only to have funding restored by Congress.*
- *In Spring 2022, the Biden Administration released a set of EDA investment priorities with key terms and definitions to guide their funding decisions. Priorities include areas like Technology-Based Economic Development and Environmentally-Sustainable Development. Workforce Development is especially of interest to the new Department of Commerce (DOC) Secretary, Gina Raimondo.*

- *Alejandra Castillo, the new U.S. Assistant Secretary of Commerce for Economic Development, has reiterated the Administration's position that **Equity** is the number one investment priority and that projects will be more competitive if they intentionally reach underrepresented populations and geographies. Assistant Secretary Castillo previously served as National Director of the Minority Business Development Agency during the Obama Administration.*
- *Since 2020, EDA has received significant funding through coronavirus relief legislation to support regional revitalization projects, including nearly $1.5 billion in flexible funding for community-based economic development initiatives through the CARES Act. In 2021, Congress passed the American Rescue Plan Act, which provided an additional $3 billion for economic development projects through a series of competitions around EDA investment priorities. These programs are projected to support some of the largest EDA investments in individual awards in the agency's history. Applications for these awards can be led by a diverse array of non-profit stakeholders and must align with stated local economic development priorities.*
- *EDA would be central to recent proposals from the Administration and Congress to invest billions of dollars in regional innovation hubs to support public-private partnerships in key technology areas around the country. The Senate's U.S. Innovation and Competition Act of 2021 proposed providing around $10 billion for a minimum of 18 hubs and the House's Regional Innovation Act would provide around $7 billion for a minimum of ten hubs. If passed, this would be among the largest investments in regional innovation in history.*

Department of Defense – Within the federal government, the Department of Defense (DOD) seeks to stand at the forefront of innovation; however, the agency still struggles with aspects of technology transfer and commercialization. Defense programs, managers, and solution providers continue to be stymied by "the Valley of Death:" the period where emerging technologies are supposed to transition from research and development (R&D) at the technology readiness levels (TRL) 8/9 to full industrial commercialization but often fail. Despite these challenges, opportunities still exist for economic development and commercialization of defense technology. For example, the Department recently refocused its R&D enterprise on *fieldable capabilities,* which can be equipped to end users on a reasonable schedule to solve warfighter problems with minimal disruption to their activities. This translates to a renewed focus on advanced technology development that capitalizes on quick approaches like those popularized by the Defense Innovation Unit (DIU) that focus on less abrasive contracting mechanisms and more diverse, equitable, and inclusive interface with nontraditional defense solution providers.

Innovation efforts also span the branches of the military services including the U.S. Army Futures Command (AFC), which was established in 2018 to determine how best to modernize the Army for future conflicts. Due to its success in nurturing innovation, several component Army commands were realigned under AFC, including U.S. Army Combat Capabilities Command (DEVCOM) and U.S. Army Training and Doctrine Command (TRADOC), signaling the Army's intent to continue supporting AFC's innovative approach. AFC now focuses research, development, experimentation, and acquisition through eight Cross-Functional Teams aligned to the Army's modernization priorities: Long-Range Fires; Synthetic Training Environment; Network; Air & Missile Defense; Future Vertical Lift; Assured Positioning, Navigation, and Timing/Space; Soldier Lethality; and Next Generation Combat Vehicles. In the Air Force, leadership has utilized the Kessel Run program to expand partnerships with academic institutions, program shops, and other stakeholders to continue to renovate how the Air Force acquires and commercializes software.

Going forward, commercial innovations at DOD will likely be dominated by big ticket Defense programs like investments in naval ships, combat and service support aircraft, tanks and ground vehicles, hypersonic weapons, and all the smaller industries required to sustain these capabilities. In addition to their strategic DOD requirement, these industries bring quantifiable return on investment for economic development in terms of jobs, infrastructure, and growth. However, new opportunities will continually present themselves. Additive manufacturing, for example, has driven down the costs of space technology to such a degree that smaller, more nimble solution providers are getting into the space industry, producing new and reusable innovations. Similarly, Quantum and artificial intelligence (AI) science will undoubtedly change the Defense acquisition enterprise in hard-to-predict ways. Details on recent economic development and commercialization activities at DOD are included below.

New activities:
- *In 2017, the Defense Innovation Unit Experimental (DIUx) was made a permanent organization under the Under Secretary of Defense for Research & Engineering (USD-R&E) and renamed the DIU. DIU operates five portfolios (AI, Autonomy, Cyber, Human Systems, Space) to identify, develop, and rapidly acquire commercial technologies for national security missions and transform the way DOD does business with industry. It has pioneered the use of Other Transactional Authority (OTA) for fast selection of commercial technology, rapidly equipping innovation to the warfighter.*
- *Initially launched as the MD5 National Technology Accelerator at the National Defense University in 2016, the National Security Innovation Network (NSIN) has a dedicated funding line to enhance the Defense innovation workforce. NSIN operates as a series of regional, distributed nodes that organize tech innovation ecosystems with startups, students, Defense contractors, and academic institutions. NSIN frequently conducts projects and events with DOD end users like hackathons, tech acceleration and incubation activities, and other initiatives aimed at developing innovations and spurring the technologies and people behind those innovations into successful commercial endeavors that support DOD.*
- *Capitalizing on the success of The Doolittle Institute as a foundry for innovation incubation and acceleration, the Air Force Research Lab (AFRL) created an ecosystem of programs to address specific challenges and end user sectors in DOD. From 2015-2017, several "WERX" programs were stood up to invest in quick initiatives to connect their individual user communities to STEM talent, industry startups, workforce development pipelines, and public/private economic development opportunities. Under the DEFENSEWERX ecosystem label, each program assists in the development of innovations for DOD end user requirements that can and often do spin out into larger, sustainable commercial entities. Current DEFENSEWERX programs include:*
  - *[AFWERX](), focused on Air Force applications.*
  - *[SOFWERX](), focused on bespoke requirements for joint Special Operations Forces (SOF).*
  - *[ERDCWERX](), focused on Army Engineering and R&D applications.*
  - *[MGMWERX](), focused on AFRL and Air University innovation and research with the state of Alabama.*
  - *[FATHOMWERX](), focused on Navy and Marine Corps applications.*
  - *[Cyber Fusion Innovation Center (CFIC)](), focused on support to US Army Cyber Command (ARCYBER).*
  - *[SPACEWERX](), spun out of AFWERX in 2021 to focus on Space Force applications.*
- *USD-R&E's Space Development Agency (SDA) was established in 2019 to manage DOD-wide investment and field capabilities in the National Defense Space Architecture (NDSA). SDA seeks to disrupt traditional space payload and launch procurement by investing in disruptive and lower-cost commercial technologies.*

- *DOD has funded basic, applied, and advanced development research in climate and environmental science, installation energy, and force sustainment through the Strategic Environmental R&D Program (SERDP). As technologies that address high-priority environmental requirements mature, they can transition or be acquired through a complementary effort called the Environmental Security Technology Certification Program (ESTCP). With the Biden Administration's 2021 legislative and budgetary agenda to create new economic opportunities through climate remediation, these programs will undoubtedly feature new and higher funding to stimulate innovation in this area for DOD. DOD is specifically interested in reducing the carbon footprint and increasing clean energy consumption of its bases and vehicles.*
- *AFRL recently solicited its first call for university-led consortia to compete in its Regional Research Convergence Hubs (ARRCH). ARRCH is envisioned as the Air Force's version of the Army Research Lab's Open Campus initiative, where hubs of technology innovation organize between academia and industry to produce research and applications that can eventually be transitioned to commercial solutions. Application periods for the Northeast and Midwest hubs have closed, but AFRL will compete hubs in the South and West regions beginning in FY 2023.*
- *In June 2021, the White House released its 100-day supply chain review, which presented a roadmap of challenges, risks, and opportunities to strengthen domestic supply chains in key industries. Tremendous new investments in supply chain security and resilience are recommended, which will likely translate into FY 2022 and later year funding for new domestic manufacturing and industrial programs. For a more detailed analysis of these supply chain opportunities, read Lewis-Burke's [analysis](#).*

Department of Energy – In 2015, the Department of Energy (DOE) created the Office of Technology Transitions (OTT) and has focused significant attention on commercialization through its activities. OTT is proposed to receive nearly $20 million in fiscal year (FY) FY 2022. The Office is headed by DOE's Chief Commercialization Officer and funds DOE's commercialization and technology transfer efforts.

In addition to OTT, DOE currently supports four Energy Innovation Hubs, which are integrated research centers that combine basic and applied research with engineering to accelerate scientific discovery to address specific energy grand challenges. The Hubs are a consortium of national labs, universities, and industry. One of the main goals of the Hubs is to transfer the scientific and engineering knowledge created in the Hubs to industry and accelerate the commercialization of new energy products. The DOE Office of Basic Energy Sciences also funds 41 Energy Frontier Research Centers (EFRCs) which focus on fundamental research to develop new innovative energy technologies. Of the 41 EFRCs, 30 are led by universities. EFRC researchers consult with industry partners to share scientific results and help translate fundamental scientific advances to the marketplace. DOE plans to recompete 31 EFRCs in the fall of 2021 and make 40 awards to new or renewed centers.

As precursors of the Energy Innovation Hubs, DOE established three Bioenergy Research Centers to provide the basic biological and genomic research needed to advance biofuels and bioproducts. After ten years, the centers were recompeted at the end of 2016 and four awards were subsequently announced in July 2017. DOE also participates in the Manufacturing USA network and funds six institutes, including its newest institute focused on cybersecurity. The institutes are focused on reducing the cost and risk of commercializing new technologies and improving business practices that can improve the energy efficiency of U.S. manufacturers or developing cutting edge capabilities and equipment to help support the energy industry.

New activities:

- *In Fall 2021, DOE's Office of Science plans to issue a $100 million funding solicitation to award up to 40 new or renewed EFRCs. Topical areas have not yet been announced, however advanced intelligence suggests topics will include clean energy technologies, such as energy storage and hydrogen; microelectronics; polymer upcycling, and transformative manufacturing.*
- *DOE's Office of Energy Efficiency and Renewable Energy plans to compete up to two new $70 million each Clean Energy Manufacturing Institutes focused on industrial decarbonization.*
- *OTT plans to release a funding solicitation by Spring 2022 for another round of energy innovation clusters in different regions to support technology incubators and startups.*
- *In Fall 2021, DOE will issue a call for the Lab Embedded Entrepreneurship Program 2022 cohorts to help entrepreneurs commercialize new clean energy technologies by matching them to DOE national laboratory experts and unique research infrastructure.*
- *DOE plans to stand up a new Office of Clean Energy Demonstrations with more than $100 million in congressional appropriations in FY 2022.*
- *Included within the bipartisan infrastructure package is $45 billion for DOE clean energy demonstration, deployment, and commercialization activities.*

National Institutes of Health – The National Institutes of Health (NIH) continues to emphasize its role in fostering more effective and efficient translation of basic scientific discoveries into treatments and therapeutics that lead to improved health outcomes. NIH encourages researchers to partner with industry across its institutes. The National Center for Advancing Translational Sciences (NCATS) continues to be the hub of these activities, focusing its efforts on transforming the translational science process to accelerate the development of treatments and cures.

NIH's participation in the National Science Foundation's (NSF) I-Corps initiative began in 2014, and it is available as an administrative supplement to existing Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) grantees. While the most recent competition expired in February 2021, NIH is likely to continue the program.

Launched in 2014, the NIH Accelerating Medicines Partnership (AMP) is the agency's signature industry partnerships program. Working with 18 drug and biotech companies and 16 non-profit organizations, the Foundation for NIH (FNIH), NIH, and AMP partners have contributed over $500 million to accelerate the pursuit of new drug treatments for Alzheimer's disease, diabetes, and the autoimmune diseases of rheumatoid arthritis and lupus. To date, projects are focused on target discovery and preclinical validation and exploring the utility of biomarkers for tracking responsiveness to treatment for Alzheimer's disease. For diabetes, there is the Type 2 Diabetes (T2D) Knowledge Portal that seeks to build a database of DNA sequence, functional genomic and epigenomic, and clinical data across 150,000 individuals with the goal of having a powerful, publicly available portal for identification and validation of effective drug candidates. The rheumatoid arthritis/systemic lupus erythematosus program seeks to ascertain and define shared and disease-specific biological pathways to identify relevant drug targets for the treatment of autoimmune diseases. AMP served as a key model for the Accelerating COVID-19 Therapeutic Interventions and Vaccines (ACTIV) which was an essential private-public partnership to prioritize and speed the development of promising treatments and vaccines.

