The House passed the majority of its appropriations bills in a seven-bill minibus package that would fund agencies including the Departments of Agriculture, Interior, Health and Human Services, Education, and more. One of the bills not yet passed is the Commerce, Justice, and Science bill, which funds the National Science Foundation, the National Aeronautics and Space Administration, and the National Oceanic and Atmospheric Administration. The House will need to work through some holdups regarding policing and pass the bill along with the other remaining five before the end of September in order to avoid a continuing resolution (CR). On July 28, the Senate announced a bipartisan agreement on infrastructure funding legislation that would include some of the Biden Administration’s priorities. The Infrastructure Investment and Jobs Act would provide $550 billion in new spending on transportation, energy, broadband, and drinking infrastructure, in addition to “resilience” programs targeting natural hazards and cybersecurity. Priorities listed in the Administration’s American Families Plan were not included in this agreement, however, and neither were elements of the American Jobs Plan calling for investments in basic and applied research or research infrastructure. Funding for those pieces may be included in a $3.5 trillion spending measure, work on which is expected to begin in the Senate next week.

The University of Minnesota Washington Update provides intelligence and analysis on recent federal activities. Faculty visiting Washington, D.C. are encouraged to contact Sarah Neimeyer, Director of Government Relations, at neimeyer@umn.edu. Contact Christina Laridaen, Lewis-Burke Associates LLC, at christina@lewis-burke.com with any questions or comments related to the Update’s content.

**Funding Opportunities and Agency Updates**

**Funding Opportunity: EDA Releases Final Solicitations for American Rescue Plan Programs**

The attached document provides summaries of the six Notices of Funding Opportunity (NOFOs) recently announced by the U.S. Department of Commerce’s (DOC) Economic Development Administration (EDA) under
their new **Investing in America’s Communities** (IAC) program, which is supported by the $3 billion EDA received under the *American Rescue Plan Act* (ARPA). The ultimate goals of the IAC NOFOs are to create new jobs and stimulate inclusive economic growth that will revitalize regions for years to come. This is one of the largest localized economic development initiatives in DOC history.

The individual NOFOs supported by IAC program include:

- **Build Back Better Regional Challenge** ($1 billion) – to support 20-30 regions by developing or growing regional innovation clusters.
- **Good Jobs Challenge** ($500 million) – to develop and strengthen workforce programs.
- **Economic Adjustment Assistance** ($500 million) – to provide flexible grants to support projects tailored to meet local needs.
- **Indigenous Communities** ($100 million) – to provide flexible support for Tribal Governments and Indigenous communities.
- **Travel, Tourism and Outdoor Recreation** ($750 million) – to accelerate the recovery of regions that rely on the travel and tourism sectors.
- **Statewide Planning, Research and Networks** ($90 million) – to support statewide resiliency planning efforts, as well as research and technical assistance.

Universities and other non-profits can compete for most of the awards. EDA generally expects to fund at least 80 percent, and up to 100 percent, of eligible project costs for each program. 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.

EDA will hold a webinar for each of the six funding opportunities released under the Investing in America’s Communities program. The dates and registration links for each webinar can be found below:

- **Build Back Better Regional Challenge** webinar will be held on **Monday, August 2 at 2 p.m. ET.**
- **Travel, Tourism and Outdoor Recreation** program webinar will be held on **Tuesday, August 3 at 2 p.m. ET.**
- **Coal Communities Commitment** webinar will be held on **Thursday, August 5 at 2 p.m. ET.**
- **Statewide Planning, Research, and Networks** webinar