NIH also took advantage of existing innovation infrastructure to create its Rapid Acceleration of Diagnostics (RADx) program in Spring 2020 to speed the development, validation, and commercialization of testing technology for COVID-19. RADx grew out of the Point-of-Care Technologies Research Network (POCTRN) established by the National Institute of Biomedical Imaging and Bioengineering (NIBIB) in

2007 to "facilitate the development of a pipeline of point-of-care technologies with commercialization potential, utilizing a center structure that enables incorporation of clinical and user needs in the development process," while also providing expertise and resources to address early barriers to commercialization and implementation. POCTRN has supported three awards cycles lasting five years each, focusing on topics such as HIV/AIDS, sexually transmitted diseases, disaster readiness, cancer care, and global health. The most recent awards were made in 2018, and, given the model's success in responding to COVID-19, a fourth round is likely to be competed in 2023.

NIH recently awarded $20 million to fund five additional hubs to support the Research Evaluation and Commercialization Hub (REACH)proof of concept centers. The REACH program was launched in 2013 as a signature initiative through NIH'S Small Business Education and Entrepreneurial Development ([SEED](#)) program to increase engagement between academic institutions and the private sector technology development experts and investors. This accelerated innovation, consortium-based centers program is modeled after the National Heart, Lung, and Blood Institute (NHLBI) Centers for Accelerated Innovation and is a unique public-private partnership aimed at finding new ways to identify and develop innovations with scientific and commercial appeal. The initial centers are located at the University of Minnesota, Long Island Bioscience Hub (Stony Brook University, Cold Spring Harbor Lab, Brookhaven National Lab), and University of Louisville. The expansion added five additional sites including the Kentucky Network for Innovation and Commercialization (University of Kentucky, Lexington, University of Louisville), Rutgers Optimizes Innovation Program (Rutgers Biomedical and Health Sciences, Rutgers University, Rutgers Cancer Institute), Midwest Biomedical Accelerator Consortium (University of Missouri, Columbia, University of Kansas Medical Center), Colorado Anschutz Medical Campus, and the Washington Entrepreneurial REACH Hub (University of Washington, Seattle, Seattle Children's Center). It is unclear if Congress will authorize funding to expand this REACH Hubs further.

New activities:
- *President Biden's fiscal year (FY) 2022 [budget request](#) for NIH includes $6.5 billion to create a new Advanced Research Projects Agency for Health (ARPA-H), that would "speed transformational innovation in health research." Modeled after the Defense Advanced Research Projects Agency (DARPA) within the Department of Defense, ARPA-H would support high-risk, high-reward research and accelerate the translation of fundamental biomedical research into clinical applications to provide more treatments and cures for more diseases. To achieve its ambitious goals, ARPA-H would need to effectively coordinate with the Food and Drug Administration (FDA), the Centers for Medicare and Medicaid Services (CMS), and the private sector. There has been a positive response to ARPA-H in Congress, with the FY 2022 House Appropriations bill providing $3.5 billion for ARPA-H on the condition that authorization legislation first pass through Congress. We anticipate the Senate will also provide funds for ARPA-H and that it will be established over the next few years with new funding opportunities.*

Food and Drug Administration – As a regulatory agency, the Food and Drug Administration (FDA) provides support for innovation and commercialization largely on the evaluation and approval side of development. For example, the FDA [Technology Transfer Program](#) provides tools and techniques to enhance collaborations between FDA and innovators to ensure patients receive faster access to safe and effective medical devices.

New activities:
- *While the agency still awaits a new commissioner, FDA will focus significant energy on improving the pipeline of medical devices, technology, and treatments for COVID-19 and future pandemics.*

This will include a priority on platform technologies that can be used to quickly develop and manufacture therapeutics and vaccines for a variety of diseases. FDA will continue to explore food and drug safety as well as digital health technology.

Biomedical Advanced Research and Development Authority – The Biomedical Advanced Research and Development Authority's (BARDA) mission is "to develop and procure medical countermeasures (MCMs) that address the public health and medical consequences of chemical, biological, radiological, and nuclear (CBRN) accidents, incidents and attacks, pandemic influenza, and emerging infectious diseases." MCMs include vaccines, therapeutics, diagnostics, and other products to protect national public health security. BARDA funding helps to bridge the "valley of death" - characterizing the late stages of product development- with the goal of seeing MCMs through to FDA approval.

BARDA awards funding for research and development through two core mechanisms: its standard [BAA](#) and the [Division of Research, Innovation, and Ventures (DRIVe)](#). Unlike the traditional BARDA funding mechanism, the DRIVe EZ-BAA encourages a range of proposals, including early concepts and pre-clinical research. Through the DRIVe EZ BAA, awards can be made in as few as 30 days and projects can be funded up to $750,000. BARDA urges interested parties and to share ideas and concepts with the agency and receive feedback via BARDA [TechWatch](#) meetings prior to submitting to any funding mechanism. Additionally, BARDA hosts an annual industry day in the fall for related federal agencies, industry, and academia to meet and engage, as well as to share information on the agency's priorities.

New activities:
- *During the COVID-19 public health emergency, many of BARDA's existing initiatives have been paused or refocused to allow for increased efforts in responding to the pandemic. BARDA will remain focused on platform technologies and other advancements aimed at enabling rapid response to future pandemics and building the Strategic National Stockpile.*
- *The [DRIVe](#) added new priority topics including: COVID-19; digital health tools for pandemic preparedness; beyond the needle—alternative delivery methods for vaccines and therapeutics; ReDIRECT—repurposing therapeutics to treat chemical agent exposure; and bringing laboratory testing to the home. DRIVe continues to fund Solving Sepsis; Early Notification to Act, Control, and Treat (ENACT), and ImmuneChip+.*

National Aeronautics and Space Administration – The National Aeronautics and Space Administration (NASA) has multiple mechanisms for supporting commercialization efforts within academia and private industry. Most of the commercialization and technology transfer work is done through the agency's Space Technology Mission Directorate (STMD); however, the Aeronautics Research Mission Directorate (ARMD) and Human Exploration and Operations Mission Directorate (HEO) also support some projects. STMD supports NASA's Technology Transfer program (T2) and has been instrumental in supporting NASA commercialization priorities such as the commercialization of low-Earth orbit spaceflight.

New activities:
- *NASA's Commercial Crew program, a flagship commercialization effort, launched its first crew to the International Space Station in November 2020.*
- *NASA announced the winners of its third Space Technology Research Institutes solicitation in May 2021, making awards to teams lead by Georgia Tech and University of Colorado --Boulder.*
- *NASA competed their second annual Lunar Surface Technology Research call in August 2021.*

U.S. Department of Agriculture – The U.S. Department of Agriculture (USDA) is committed to promoting innovation across agriculture to ensure the resilience and success of American farmers, ranchers, producers, and forestry. As climate change and the global pandemic continue to threaten the U.S. food supply chain and resiliency of farmlands, USDA has looked to innovate and create a more durable agricultural sector. In 2020, as part of a broader government-wide strategy, USDA developed and released its Agriculture Innovation Agenda (AIA). The AIA aims to align USDA resources, innovation strategies, and ultimately help USDA reach its goal of increasing agricultural production by 40 percent and cutting its environmental footprint in half by 2050. In coordination with the new AIA, USDA has sought public comment on "ready-to-go" cutting-edge technologies and released several funding opportunities centered around the incorporation of innovative practices on farms and testbed sites such as the Farm of the Future and the Conservation Innovation Grants.

In the same effort to develop innovative solutions to issues of resilience and efficiency, USDA has partnered with NSF for an inter-agency program centered around artificial intelligence (AI). The National AI Research Institutes program aims to accelerate the transition of AI innovations into different sectors and grow future talent. Two of the seven original AI Institutes awarded were partnerships between NSF and the National Institute of Food and Agriculture (NIFA), USDA's primary research arm, including: AI Institute for Next Generation Food Systems and AI Institute for Agricultural Resilience, Management, and Sustainability. Another two NSF-NIFA AI Institutes were awarded in the most recent cycle of 11 awards: Institute for Agricultural AI for Transforming Workforce and Decision Support (AgAID) and AI Institute for Resilient Agriculture.

USDA also has an annual solicitation through the Natural Resources Conservation Service (NRCS) Conservation Innovation Grants On-Farm Trials, which was authorized in the 2018 Farm Bill. The On-Farm Trials grants are designed to cultivate partnerships between NRCS and agricultural producers to improve their operations and simultaneously improve air, water, and soil quality. The funding laid out is intended to provide producers with technical assistance and incentive payments to help mitigate risks associated with implementation of innovative new conservation practices and systems. This year's solicitation had an emphasis on soil health, but the program also covers topics including climate smart agriculture, irrigation management, and other agricultural conservation practices.

New activities:
- *President Biden's proposed budget requested significant increases over FY 21 for USDA research arms like NIFA and the Agricultural Research Service (ARS).*

National Institute of Standards and Technology – While most research supported by the National Institute of Standards and Technology (NIST) is carried out internally at NIST laboratories, the agency has been working to raise its profile and partnerships with industry and academia.

The NIST Centers of Excellence (COEs) are important to furthering scientific understanding around emerging areas of national interest. NIST currently runs three active COEs in forensics, disaster resilience, and advanced manufacturing. These centers were funded at up to $5 million a year for five years, with a possible five-year extension, for a maximum of $50 million over ten years. The COEs focus efforts on Advanced Materials, Community Resilience, and Forensic Science.

NIST has not run a fully open COE competition since 2014. At the time of this writing, the House's draft NIST reauthorization bill includes provisions for a new Greenhouse Gas Measurement Center of Excellence.

Additionally, NIST supports national manufacturing and innovation objectives through its [Office of Advanced Manufacturing](#) and its [Manufacturing USA program](#). In December 2014, Congress passed the Revitalize American Manufacturing and Innovation Act (RAMI), which established the National Network for Manufacturing Innovation Program, now known as Manufacturing USA, to foster collaboration in manufacturing innovation among industry, academia, nonprofits, and government agencies through public-private partnerships. While there are over a dozen institutes that comprise Manufacturing USA, currently only one is funded directly through NIST (other institutes are sponsored by DOD and DOE), the [National Institute for Innovation in Manufacturing Biopharmaceuticals](#) (NIIMBL).

Finally, the [Hollings Manufacturing Extension Partnership](#) (MEP) program is a public-private partnership that includes and partners with universities to support U.S. manufacturing capabilities. Regional MEP Centers "work with manufacturers to develop new products and customers, expand and diversify markets, adopt new technology, and enhance value within supply chains."

New activities:
- *In June 2021, NIST released a [solicitation](#) seeking [road map](#) proposals to "establish new or strengthen existing industry-driven consortia that address high-priority research challenges to grow advanced manufacturing in the United States," signaling the possible creation of additional manufacturing consortia or institutes.*
- *The President's FY 2022 budget request included $150 million to fully fund two new Manufacturing Innovation Institutes, with one focused on the design and manufacture of semiconductors. It is unclear currently if Congress will support this proposal in final FY 2022 appropriations.*
- *The President's FY 2022 budget request also included a proposed $275 million for the MEP program, which would be an increase of $125 million or 83.3 percent over the 2021 enacted level. The proposed increase would enable MEP to provide additional services to more companies to support critical supply chains and workforce development.*

Minority Business Development Agency – The Minority Business Development Agency (MBDA) invests in the growth and global competitiveness of minority businesses enterprises (MBEs) through industry-focused services and technical assistance. MBDA's major competitions include Business Centers, as well as specialty centers, such as Advanced Manufacturing Centers, Export Centers, and Federal Procurement Centers. President Biden has made diversity and inclusion a focal point of his presidency and MBDA will play a central role in creating equal opportunity for minority communities and businesses. The Biden Administration's Build Back Better agenda recognizes the importance of MBEs and recommends investing heavily in MBDA to assist MBEs in accessing capital, investing in new technologies, successfully competing for federal contracts, and expanding the role minority businesses play in our economy. Additionally, the bipartisan infrastructure package would make MBDA a permanent part of the federal government, rather than needing to be authorized through an Executive Order signed by the President. The proposed infrastructure bill would also significantly expand the agency's budget from $42 million to $110 million.

New activities:
- *MBDA launched pilot program called the Minority Colleges and Universities Competition, which aims to promote entrepreneurship for undergraduate students at Minority Serving Institutions (MSIs). The funds can be used towards any product or tool that encourages inclusive innovation*

and economic development with programs focused on equipping undergraduates with the skills to develop a business and commercialize products and services.

- *The bipartisan infrastructure bill would expand the scope of MBDA services to operate regional offices and rural business centers that would be administered through MSIs and Historically Black Colleges and Universities (HBCUs), in addition to creating a new program that promotes entrepreneurship at HBCUs and MSIs.*

Small Business Administration – The Small Business Administration (SBA) supports small business growth by providing access to capital, public-private partnerships, technical assistance, and providing commercialization support. While each federal agency runs its own Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs, SBA is charged with overseeing and coordinating the SBIR and STTR programs across the government and provides support to expand innovation and entrepreneurship through initiatives that bolster SBIR/STTR. For instance, the Federal and State Technology (FAST) Partnership Program is an annual competition that provides funding for statewide initiatives to increase the number and quality of SBIR/STTR applications. SBA also organizes a Road Tour that allows program officers from different agencies' SBIR/STTR programs to meet with researchers and small businesses across the country. SBA events are usually held at states' Small Business Development Centers (SBDCs), which are SBA's centralized hubs for small business support in each state. Competitions for new SBDCs are infrequent and SBA has also been known to lean on states' FAST awardees to host gatherings to ensure geographic diversity.

While SBA played a major role in providing direct aid to small businesses and other non-profits during COVID-19, there were little advances in the agency's innovation and entrepreneurial support programs during the Trump Administration. This could change under the Biden Administration, as SBA's Office of Investment and Innovation (OII) launched several new competitions under President Obama. The Biden Administration's shared interest in federal support for innovation and entrepreneurship could raise OII's profile in the years ahead.

New Activities:
- *SBA launched a competition focused on supporting entrepreneurs involved in research and development (R&D) and enhancing regional innovation. The competition is divided into two distinct tracks: the Growth Accelerator Fund Competition (GFAC), which supports individual entrepreneurial training organizations, and SBIR Catalyst, which supports clusters of organizations that are focused on enhancing regional innovation and entrepreneurship.*
- *Another initiative to watch is the Program for Investment in Micro-Entrepreneurs, which supports nonprofits to help low-income entrepreneurs access financing for their small businesses through technical assistance or training that aids in capacity building.*
- *Additional support for SBA programming is expected to be addressed within the next year as Congress seeks to reauthorize SBIR/STTR and related initiates before they expire on September 30, 2022. Providing more funding and authorities for programs like FAST has been discussed in initial conversations.*

Selected Federal Agency Funding Opportunities for Innovation and Economic Development

Small Business Innovation Research/ Small Business Technology Transfer
The U.S. Government's flagship initiatives supporting innovation and commercialization of federally funded research and development (R&D) are the SBIR and STTR programs. Although the SBIR/STIR programs are overseen by SBA, each agency is responsible for administering their own programs. The administration of SBIR/STTR programs varies based on federal agency and additional information on specific competitions is available on each participating agency's website.

The current SBIR/STTR authorization allows agencies to set aside additional funding for initiatives to attract small business development and participation in the programs. For instance, NIH has used this program to fund phase zero proof of concept centers to identify promising technologies and transfer them to start-up companies. Authorization of these programs is set to expire if Congress does not act by September 30, 2022. At the time of this writing, Congress has not begun formal consideration of a reauthorization for the SBIR and STTR programs, though House and Senate Committees have begun to have early hearings to gather information.

SBIR Program
The SBIR program supports competitive awards that allow small businesses to explore the potential of developing and commercializing new technologies. Federal agencies participating in SBIR have extramural research budgets over $100 million and include: Department of Agriculture (USDA), Department of Commerce (DOC), Department of Defense (DOD), Department of Education (ED), Department of Energy (DOE), Department of Health and Human Services (HHS), Department of Homeland Security (DHS), Department of Transportation (DOT), Environmental Protection Agency (EPA), National Aeronautics and Space Administration (NASA), and National Science Foundation (NSF).

Qualifying agencies are required to set aside 3.2 percent of their extramural research budgets for SBIR, so available funding has grown rapidly at agencies that received an influx of research support in recent years, like NIH, and more slowly at those that have not. More growth can be expected at other agencies like DOE and NSF as Congress considers bolstering research funding as part of their overall competitiveness agenda.

SBIR supports three phases of awards:
- Phase 1 – To establish the technical merit, feasibility, and commercial potential of a new technology or innovation. Awards are usually between $50,000-$250,000 for six months to one year.
- Phase 2 – To progress the results achieved in Phase 1 SBIR awards. Awards are usually between $500,000-$1.5 million for two years.
- Phase 3 – To commercialize the results of Phase 1 and Phase 2 activities. Phase 3 is funded by private industry, not SBIR.

The primary employment of a SBIR principal investigator must be with a small business but they can partner with research institutions on awards.

Sources and Additional Information:
- Additional information on university partnerships on SBIR awards can be found at https://www.sbir.gov/node/2011103.
- More information on the SBIR program is available at http://www.sbir.gov/about/about-sbir.

STTR Program
The STTR program aims to bridge the gap between basic research and commercialization. STTR supports the expansion of public/private partnerships to include joint venture opportunities for small businesses and non-profit research institutions. STTR supports the same three phases of awards and funding amounts as SBIR, listed above.

Unlike SBIR, STTR projects *must* include formal collaboration with research institutes in Phase 1 and Phase 2 (collaboration between small businesses and research institutes is permitted but not required in SBIR). Research institution partners can also serve as principal investigators. Federal agencies participating in STTR have extramural research budgets over $1 billion and include: DOD, DOE, HHS, NASA, and NSF.

Sources and Additional Information:
- More information on the STTR program is available at http://www.sbir.gov/about/about-sttr.

National Science Foundation

Industry/University Cooperative Research Centers Program
The Industry/University Cooperative Research Centers (I/UCRC) Program supports partnerships between universities and industry to carry out high quality, industry-driven research, as well as to train the next generation of innovative students. I/UCRCs are supported in all NSF research areas. There are currently around 75 I/UCRCs, with planned NSF funding of around $20.5 million in the current solicitation. Institutions of higher education are eligible to apply and the primary investigator (PI) on the award must be a tenured faculty member.

Under the current solicitation, I/UCRCs can receive two phases of funding for five years each.
NSF uses the following funding formula for new I/UCRCs: Phase I for the first five years - $150,000 annually; Phase II or Phase II + for the second five years - $100,000 or $150,000 annually. Centers that were previously funded under another solicitation can apply for Phase III for a final five years of funding at $50,000 annually. The I/UCRC program also offers $20,000 planning grants.

NSF routinely issues Dear Colleague Letters to highlight areas of particular interest to the I/UCRC program. Current priority areas are advanced electronics; advanced manufacturing; advanced materials; biotechnology; civil infrastructure systems; energy and environment; health and safety; information, communication, and computing; sensing and information systems; and system design and simulation. The next preliminary proposal deadline is **March 8, 2022**, and the next full proposal deadline is **June 8, 2022**. There are usually two deadlines per calendar year. Preliminary proposals are only required for planning grants.

Sources and Additional Information:
- The I/UCRC webpage can be found at https://iucrc.nsf.gov/.
- The I/UCRC solicitation can be found at https://nsf.gov/pubs/2020/nsf20570/nsf20570.htm?org=NSF.

- The most recent I/UCRC webinar is available for viewing at https://www.youtube.com/watch?v=s_XnAJ1G3E8.

Partnerships for Innovation

The Partnerships for Innovation (PFI) program supports researchers from all disciplines funded by NSF to participate in technology development, building of partnerships, and commercializing research. PFI has two tracks:

1. The Technology Transfer (PFI-TT) Track; and
2. Research Partnerships (PFI-RP) Track

The PFI-TT track provides the opportunity to turn promising, prior-funded NSF research into technological innovations through prototyping, scale-up work, or proof-of-concept work. PFI-TT projects are considered successful if they create "technology-driven commercialization outcomes" and address a societal need. PFI-TT supports approximately 40-50 awards per year at $250,000 per award. Awards can be between 18 and 24 months.

The PFI-RP track supports partnerships between academic institutions, non-profits, industry, and public-private partnerships engaged in complex technology development beyond the scope of a single researcher. Through PFI-RP, partnerships conduct applied research on a larger commercialization project. Like PFI-TT, PFI-RP awards are expected to have a societal impact. PFI-RP supports approximately 10-15 awards per year at $550,000 per award for an award period of 36 months.

Institutions of higher education and non-profits with experience in technology transfer are eligible to apply for PFI awards. The next application deadline is **January 12, 2022**. There are usually multiple application deadlines per year.

Sources and Additional Information:
- The most recent solicitation is available at https://www.nsf.gov/pubs/2019/nsf19506/nsf19506.pdf.
- Additional information, including past PFI program webinars, is available at https://beta.nsf.gov/funding/opportunities/partnerships-innovation-pfi-0.

Innovation Corps

The Innovation Corps (I-Corps) supports a range of activities and training programs to equip scientists and engineers with the entrepreneurial skills they need to transfer technology developed in their laboratories to market and broaden the impact of NSF-funded, basic research projects. I-Corps currently supports two components:

- I-Corps Teams – I-Corps teams provide technical, entrepreneurial, and business know-how to help launch technological innovations. The I-Corps team includes a principal investigator, an entrepreneurial lead, and a mentor.
- I-Corps Hubs – Hubs are responsible for creating a network of universities with the capability to help researchers learn how to commercialize research.

I-Corps previously supported Nodes and Sites which still exist from previous solicitations, the most recent I-Corps solicitation only supported I-Corps Teams and Hubs. NSF intends for I-Corps Hubs to operate as the backbone of the I-Corps National Innovation Network.

A revised I-Corps Hubs solicitation is expected to be released in Fall 2021. Proposals are accepted at any time for I-Corps teams. Two and four-year institutions of higher education are eligible to apply for both team and hubs awards.

Sources and Additional Information:
- The I-Corps website is at http://www.nsf.gov/news/special_reports/i-corps/index.jsp.
- The previous I-Corps Hubs solicitation is available at https://www.nsf.gov/pubs/2020/nsf20529/nsf20529.htm. A new solicitation is expected sometime this fall.

Convergence Accelerator
The Convergence Accelerator program was established in 2019 to support interdisciplinary solutions to challenges facing the U.S. The goal of the Convergence Accelerator is to quickly move use-inspired research into market by building on basic research through bringing together experts across disciplines in partnership to create long-lasting change.

The Convergence Accelerator program has three phases, beginning with the ideation process. NSF releases a Request for Information (RFI) to solicit ideas from the broader scientific community on what the research topics should be for an upcoming solicitation. Topic ideas submitted through the RFI must be broad in scope, built upon basic research, impactful and scalable, and suitable for multidisciplinary research. After topic ideas are submitted, NSF invites some of them to submit a workshop proposal, which are used to expand on the submitted topic ideas. The results from the workshops are used to help NSF select the topics for the next Convergence Accelerator solicitation.

The Convergence Accelerator program offers two phases of funding. All teams who are funded by the program start in Phase I. At the end of Phase I, teams must participate in a pitch competition, which is how NSF selects the teams they will fund for Phase II. Applications for the Convergence Accelerator program are expected to focus on turning foundational research into practice through leveraging a multidisciplinary approach, and by the end of Phase II, solutions funded through the program are expected to be sustainable and impacting society.

Phase I is a nine-month planning effort that funds teams with grants that are up to $750,000. Participating teams engage with NSF's innovation curriculum and are expected to identify required skills and partnerships to accelerate their solution. Teams that are selected for Phase II enter into a 24-month development effort and are funded at up to $5 million through a cooperative agreement.

NSF hosted workshops for the 2021 cohort topics this spring. After the workshops, the topics "Networked Blue Economy" and "Trust & Authenticity in Communications Systems" were selected. Applications to participate in the 2021 cohort were due by June 14, 2021. NSF anticipates $22 million in funding for 25-30 Phase I awards, which will be made as standard grants, and 5-8 Phase II awards, which will be made as cooperative agreements.

Sources and Additional Information:
- The 2021 Cohort solicitation is available at https://www.nsf.gov/pubs/2021/nsf21572/nsf21572.pdf.
- Additional information on the NSF Convergence Accelerator Program is available at https://www.nsf.gov/od/oia/convergence-accelerator/.

- Additional information on the workshops for the 2022 solicitation topics is available at https://www.nsf.gov/od/oia/convergence-accelerator/2021-workshops.jsp.

National AI Research Program
The NSF National AI Research Program was created after the President's Council of Advisors for Science and Technology (PCAST) published their report, *Recommendations for Strengthening American Leadership in Industries of the Future*, and the 2019 update to the *National Artificial Intelligence Research and Development Strategic Plan* both called for increased and sustained investment into artificial intelligence (AI).

The National AI Research Program is a joint effort between NSF, the U.S Department of Homeland Security (DHS) Science & Technology Directorate (S&T), the U.S. Department of Transportation (DOT), Federal Highway Administration (FHWA), and the U.S Department of Agriculture (USDA) National Institute of Food and Agriculture (NIFA). The 2020 solicitation also included industry partners Accenture, Amazon, Google, and Intel.

The overarching vision for this program is to advance AI to address societal issues. Proposed Institutes must be multi-disciplinary, composed of multiple organizations across all geographic regions of the U.S. working together to create new research capabilities, and serve as a nexus point for collaborative efforts around the continuing growth of AI. Institute proposals are expected to communicate how they will perform use-inspired AI research, advance foundational research in AI, and actively work to develop a diverse and well-trained future AI workforce. Applications must focus on one of the outlined themes in the solicitation. The themes for the 2020 competition were: Human-AI Interaction and Collaboration AI Institute for Advances in Optimization; AI and Advanced Cyberinfrastructure; Advances in AI and Computer and Network Systems; AI Institute in Dynamic Systems; AI-Augmented Learning; AI to Advance Biology; and AI-Driven Innovation in Agriculture and the Food System.

NSF and its partners invested $140 million in seven institutes in its first round, the 2019 solicitation. For the 2020 solicitation, NSF and its industry and government partners invested in 11 new institutes making for a combined investment of $220 million. A third competition is expected in fall 2021.

Sources and Additional Information:
- Additional information on the AI Institutes program, including past webinars and FAQ documents, is available at https://beta.nsf.gov/funding/opportunities/national-artificial-intelligence-research-institutes.
- The press release on the most recent awardees of the program is available at https://beta.nsf.gov/science-matters/expanding-geography-innovation-nsf-ai-research-institutes-2021?utm_medium=email&utm_source=govdelivery.
- The 2020 solicitation is available at https://www.nsf.gov/pubs/2020/nsf20604/nsf20604.pdf.
- PCAST's 2019 *Recommendations for Strengthening American Leadership in Industries of the Future* is available at https://science.osti.gov/-/media/_/pdf/about/pcast/202006/PCAST_June_2020_Report.pdf?la=en&hash=019A4F17C79FDEE5005C51D3D6CAC81FB31E3ABC.
- The 2019 *National Artificial Intelligence Research and Development Strategic Plan* is available at https://www.nitrd.gov/pubs/National-AI-RD-Strategy-2019.pdf.

Science and Technology Centers: Integrative Partnerships

The Science and Technology Centers (STC): Integrative Partnerships program supports large-scale, longer-term awards that are innovative, potentially transformative, and involve complex research and education projects. STCs are multi-institutional public-private partnerships that carry out research at the interface of disciplines and/or take new approaches to existing disciplines. STCs involve any area of science or engineering that is supported by NSF and are expected to involve groups underrepresented in science and engineering. STCs must also undertake activities to support knowledge transfer.

The most recent solicitation was released in March 2019 and the program is expected to be competed again in fall 2021. The STC competition is very competitive, previous competitions have attracted around 250 preliminary proposals and only funded three to five new centers. Institutions of higher education must lead STC proposals and are expected to develop partnerships with other academic institutions, research laboratories, and third parties as appropriate for their application.

Sources and Additional Information:
- Additional information about the STC program is available at https://beta.nsf.gov/funding/opportunities/science-and-technology-centers-integrative-partnerships.
- The 2019 solicitation is available at https://www.nsf.gov/pubs/2019/nsf19567/nsf19567.pdf.

Engineering Research Centers
Engineering Research Centers (ERCs) support large interdisciplinary research projects that promote partnership between industry and universities and create societal impact. In addition to research and technology development, ERCs are responsible for growing the engineering workforce, sustaining a culture of diversity and inclusion, and creating an enduring "value system of innovation." ERCs are also expected to support NSF's goal of providing global leadership in research and education and creating new scientific concepts. Since the founding of the ERC program in 1975, NSF has supported 75 ERCs, which has led to more than 200 spin-off companies and 850 patents.

There are currently 14 active ERCs which are grouped in the following research areas: advanced manufacturing; health; energy and environment; and infrastructure. The "Gen-4" Engineering Research Center solicitation was released in 2020, with full proposals due in May 2021. Award announcements from this solicitation are expected in 2022. Each center is awarded funding for up to ten years, with the first five years of funding guaranteed and the second five years of funding contingent on the performance of the ERC and submission of a renewal proposal. For the 2020 solicitation, NSF intends to fund up to five centers at $25 million annually. The next competition is expected to be released in spring 2023 for awards to be made in FY 2025.

Sources and Additional Information:
- Additional information about the NSF ERC program is available at https://beta.nsf.gov/funding/opportunities/science-and-technology-centers-integrative-partnerships.
- The 2020 ERC solicitation is available at https://www.nsf.gov/pubs/2020/nsf20553/nsf20553.pdf.
- Information on current centers is available at https://www.nsf.gov/awardsearch/advancedSearchResult?ProgEleCode=1297,%201790,7213,%207555,%207614,%208005&BooleanElement=ANY&BooleanRef=ANY&ActiveAwards=true&#results.

Centers for Chemical Innovation
The Centers for Chemical Innovation (CCI) program supports research centers that focus on long term, transformative, and innovative chemical research challenges. CCIs can partner with industry and other organizations and fully integrate research and education activities to broaden participation of underrepresented groups. The CCI program is open to all fields supported by NSF's Division of Chemistry and is a two-phase program: Phase I supports the formation and development of new centers; Phase II provides sustained funding.

The latest solicitation was released in May 2021 to support Phase I Centers and Phase II renewals. Required preliminary proposals were due August 23, 2021. Up to $9.4 million is available to support up to four awards.

Sources and Additional Information:
- The CCI webpage is available at https://beta.nsf.gov/funding/opportunities/centers-chemical-innovation-cci.
- The last CCI solicitation can be found at https://www.nsf.gov/pubs/2021/nsf21587/nsf21587.pdf.

Economic Development Administration

Investing in America's Communities: EDA's American Rescue Plan Act Programs
In late July 2021, EDA announced six Notices of Funding Opportunity (NOFOs) under the Investing in America's Communities (IAC) program, which is supported by the $3 billion EDA received under the *American Rescue Plan Act* (ARPA). Through these programs, EDA intends to fund projects that support broad-based, equitable, community-led economic development. These investments are intended to aid communities, including those historically underserved, via investments in infrastructure, innovation, and workforce development. Proposals should create well-paying, high-quality jobs and strengthen the U.S.' global economic competitiveness and ability to recover from the COVID-19 pandemic. The individual NOFOs are rooted in EDA's Investment Priorities. While several of the NOFOs only *require* alignment with the "Recovery & Resilience" priority, projects that closely align with individual priorities and key definitions could be more competitive. This is especially the case for the Equity priority, as most of the NOFOs call for support for historically underserved populations and areas.

The individual NOFOs of the IAC program are listed below. More in-depth summaries of each program can be found in Lewis-Burke's overview document and in the individual NOFOs.

- **Build Back Better Regional Challenge ($1 billion)**: This program will provide investments in 20 to 30 regions across the country to sustainably revitalize their economies. Regional coalitions will be invited to apply for funding to implement three to eight projects aligned with a cohesive regional development strategy. Collective awards will range from $25 million to $75 million, with a potential for up to $100 million. Proposals should look at developing new industries or expanding existing ones through planning, infrastructure development, workforce training, innovation and commercialization, and access to capital. $100 million of the program will be dedicated to supporting the *Coal Communities Commitment* initiative, which targets new industry growth in coal communities. Awards will be provided to coalitions of stakeholders in two phases:
    - Phase 1 – Concept Proposals: EDA will provide around $500,000 in technical assistance funds to 50-60 regional coalitions. Selected coalitions will be considered "finalists" and

receive support to further develop regional collaboration for full applications. Funding will also be used to support a Regional Competitiveness Officer position and other capacity-building efforts. EDA intends to develop a nation-wide coalition of Phase 1 awardees that can coordinate economic growth strategies and support future regional efforts even if they are not awarded Phase 2 awards. **Phase 1 deadline: October 19, 2021**

- o Phase 2 – Full Applications: This phase will fund the implementation of 20-30 finalists' projects/strategies. EDA anticipates funding individual regional growth clusters with component projects that collectively cost between approximately $25 million and $75 million and potentially up to $100 million. **Phase 2 deadline: March 15, 2022.**

- **Good Jobs Challenge ($500 million)**: This program supports the building and strengthening of regional workforce training systems and sector-based partnerships, with a focus on programs targeted at women, people of color, and historically underserved communities.
Projects that help workers complete training programs, including Registered Apprenticeships, and provide wrap-around services like childcare and transportation would be supported. There are expected to be approximately 25 to 50 awards ranging from $1 million to $25 million. **Application deadline: January 26, 2022.**

- **Economic Adjustment Assistance (EAA) Challenge ($500 million):** This longstanding program will provide flexible grants through various construction, non-construction, innovation, and/or workforce development projects tailored to meet local needs. EDA is expected to support projects between approximately $500,000 and $5 million, which would be larger than standard EAA awards. $200 million of the EAA program will be dedicated to supporting the *Coal Communities Commitment* initiative. **Application deadline: Rolling – EDA encourages eligible applicants to submit as soon as possible.**

- **Statewide Planning, Research, and Networks Grants ($90 million):** EDA will allocate $59 million in State Planning grants to support the development of equitable and resilient local economies that can withstand future economic shocks. EDA will allocate $31 million for Research and Networks Grants to evaluate implementation by EDA and its grantees and extend technical assistance to support EDA's ability to work with and build capacity with new and existing grantees. This is one of the largest research programs in several years for EDA. **Application deadlines for Research and Networks Grants: Rolling – EDA encourages eligible applicants to submit as soon as possible.**

- **Travel, Tourism, and Outdoor Recreation Grants ($750 million):** The funding was specifically carved out by Congress to accelerate the recovery of the travel and tourism sectors and the communities that rely on those industries. One of the programs under this thrust, Regional Tourism Grants, will allocate $240 million for competitive grants to further invest in infrastructure, workforce, or other projects to support recovery and resilience. **Application deadline for competitive grants: Rolling – EDA encourages eligible applicants to submit as soon as possible.**

- **Indigenous Communities Challenge ($100 million):** EDA will allocate funds specifically for Tribal Governments and Indigenous communities to broadly support a wide range of economic development activities. **Application deadline: Rolling – EDA encourages eligible applicants to submit as soon as possible.**

While due dates and specific goals for the IAC programs vary, there are some similarities among the NOFOs. For instance, although ARPA required EDA funding to respond to economic injury caused by COVID-19, EDA has determined that economic impacts from COVID are so widespread that any program that creates jobs, increases economic diversity, or supports resiliency of a local economy is eligible. Also, projects funded under most, but not all, of the NOFOs must be linked to a region's Comprehensive Economic Development Strategy (CEDS) or equivalent plan, many of which have been updated to address the impacts of COVID-19. For some of the programs, EDA may use its discretion and move one or more of the proposed projects to another NOFO under which it is eligible.

EDA generally expects to fund at least 80 percent, and up to 100 percent, of eligible project costs for each program. Also, under the statute, EDA's American Rescue Plan appropriations are available for making awards through September 30, 2022, though performance under the awards may extend to September 30, 2027. Finally, as with all EDA awards, applicants are strongly encouraged to thoroughly review the solicitations and collaborate with their state's contact listed in each NOFO for any support and technical assistance.

Sources and Additional Information:

- The EDA *American Rescue Plan Act* webpage, with breakout pages for each competition, is available at https://www.eda.gov/ARPA/.
- EDA's investment priorities are available at https://eda.gov/about/investment-priorities/.
- Additional resources, including recordings of webinars on each program can be found at https://eda.gov/arpa/resources/.
- The solicitation for the Build Back Better Regional Challenge is available at https://www.grants.gov/web/grants/view-opportunity.html?oppId=334735.
- The solicitation for the Good Jobs Challenge is available at https://www.grants.gov/web/grants/view-opportunity.html?oppId=334720/.
- The solicitation for the Economic Adjustment Assistance Challenge is available at https://www.grants.gov/web/grants/view-opportunity.html?oppId=334743.
- The solicitation for the Statewide Planning, Research, and Networks grants is available at https://www.grants.gov/web/grants/view-opportunity.html?oppId=334728.
- The solicitation for the Travel, Tourism, and Outdoor Recreation Grants is available at https://www.grants.gov/web/grants/view-opportunity.html?oppId=334748.
- The solicitation for the Indigenous Communities Challenge is available at https://www.grants.gov/web/grants/view-opportunity.html?oppId=334764.

Build to Scale
EDA's Build to Scale (B2S) program is a recently rebranded version of their popular Regional Innovation Strategies (RIS) program. B2S continues the goals of the original RIS program of stimulating entrepreneurship, supporting cluster based economic development, promoting job growth in emerging sectors, and translating discoveries from the lab to the marketplace. The B2S solicitation is annual and typically released in February. B2S funding can be used to develop proof of concept and commercialization centers, as well as develop seed capital funds. In the past, the program has also provided awards for innovation around specific sectors through the Industry Challenge, which was featured in the 2020 competition but not in the 2021 edition.

Each of the opportunities under this program expand upon EDA's efforts to bring together regional stakeholders through public-private partnerships focused on job creation, commercialization activities, and innovative research enterprises. Additional information on each of the funding opportunities competed in 2021 is provided below.

Venture Challenge (formally the i6 Challenge under RIS): The goals of the Venture Challenge are to stimulate entrepreneurship and the growth of scalable startups in a region or combination of regions by providing support to innovation-facing organizations like universities or accelerators. Funding could be used to leverage regional strengths to advance job creation, improve research commercialization, and remediate "structural barriers that inhibit regional innovation capacity and resilience." In the 2021 competition, there were two funding levels for the Venture Challenge program, Build and Scale. Overviews of these programs are provided below.

- *Venture Challenge Build* provided support for developing new interventions to address identified needs and/or implementing known interventions to a new community. EDA provided up to $750,000 over a three-year project period for Build projects in 2021.
- *Venture Challenge Scale* supported the scaling of existing efforts that achieved positive impacts. EDA provided between $750,000 and $1.5 million over a three-year project period for Scale projects in 2021.

Capital Challenge (formally Seed Fund Support): This program provides funding for the planning, formation, marketing, expansion, or launch of regional seed capital funds. Funding will support operational and programmatic costs and cannot be used for investment funds. EDA provided up to $400,000 over a three-year project period for Capital Challenge projects.

Sources and Additional Information:

- The B2S program page with additional information on the initiative, including an informational webinar for the 2021 competition and 2020 awardees, can be found at https://www.eda.gov/oie/buildtoscale/.

Public Works and Economic Adjustment Assistance programs & CARES Act Support
The EDA Public Works and Economic Adjustment Assistance (EAA) programs are signature initiatives at the agency that provide competitive funding for projects that leverage regional strengths to promote economic growth and resilience. Public Works and EAA programs fund similar activities, with EAA focusing more on planning, support, and development strategies for regions facing economic hardships. Given the substantial overlap between the programs, they are both included in the same solicitation which is typically released annually. Funding can include activities such as construction, non-construction (i.e. strategic development, infrastructure development strategies etc.), technical assistance, and revolving loan funds. Projects must be consistent with an existing comprehensive economic development strategy (CEDS) for the region.

Projects must be focused on providing support to economically distressed regions. EDA defines distressed regions as having an unemployment rate for the most recent 24-month period that is at least one percent higher than the national average; per capita income that is 80 percent or less than the national average; or a "special need" identified by EDA. In 2020, Congress and the Trump Administration leveraged the flexibility of the programs to get economic development solutions directly to communities by providing $1.5 billion to the EAA program as a "special need" through the CARES Act.

Through EAA, funding was made available for communities to "prevent, prepare for, and respond to the coronavirus, including for necessary expenses for responding to economic injury as a result of coronavirus" regardless of the area's level of distress. This is a similar mechanism EDA leveraged in past years to assist non-distressed regions as they rebuild from natural disasters. Most of this funding has been allocated.

In FY 2021, EDA was appropriated $237 million for the EAA and Public Works programs. The average size of a Public Works investment has been approximately $1.4 million, and investments generally range from $600,000 to $3 million. The average size of an EAA investment has been approximately $650,000 and investments generally range from $150,000 to $1 million.

Sources and Additional Information:
- The most recent solicitation can be found at https://www.grants.gov/web/grants/view-opportunity.html?oppId=321695.

University Centers
This program provides funding for universities to leverage existing assets to promote regional innovation, high-growth entrepreneurship, inclusiveness, and resiliency. Annual awards for the University Centers selected previously has been in the range of $80,000 to $200,000 each over a five-year period. EDA competes University Centers on a staggered schedule for the six EDA Regional Offices and generally funds eight to ten awards per region. The most recent competitions were for Chicago and Philadelphia regions. A chart outlining forthcoming competitions is provided below.

FY 2022 (next competition)	Atlanta Regional Office	Serves: Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee
	Seattle Regional Office	Serves: Alaska, Arizona, American Samoa, California, Guam, Hawaii, Idaho, Republic of Marshall Islands, Federated States of Micronesia, Nevada, Northern Mariana Islands, Oregon, Republic of Palau, and Washington
FY 2023	Austin Regional Office	Serves: Arkansas, Louisiana, New Mexico, Oklahoma, and Texas
	Denver Regional Office	Serves: Colorado, Iowa (excluding Muscatine and Scott counties), Kansas, Missouri, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming

Sources and Additional Information:
- Additional information on the program can be found at https://www.eda.gov/programs/university-centers/.

STEM Talent Challenge
The STEM Challenge is an annual solicitation that seeks to bolster workforce development through the creation and implementation of programs that support high-growth, high-wage entrepreneurial ventures, and industries in emerging technology sectors. While the 2020 solicitation supported two primary activities, Planning and Development and Program Implementation, the solicitation that was

released in August 2021 encourages projects to more broadly focus on fostering collaboration, promoting workforce training, and connecting STEM talent to unfilled job openings. The solicitation notes that applications should include plans to build or expand community-based partnerships that link STEM employment opportunities to underserved populations. EDA will allocate $2 million for grants funded at up to $250,000 per individual award for a 24-month workforce program, differing from last year's individual awards that were up to $300,000 for 18-to-24-month projects. Applications for the most recent solicitation are due **October 12, 2021.**

This program could continue to grow under the Biden Administration as Department of Commerce Secretary Gina Raimondo has strongly emphasized workforce development. Further, the President's budget request proposed funding the program at $10 million in FY 2022, as did the House Commerce, Justice, Science FY 2022 appropriations bill. In EDA's budget justification, they argue the increase is necessary because the program is "oversubscribed," having received 78 applications in the last competition while only being able to make seven awards. If given an increase in funds, they intend to expand the program and the number of grantees.

Sources and Additional Information:
- Additional information on the program can be found at https://eda.gov/oie/stem/.

Department of Defense

Manufacturing Technology Program
DOD's Manufacturing Technology Program (ManTech) Program was originally created in 1956 to further national security objectives through the development and application of advanced manufacturing technologies. Housed within the Office of the Under Secretary for Research and Engineering (OUSD-R&E), ManTech bridges the gap from R&D to full-scale production and aids in the economical and timely acquisition of weapon systems and components. ManTech invests in advanced manufacturing ecosystems built on common commercial and defense challenges for shared risks and shared benefits. ManTech oversees the DOD Manufacturing Innovation Institutes (MIIs), a key investment strategy for future DIB security and stability. MIIs help overcome defense industrial base (DIB) challenges by advancing manufacturing innovation for focused technology areas and their associated manufacturing ecosystems. MIIs are excellent sources for economic development and commercialization initiatives as they drive public-private partnerships, act as regional hubs for manufacturing excellence, investment in research and industrially relevant manufacturing technologies, and promote manufacturing education and workforce development solutions.

Sources and Additional Information:
- A guide to the institutes' missions and recommendations for how to engage with them can be found here: https://www.manufacturingusa.com/pages/how-engage-dod-institutes.

University Affiliated Research Centers
University Affiliated Research Centers (UARCs) are a DOD mechanism for engaging universities with industry to ensure that science, engineering, and technology requirements are supported. Each UARC has areas of expertise that are identified as core competencies that it must provide in support of its mission to support DOD. While UARC awards are made directly to universities, they often facilitate collaboration between academia and industry in support of the DOD mission. UARCs are among the highest-profile DOD contracting mechanisms for universities as they enable sole-source funding awards. The newest UARC was awarded to the University of Nebraska in 2012. There are 13 UARCs, but it is

unlikely that additional centers will be established. Instead, DOD organizations and commands have chosen to determine their own outreach and selection of academic institutions for longer-term partnerships. For example, in August 2021, the US Space Force signed the first of ten planned partnership programs with the University of South Dakota. The Space Force memorandum of understanding states these partnerships will meet four goals: workforce development for Space Force Guardians, mutual research pursuits, service-as-scholarship programs like ROTC devoted to space, and recruitment of diverse STEM talent.

Sources and Additional Information:
- An overview of Army UARCs is available at http://www.arl.army.mil/www/default.cfm?page=510.
- An overview of all UARCs from the Defense Innovation Marketplace is at https://defenseinnovationmarketplace.dtic.mil/ffrdcs-uarcs/.

Army Research Laboratory Collaborative Research Alliances and Collaborative Technology Alliances
DOD supports university-industry collaborations through Military Service-specific initiatives like the Army Research Laboratory's (ARL) Collaborative Research Alliances (CRAs) and Collaborative Technology Alliances (CTAs). These mechanisms support collaborations between Defense laboratories and centers, industry, and academia to ensure rapid technology transfer of new innovations and technologies. Alliance topics include cybersecurity, Internet of Things applications, autonomy, AI, and other novel applications for Army deployment. Industry is encouraged to participate in these alliances to enable commercialization. ARL uses CTAs to drive the development of "complex technologies" to solve some of the Army's most complex challenges.

Sources and Additional Information:
- An overview of current ARL CRA/CTA opportunities is available at http://www.arl.army.mil/www/default.cfm?page=93.

ARL Open Campus
ARL continues its Open Campus initiative to enhance relationships with the international, academic, and entrepreneur communities by sharing ARL facilities and research opportunities. Open Campus increases opportunities for technological advancement and transfer of research knowledge. Four regions of the country feature Open Campus locations as well as several issue area-specific centers for research listed as critical ARL requirements. Each center seeks industry partners to advance research into its field of study on behalf of emerging Army requirements.

Sources and Additional Information:
- More information on the Open Campus initiative can be found here: https://www.arl.army.mil/opencampus/.

Irregular Warfare Technical Support Directorate
The Irregular Warfare Technical Support Directorate (IWTSD), formerly known as the Combating Terrorism Technical Support Office (CTTSO), is funded by the Assistant Secretary of Defense for Policy (ASD) Special Operations and Low-Intensity Conflict (SO/LIC). IWTSD issues an annual BAA to identify and develop capabilities to combat terrorism and irregular adversaries and to deliver those capabilities to DOD and interagency partners through rapid research and development, advanced studies, technical innovation, and support to U.S. military operations. The BAA is typically issued in March each year and is preceded by an Industry Day where commercial, academic, and nonprofit partners can interact and

understand IWTSD's subgroups' specific requirements. IWTSD typically seeks technologies at the TRL-4 level and above to fulfill their mission of equipping end users within a 6-24-month timeframe.

Sources and Additional Information:
- Sign up to be notified for future BAA cycles at www.cttso.gov.

Rapid Reaction Technology Office
The Under Secretary of Defense for Research and Engineering's Rapid Reaction Technology Office (RRTO) program periodically solicits proposals to leverage commercial technology to meet needs identified by combatant commanders, Military Service organizations, other Defense agencies, and interagency organizations. RRTO aims to remove barriers to commercial technology utilization and support DOD's Better Buying Power objectives by leveraging technology and emerging products developed by small, innovative businesses in the commercial sector, including commercial startups and spinoffs from universities. RRTO announced its Global Needs Statement and corresponding Fall Virtual Solutions Meeting, applications to which closed in April 2021.

Sources and Additional Information:
- The Global Needs Statement and more information on RRTO can be found at https://sam.gov/opp/d1c8253de5ed42c394d858aac1b90427/view.

Military Service Rapid Capabilities Offices
DOD has established Military Service Rapid Capabilities Offices (RCOs) in each of the Military Services chartered to rapidly identify and deploy technologies and commercial systems in support of near-term operations. Each office publishes technology interest areas and conducts Service-specific events like pitch days, hackathons, and experiments. Some Services, like the Army RCCTO, maintain open BAAs to encourage persistent engagement with innovative solution providers. Others, like the Office of Naval Research's (ONR) NavalX program (which resides inside a technology accelerator department that acts as the Navy RCO) conduct regular Tech Bridges between Navy warfighters and solution providers to vet requirements, develop innovations, and transition them into the field quickly.

Sources and Additional Information:
Information about each Service's unique RCO can be found below:
- Army Rapid Capabilities and Critical Technologies Office (RCCTO): https://rapidcapabilitiesoffice.army.mil/ace/.
- Marine Corps Rapid Capabilities Office at the Marine Corps Warfighting Laboratory (MCWL): https://www.mcwl.marines.mil/Divisions/RCO/.
- Naval Accelerator Department (Code 36/NavalX), Office of Naval Research (ONR): https://www.onr.navy.mil/en/Science-Technology/Departments/Code-36.
- Department of the Air Force Rapid Capabilities Office (DAF RCO): https://www.af.mil/About-Us/Fact-Sheets/Display/Article/2424302/rapid-capabilities-office/.
- Space Rapid Capabilities Office (SRCO): https://www.kirtland.af.mil/Units/Space-Rapid-Capabilities-Office/.

Defense Manufacturing Community Support Program
The Defense Manufacturing Community Support Program (DMCSP) is designed to spearhead long-term investments in critical skills, facilities, research and development, and small business support to strengthen manufacturing capabilities and national security in designated Defense manufacturing

communities. The DMCSP allows organizations to obtain Defense Manufacturing Community (DMC) designation and funding and aims to recognize communities where local stakeholders can utilize long-term planning to attract and expand Defense manufacturing through private and public investments. Recipients typically include consortia seeking local investment in workforce training, retraining, or recruitment and retention; business incubators; advanced research and commercialization with Federal laboratories and depots; supply chain development; and small business assistance.

Sources and Additional Information:
- Information on the program can be found here: https://oldcc.gov/defense-manufacturing-community-support-program#block0.

Department of Energy

Office of Technology Transitions Programs
The Office of Technology Transitions (OTT) oversees DOE's commercialization and technology transfer efforts, helping to broaden the impact of energy research from the National Laboratories and applied energy programs. OTT funds two major programs: the Energy Program for Innovation Clusters (EPIC) and the Technology Commercialization Fund (TCF).

OTT established EPIC in 2020 as a two-part prize competition to support regional energy innovation. EPIC recognizes innovative energy technology incubators that have had outsized impact on their communities. Part one of EPIC's prize competition made 20 small awards primarily to technology incubators and startups. In 2021, part two of the prize competition awarded $9.5 million to ten larger energy innovation leaders including three universities. OTT also oversees TCF, a $30 million fund for advancing applied energy technologies developed by the National Laboratories and DOE facilities. Additionally, labs and facilities identify private industry partners to commercialize their technology and provide matching funds. EPIC will likely be competed in spring 2022.

To accelerate the deployment and commercialization of clean energy technologies, the Biden Administration in its FY 2022 President's budget request proposed the creation of a new Office of Clean Energy Demonstration (OCED). Both the House and Senate FY 2022 Energy and Water appropriations bills approved the creation of this office and would each provide at least $100 million to support initial demonstration efforts focused on energy storage projects. Congress also would provide $23 billion for this new office in the Senate-passed bipartisan infrastructure package to support a broad range of renewable energy, energy efficiency, industrial decarbonization, and carbon capture, sequestration, and utilization projects. The purpose of OCED would be to serve as the central hub to accelerate the commercialization of more mature clean energy technologies. OCED would compete and award multi-year, cost-shared agreements for specific technology demonstrations with the private sector. Institutions of higher education and other research organizations could partner with the private sector on these projects. Since Congress has not yet completed FY 2022 appropriations or passed the bipartisan infrastructure package, this new office has not yet been established and future funding is still uncertain.

Sources and Additional Information:
- Information on the Office of Technology transitions can be found at https://www.energy.gov/technologytransitions/about-us.
- Information on the Energy Program for Innovation Clusters (EPIC) can be found at https://www.energy.gov/technologytransitions/energy-program-innovation-clusters.

- Information on the Technology Commercialization Fund (TCF) can be found at https://www.energy.gov/technologytransitions/technology-commercialization-fund.

Energy Innovation Hubs

DOE's Energy Innovation hubs are comprised of large, multi-disciplinary groups of researchers tasked with a specific grand energy challenge. The Hubs are modeled after the large and successful Manhattan Project and the AT&T Bell Laboratories, which brought together basic and applied research, and engineering into integrated teams to advance scientific research. DOE has funded six Hubs in the past and each Hub typically receives $120 million over five years with an opportunity for a five-year extension. The newest Hub, established in 2019, is the Energy-Water Desalination Hub, known as the National Alliance for Water Innovation (NAWI), led by Lawrence Berkeley National Laboratory. Other examples of past or existing Hubs include the Fuels from Sunlight Hub, the Consortium for Advanced Simulation of Light Water Reactors, and the Batteries and Energy Storage Hub.

Sources and Additional Information:
- Additional information on Energy Innovation Hubs with links to each Hub can be found at http://energy.gov/science-innovation/innovation/hubs.

Energy Frontier Research Centers

The DOE Office of Basic Energy Sciences supports 41 Energy Frontier Research Centers (EFRCs) involving universities, national laboratories, industry, and other partners with universities leading several of them. EFRCs are small multi-investigator, multi-disciplinary centers focused on fundamental research to overcome the barriers of development for new innovative energy technologies and accelerate use-driven research to address energy needs. The centers are funded between $2 million and $4 million per year over four years.

In 2009, DOE distributed the first EFRC awards, funding 46 proposals with five-year award terms, 16 of which were funded by the *American Recovery and Reinvestment Act.* DOE's open recompetition in 2014 was limited to funding only 32 centers due to limited appropriations and changing the award term to four years. DOE then began making "off-year" solicitations for a limited number of awards, most recently, making ten awards in FY 2020.

DOE is expected to announce the FY 2022 competition in Fall 2021 and fund 40 new or renewed centers. Similar to the FY 2018 competition, the funding solicitation is expected to cover a broad range of energy science topics. DOE has not yet finalized the FY 2022 topic areas, however based on discussions with DOE program managers, an analysis of the FY 2022 President's budget request, and recent workshops, the most likely topic areas include advanced manufacturing focusing on sustainability; clean energy technologies including direct air capture; hydrogen production, storage, and use; and advanced solar and energy storage. Other topics may include cryogenic electron microscopy, microelectronics, and chemical upcycling of polymers. DOE is also expected to require EFRC solicitations to include participation from Minority Serving Institutions and non-R1 universities.

Sources and Additional Information:
- More information is available on the EFRC web page available at https://science.osti.gov/bes/efrc.
- DOE's summary of the EFRC program is available at https://science.osti.gov/-/media/bes/pdf/brochures/2019/EFRC_Booklet_2019.pdf?la=en&hash=C4FDA7E3492B662CE4D425C76C03A554CD324C93

- Summaries of the existing EFRCs can be found at https://science.osti.gov/-/media/bes/efrc/pdf/technical-summaries/ALL_EFRC_technical_summaries.pdf?la=en&hash=37474A5F4BC52C8CC361EE3B317F62BBC57E000A.

Bioenergy Research Centers

As a precursor to the Energy Innovation Hubs, DOE has established four Bioenergy Research Centers since 2007 to leverage fundamental biological and genomic research and biotechnology tools to advance biofuel production. The centers were tasked with addressing three grand challenges, including developing new bioenergy crops; tackling biologically based conversion methods; and exploring innovative ways to create biologically based biofuels. Originally, three centers were funded at $25 million per year for an initial five-year period. All three centers were renewed for an additional five years in April 2013, and again in 2018 with the addition of a fourth center. As of 2019, the four Bioenergy Research Centers were responsible for more than 715 invention disclosures, 510 patent applications, and 244 licensing options to transfer research results and new technologies with the private sector.

Sources and Additional Information:
- The DOE Bioenergy Research Centers website is at http://genomicscience.energy.gov/centers/.
- The DOE Office of Biological and Environmental Research (BER) website is at http://science.energy.gov/ber/.
- DOE's 2020 Program Update on Bioenergy Research Centers is at https://genomicscience.energy.gov/centers/BRC_Booklet_2020HR.pdf.

Lab Embedded Entrepreneurship Program

The Lab Embedded Entrepreneurship Program (LEEP) helps energy entrepreneurs partner with National Laboratories to develop new energy technologies and attract private investment and receives funding through DOE's Office of Energy Efficiency and Renewable Energy (EERE). The program has run at three national laboratories: Cyclotron Road at Berkeley National Lab, Chain Reaction at Argonne National Lab, and Innovation Crossroads at Oak Ridge National Lab. The labs issue an annual call each fall and select around 20 entrepreneurs to work alongside national lab experts and mentors to conduct R&D on energy technologies and introduce them to investment networks to help bring the new product to market. The awards to entrepreneurs usually involve a fellowship that covers living costs and a travel stipend up to two years, plus up to $350,000 to use on collaborative R&D at the lab and with industry experts. Entrepreneurs also receive technology and business guidance; market research and customer discovery assistance; introductions to commercial partners and investors; and access to mentors and advisory networks.

Sources and Additional Information:
- An overview of the LEEP program is at https://www.energy.gov/eere/amo/lab-embedded-entrepreneurship-program.
- Informational webinars for the 2022 LEEP cohorts will take place throughout the fall. Details are available on each of the lab's websites: https://chainreaction.anl.gov/apply/ https://cyclotronroad.lbl.gov/apply-now https://innovationcrossroads.ornl.gov/apply.

National Institutes of Health (NIH)

NIH's Small Business Innovation Research/ Small Business Technology Transfer Support Programs
NIH maintains a Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) website with a comprehensive listing of all relevant funding opportunities, including parent grant solicitations for the NIH, CDC, and FDA, targeted SBIR/STTR solicitations, research & development contract solicitations, commercialization readiness pilot programs, and diversity supplements.

Sources and Additional Information:
- More information on NIH's SBIR/STTR program can be found at https://sbir.nih.gov/funding.

National Cooperative Drug Discovery/Development Groups for the Treatment of Mental Disorders, Drug or Alcohol Addiction
U19 Clinical Trial Optional
Partnerships between academia and industry are strongly encouraged for this program which seeks to create multidisciplinary research groups or partnerships for the discovery of pharmacological agents to treat and study metal illness or drug or alcohol addiction. Supported by the National Institute of Mental Health (NIMH), National Institute on Alcohol Abuse and Alcoholism (NIAAA), and the National Institute on Drug Abuse (NIDA), applications are sought to advance the discovery, preclinical development, and proof of concept testing of new, rationally based candidate agents to treat these areas. The current application opportunity expires on March 26, 2022 with the next due date as **November 26, 2021**.

Sources and Additional Information:
- More information on this opportunity is available at https://grants.nih.gov/grants/guide/pa-files/PAR-20-119.html.

Drug Development Collaboratory
UH3/UG3 Clinical Trial Required
The National Center for Advancing Translational Sciences (NCATS) launched this initiative to support intramural-extramural collaborations on late-stage translation projects for the therapeutic development of biologics, small molecules, or gene therapies. This collaboration with the NCATS Therapeutic Development Branch supports late-stage pre-clinical work and clinical trial planning for the applicant institutions. The goal of the program is to generate enough data to support a successful Investigational New Drug (IND) application to the FDA. The program was just announced in 2020 and the first application deadline was February 9, 2021. For the current solicitation the next application deadline is **February 9, 2022.**

Sources and Additional Information:
- More information on this opportunity is available at https://grants.nih.gov/grants/guide/pa-files/PAR-20-301.html.

Innovative Approaches to Improving Environmental Health Literacy
R41/R42 Clinical Trial Not Allowed and R43/R44 Clinical Trial Not Allowed
These solicitations, published by the National Institute of Environmental Health Sciences (NIEHS), are part of NIEHS' larger Partnerships for Environmental Public Health Program, and aim to support the development of tools that "build capacity, improve environmental health literacy, and support citizen science endeavors." Approaches or resources developed should meet the needs of community members, health care and public health professionals, educators, and students at all levels. Applications for this specific program are due **November 11, 2021**. Given NIH's interest in elevating environmental

health across the agency, it is likely that the solicitations will be reissued or that additional opportunities like this will be competed in the future.

Sources and Additional Information:
- The solicitation for STTR awards (R41/R42) is available at https://grants.nih.gov/grants/guide/rfa-files/RFA-ES-21-009.html.
- The solicitation for SBIR awards (R43/R44) is available at https://grants.nih.gov/grants/guide/rfa-files/RFA-ES-21-008.html.

Concept to Clinic: Commercializing Innovation (C3i) Program
This program, ran by the National Institute of Biomedical Imaging and Bioengineering (NIBIB) is designed to provide medical device innovators with tools, mentoring, and specialized business frameworks to translate their technologies from lab concepts to the clinic/market. The curriculum includes three stages of support including education, validation/execution, and acceleration, all aimed at guiding investigators as they work towards creating commercially viable products and potential business opportunities. The current Concept to Clinic: Commercializing Innovation (C3i) program began in June 2021 and will end in October 2022, and the course is usually offered annually. Applications for the 2021 edition were due on May 25, 2021, and interested investigators can expect a similar due date for 2022 (**late May 2022**).

Sources and Additional Information:
- More information about the C3i program can be found at https://www.nibib.nih.gov/research-program/c3i-program.

Food and Drug Administration (FDA)

Centers of Excellence in Regulatory Science and Innovation (CERSI)
Centers of Excellence in Regulatory Science and Innovation (CERSI) were created in 2011 and are the main account by which FDA supports university research. These centers are led by universities and bring together academic, industry, and other government agency partners to develop new tools, approaches, and standards for evaluating the safety, efficacy, and quality of innovative products. Workshops and conferences are used to help bring together groups for discussion across a wide range of fields. Four CERSIs are currently designated following the initial competition in 2011 and subsequent ones in 2014 and 2016.

Sources and Additional Information:
- An overview of the program can be found at https://www.fda.gov/science-research/advancing-regulatory-science/centers-excellence-regulatory-science-and-innovation-cersis.

Broad Agency Announcement (BAA) for Advanced Research and Development of Regulatory Science
FDA releases an annual BAA soliciting proposals on a variety of regulatory science priority areas for the agency. These priorities often cross food and drug safety, product manufacturing, clinical trial innovation, data sciences, social and behavioral science, and global supply chain security, among other topics.

Sources and Additional Information:
- An overview of the program can be found at https://www.fda.gov/science-research/advancing-regulatory-science/regulatory-science-extramural-research-and-development-projects.

- The FY 2021 FDA BAA can be found at
  https://sam.gov/opp/80543862ddf14b65a8eb2fa0072de138/view?keywords=fdabaa-21-00123.

National Aeronautics and Space Administration (NASA)

Space Technology Mission Directorate Programs
The Space Technology Mission Directorate (STMD) seeks the rapid maturation of cross-cutting, broadly applicable technologies through collaborative partnerships with NASA Centers, academia, and the private sector. STMD's specific focus is on high-impact, transformative technologies that are too nascent or risky for the private sector to support independently.

While NASA's other directorates are guided by mission and operational needs, STMD is comprised of capability-driven programs. As such, STMD focuses on improving NASA's technological capabilities across a broad array of areas—from propulsion and power generation to materials science and high-performance computing. This wide-ranging portfolio allows STMD to support technological research and development in areas not directly related to spaceflight, making it highly accessible to university faculty and students in the engineering disciplines. STMD would be funded at $1.425 billion in the President's FY 2022 budget request, which is 29.5 percent above the FY 2021 enacted level while the House Commerce, Justice, Science appropriations bill would fund STMD at $1.280 billion.

Technology Transfer Program
NASA STMD has created its Technology Transfer program (T2) to coordinate its many technology commercialization projects. T2 allows the public to access its patent portfolio and software catalogue in order to license or use its technologies. NASA has also stood up multiple programs that both facilitate technology transfer and highlight the agency's commercialization successes. Of most relevance to universities is the Technology Transfer University (T2U) program. NASA currently partners with 25 universities around the country to bring NASA technology into the hands of students and faculty. The T2U program is open to all interested U.S. universities.

Sources and Additional Information:
- NASA's T2 portal can be found at https://technology.nasa.gov/.
- More information on the T2U program can be found at https://technology.nasa.gov/t2u.

STMD Technology Innovation Initiatives
NASA moved away from their *Technology Roadmaps* in 2020 with the release of the *2020 NASA Technology Taxonomy*. Unlike the 2015 Roadmap, the new Taxonomy does not provide detailed outlines of NASA's current technological capabilities, but instead lists specific technologies categorized under general areas where NASA anticipates future technologies will be needed to enable space missions and aviation technology. STMD provides support through 12 distinct programs, each focused on different phases of the technology-readiness level (TRL) spectrum. A technology at TRL-1 is a basic concept while a technology at TRL-9 is ready for missions and operations. The following STMD programs are particularly relevant to universities and private industry:

- **NASA Innovative Advanced Concepts** – NASA Innovative Advanced Concepts (NIAC) focuses on maturing a technology from a basic idea to an experimental proof of concept (TRL-1 to TRL-3). Proposals for NIAC funding are generally "blue sky" ideas for radical new mission concepts that depend on an enabling new technology.

- **NASA iTech** – NASA iTech promotes new NASA relevant ideas by connecting innovators with potential investors. Innovators can apply to NASA iTech though their annual cycle competition or pitch their ideas at Ignite the Night events which are held around the U.S. and focus on regional innovators. NASA does not provide funding for iTech winners but connects them with investors from private industry. Many recent focus areas have centered on foundational NASA commercialization priorities including commercialization of low-Earth orbit, hybrid and electric aircraft, and small satellite systems.
- **Space Technology Research Grants** – The Space Technology Research Grants (STRG) focus on TRL-1 through TRL-3, but unlike NIAC, it is designed to be responsive to the priorities outlined in the NASA Technology Roadmaps. STRG encourages faculty and students to pursue research in transformative space technology through the three separate component programs below.
  - **Space Technology Research Institutes** – Space Technology Research Institutes (STRIs) strengthen NASA's connections to academic communities by developing diverse, multidisciplinary university-led centers that both advance cutting-edge technology and train the next generation of scientists and engineers that will lead NASA's science and technology innovation. Each institute advances low to mid TRL projects around a central technology focus area. The STRI competition is released once every two years and funds two institutes for five years at $3 million annually.
  - **Early Career Faculty** – Early Career Faculty (ECF) awards are specifically for early career faculty and seeks to advance technologies outlined in NASA's Technology Roadmaps from TRL-1 to TRL-3.
  - **Early Stage Innovation** – Early Stage Innovation (ESI) has the same scope as ECF, but it is not restricted to early career faculty.
  - **NASA Space Technology Graduate Research Opportunities** – NASA Space Technology Graduate Research Opportunities (NSTRGO), first released in 2019, replaced the NASA Space Technology Research Fellowships programs, but achieves the same objective. NSTGRO provides financial and material support to graduate students through training grants and opportunities to conduct research at a NASA Center.
  - **Lunar Surface Technology Research (LuSTR)** – Lunar Surface Technology Research (LuSTR) opportunities specifically advance technologies that explore the lunar surface and forms part of the Artemis program which will eventually bring humans back to the Moon.
- **Game Changing Development** – Game Changing Development (GCD) focuses on rapidly maturing technologies from experimental proof of concept to technology validation in a relevant environment (TRL-3 to TRL-5/6). GCD focuses on potentially revolutionary, high-risk high-reward technologies that may lead to new approaches to space missions. GCD works with partners from across academia, industry, and within NASA centers, but its emphasis on higher TRL levels means that universities are more likely to compete with private companies for funding.
- **Small Spacecraft Technology Program** – The Small Spacecraft Technology Program (SSTP) leverages university partnerships to advance small spacecraft capabilities and subsystems from validation in an operational environment to technology demonstration in an operational environment (TRL-3 to TRL-7). SSTP does this by identifying new subsystem technologies and sponsoring flight demonstrations for small spacecraft. SSTP identifies new technologies through frequent solicitations.
- **Prize and Challenge Competitions** – NASA holds a number of prize and challenge competitions including the Centennial Challenges and Entrepreneurs Challenge. The Centennial Challenges are open to the public (teams comprised of students, faculty, or industry researchers are

encouraged to apply). The focus of the competitions varies, with the most recent challenges focusing on space robotics, 3-D printable habitats, medical research, and CubeSats. The Entrepreneurs Challenge, sponsored by NASA's Science Mission Directorate (SMD), allows entrepreneurs to pitch a technology that advances NASA's science interests. NASA will award up to $90,000 to entrepreneurs who successfully pitch their ideas.

Funding opportunities for all of these programs are released as appendices to the annual Space Technology Research, Development, Demonstration, and Infusion (SpaceTech-REDDI) NASA Research Announcement (NRA). The exceptions are NSTGRO, SSTP, and the prize and challenge competitions which are released as standalone solicitations.

Sources and Additional Information:
- NASA's 2020 Technology Taxonomy can be found at
  https://www.nasa.gov/offices/oct/taxonomy/index.html.
- More information on NIAC is available at
  https://www.nasa.gov/directorates/spacetech/niac/index.html.
- More information on the STRI is available at
  https://www.nasa.gov/directorates/spacetech/strg/stri. The latest STRI announcement can be found at
  https://www.nasa.gov/directorates/spacetech/strg/New_Space_Tech_Research_Institutes_to_Advance_Electric_Propulsion_Entry_Systems.
- More information on ECF is available at
  https://www.nasa.gov/directorates/spacetech/strg/archives_stro.html.
- More information on ESI is available at
  https://www.nasa.gov/directorates/spacetech/strg/early-stage-innovations-esi.
- More information on NSTGRO is available at
  https://www.nasa.gov/directorates/spacetech/strg/nstgro.
- More information on LuSTR is available at
  https://www.nasa.gov/directorates/spacetech/strg/lustr.
- More information on GCD is available at
  https://www.nasa.gov/directorates/spacetech/game_changing_development/index.html.
- More information on the SSTP is available at
  https://www.nasa.gov/smallspacecraft#.VQb6QkjJzyE.
- More information on NASA's prize and challenge competitions is available at
  https://www.nasa.gov/solve/index.html.

Aeronautics Research Mission Directorate Programs
NASA aeronautics has made decades of contributions to aviation. Every U.S. commercial aircraft and U.S. air traffic control tower has NASA-developed technology on board that helps improve efficiency and maintain safety. NASA aeronautics research creates on-ramps for industry and academia to realize various future states of aviation. The Aeronautics Research Mission Directorate's (ARMD) current programs include:
- **University Leadership Initiative** – NASA's University Leadership Initiative (ULI) provides an opportunity for the U.S. university community to receive NASA funding to build teams and set their own research agenda. ARMD assists in the transition of research results to an appropriate range of stakeholders that lead to a continuation and commercialization of the research.

- **Sustainable Flight National Partnership** – The Sustainable Flight National Partnership (SFNP) is partnering with industry, academia, and other agencies to accomplish aviation's aggressive climate change agenda to reduce aviation carbon emissions by half compared to 2005 by 2050 and achieve net-zero emissions by 2060. During the next ten years, SFNP will demonstrate the first-ever high-power hybrid-electric propulsion system on a large transport aircraft, ultra-high efficiency long and slender aircraft wings, new large-scale manufacturing techniques of composite materials, and advanced engine technologies based on breakthrough NASA innovations.
- **Advanced Air Mobility –** NASA's Advanced Air Mobility (AAM) program partners with industry, academia, and state and local governments to help emerging aviation markets safely develop an air transportation system that moves people and cargo between places previously not served or underserved by aviation–local, regional, intraregional, urban–using revolutionary new aircraft that are only just now becoming possible.
- **Low-Boom Flight Demonstration** – NASA's aeronautical innovators are leading a government-industry team to collect data that could make supersonic flight over land possible, dramatically reducing travel time in the U.S. or anywhere in the world.

Sources and Additional Information:
- More information on NASA ARMD is available at https://www.nasa.gov/aeroresearch.
- More information on ULI is available at:
  https://www.nasa.gov/aeroresearch/programs/tacp/ui-uli.
- More information on the SFNP is available at:
  https://www.nasa.gov/subject/7564/green-aviation/.
- More information on NASA's AAM Program is available at https://www.nasa.gov/aam.
- More information on the LBFD is available at
  https://www.nasa.gov/mission_pages/lowboom/overview.

U.S. Department of Agriculture (USDA)

Rural Innovation Stronger Economy Program
USDA's Rural Innovation Stronger Economy (RISE) competitive grants program was authorized through the 2018 Farm Bill and aims to support job accelerator partnerships that foster high wage jobs and new businesses in distressed rural and energy communities, as well as leveraging and maximizing local assets, including broadband. The grant is designed to spark regional, innovation-driven economic development in rural communities, with an emphasis on areas where at least 20 percent of the population is living in poverty (based on U.S. Census Bureau data).

RISE grants are solicited through USDA's Rural Business-Cooperative Service (RBCS) Agency. Eligible applicants include rural jobs accelerator partnerships with expertise in delivering economic and job training programs, consisting of non-profit entities, state entities, tribal entities, institutions of higher education, and public bodies.

Sources and Additional Information:
- The federal register notice is available at https://public-inspection.federalregister.gov/2021-12335.pdf.
- The program overview is available at https://www.rd.usda.gov/sites/default/files/fact-sheet/20210528-rbcs-risefactsheet-final508.pdf.

Agriculture Innovation Demonstration Center Grants

The Agriculture Innovation Demonstration Center (AIC) Program is funded through RBCS annually, however the funding amount and timing of the solicitation is not consistent. The program aims to establish and operate AICs that provide technical and business development assistance to agricultural producers seeking to engage in the marketing or the production of Value-Added products. Of note, funds can be used for technical assistance for product development (excluding research and development) and process development services, including engineering services, scale production assessments, and systems development.

Sources and Additional Information:
- The federal register notice is available at https://www.federalregister.gov/d/2019-22551.
- The program page can be found at https://www.rd.usda.gov/programs-services/business-programs/agriculture-innovation-center-program.

Conservation Innovation Grants

USDA's Natural Resources Conservation Service (NRCS) launched the Conservation Innovation Grants (CIG) On-Farm Conservation Innovation Trials (On-Farm Trials) competitive grants program. The CIG program aims to stimulate the adoption and evaluation of innovative natural resource conservation approaches on private lands, improving air, water, and soil quality. The On-Farm Trials are designed to cultivate partnerships between NRCS and agricultural producers to improve their operations and simultaneously improve air, water, and soil quality. The funding laid out is intended to provide producers with technical assistance and incentive payments to help mitigate risks associated with implementation of new conservation practices and systems.

Sources and Additional Information:
- The funding opportunity can be found at https://www.grants.gov/web/grants/view-opportunity.html?oppId=332993.
- More information on CIG is available at https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/financial/cig/?cid=nrcseprd1459039.

Farm of the Future

USDA's National Institute of Food and Agriculture (NIFA) released a solicitation for its new Farm of the Future competitive grant. The highly anticipated program, which was established in the fiscal year 2021 appropriations bill, aims to demonstrate sustainable and profitable practices of climate-smart agriculture, forestry, and animal production through a rural agricultural test bed and demonstration site. The test bed will integrate precision agriculture, automation, data exchanges, and socioeconomics and will evaluate smart technologies like remote sensing, machine learning, and autonomous robots to develop smart, data-driven ways to enhance resilient agriculture. This program is only open to land-grant universities but reflects USDA's increased focus on smart technologies in agriculture.

Sources and Additional Information:
- The RFA is available at https://nifa.usda.gov/sites/default/files/rfa/FY22-Farm-of-the-Future-RFA-508.pdf.
- The program overview is available at https://nifa.usda.gov/funding-opportunity/farm-future?utm_content=&utm_medium=email&utm_name=&utm_source=govdelivery&utm_term=.

Small Business Administration (SBA)

The Federal and State Partnership Program
SBA's Federal and State Partnership (FAST) program is an annual competition that provides funding for statewide initiatives to increase the number and quality of Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) program applications. FAST awardees, often universities, play a critical role in providing technical and business assistance to small firms that are traditionally left out of competitions for SBIR/STTR awards. FAST institutions are often looked to by SBA as trusted partners to lead state/regional events and programs. SBA emphasizes that submissions should address helping disadvantaged firms compete for SBIR/STTR in areas such as the commercialization of university research, mentoring for SBIR grants, R&D assistance for small businesses, and the transfer of technology developed through SBIR/STTR awards. There can only be one application per state and there must be demonstrated support for the applicant from the state's governor's office.

Sources and Additional Information:
- More information on the FAST program, including the 2021 competition, is at https://www.sbir.gov/about-fast.

Growth Accelerator Fund Competition and SBIR Catalyst
SBA launched a competition out of the Office of Investment and Innovation (OII) focused on supporting entrepreneurs involved in research and development (R&D) and enhancing regional innovation. The competition is divided into two distinct tracks: the Growth Accelerator Fund Competition (GAFC), which supports individual entrepreneurial training organizations, and SBIR Catalyst, which supports clusters of organizations that are focused on enhancing regional innovation and entrepreneurship. The solicitation aligns with SBA's role as coordinator of the SBIR/STTR programs, which are cornerstone investments by federal agencies to commercialize federally funded basic research. Through these awards, SBA provides funding to local innovation facilities to further support the development of start-up companies and awareness of SBIR/STTR.

The GAFC provides additional resources to accelerators and incubators to "help these entities provide focused assistance to high tech entrepreneurs, including support for company formation as well as awareness and education of the SBIR and STTR programs." Applicants must focus proposed efforts to support entrepreneurs in one of the priority groups listed in the solicitation, including those underrepresented in SBIR/STTR as designated by SBA and entrepreneurs building technologies in key areas. Priorities in the 2021 competition included but were not limited to:

- "Clean Energy: such as electric vehicles, solar, wind, geothermal, nuclear, energy efficiency;
- Supply Chain Resilience: such as semiconductors, pharmaceuticals and active pharmaceutical ingredients (APIs), high-capacity batteries, critical minerals, agricultural commodities;
- Infrastructure: such as broadband, electrical grid, water supply and sewer, transportation infrastructure, electric vehicle charging stations; and
- Other STEM/R&D areas."

The SBIR Catalyst supports collaborative partnerships between organizations that assist entrepreneurs in underserved communities. Applicants are expected to submit a proposal involving multiple entrepreneur support organizations and partners from different states/territories in a large geographic area. Funding may be used to establish and scale partnerships, expand access to mentorship in early-

stage technology development, train applicants to submit competitive SBIR/STTR proposals, develop commercialization pathways for STEM companies, and importantly, seek to fill gaps in the innovation ecosystem.

Sources and Additional Information:
- The most recent solicitation can be found at https://www.sbir.gov/sites/default/files/2021%20GAFC-SBIR%20Catalyst%20Prize%20Competition%20Guidelines_%20Final.pdf.
- More information on the funding opportunity, including a link to register to the webinar and templates for the slide decks can be found at https://www.sbir.gov/accelerators.

Minority Business Development Agency (MBDA)

Business and Specialty Centers
MBDA supports various centers focused on expanding business development for minority-owned businesses and providing technical assistance to industry. The Business Centers program comprises most centers funded through MBDA. This five-year grant aims to improve access to markets and focuses on cultivating public-private partnerships to increase competitiveness and spur job creation. The centers' three pillars are access to capital, access to contract opportunities, and access to foreign markets. Following the program's most recent competition, which closed in March 2021, MBDA is supporting 36 locations across 29 different states.

In addition to the Business Center program, MBDA funds Specialty Centers, which include Export Centers, Advanced Manufacturing Centers, and Procurement Centers. The most recent competition for the Advanced Manufacturing solicitation closed in April of 2021 and awarded four projects $400,000 to provide technical assistance, business development, and manufacturing assistance services to minority businesses.

Sources and Additional Information:
- Information on the most recent competition of Business Centers is available at https://www.mbda.gov/mbda-business-center-program-grant-competitions.
- A list of Specialty Centers can be found at https://www.mbda.gov/mbda-programs/specialty-centers.
- The most recent competition of the advanced manufacturing specialty center can be found at https://www.grants.gov/web/grants/view-opportunity.html?oppId=331880.

Broad Agency Announcements
In 2018, MBDA released a broad agency announcement (BAA) that provided federal funds to assist innovative projects, education, and outreach that include minority businesses. The announcement was used to encourage new activities, education, outreach, innovative projects, or sponsorships that are not addressed through other MBDA programs. Through this BAA, MBDA funded projects that impacted one or more of the core needs for American Indian, Alaska Native, and Native Hawaiian communities. A BAA outlining the same initiatives launched the American Indian, Alaska Native, and Native Hawaiian Project in May 2021. This program outlines three strategic initiatives to support Tribal and native business growth: Innovation and Entrepreneurship; Strategic Planning; and Transformative Projects, with a focus on infrastructure.

Building on the 2018 BAA, MBDA published an additional BAA in July 2021 to help promote and accelerate the growth of entrepreneurship among underrepresented undergraduates. The Minority Colleges and Universities Competition is a pilot program which aims to promote entrepreneurship at Historically Black Colleges and Universities (HBCUs), Hispanic Serving Institutions (HSIs), Tribal Colleges and Universities (TCUs), Native Hawaiian Serving Institutions (NHSIs), and Alaska Native Serving Institutions (ANSIs). The funds can be used towards any product or tool that encourages inclusive innovation and economic development with programs focused on equipping undergraduates with the skills to develop a business and commercialize products and services.

Sources and Additional Information:
- The May 2021 BAA is available at https://www.grants.gov/web/grants/view-opportunity.html?oppId=333858.
- The July 2021 BAA can be found at https://www.grants.gov/web/grants/view-opportunity.html?oppId=334781.
- Information on the 2018 BAA is available at https://www.mbda.gov/sites/default/files/media/files/2018/mbda-obd-2018-2005687_ffo_report.pdf.
- The Minority Colleges and Universities program page is available at https://www.mbda.gov/minority-colleges-and-universities-grant-competition.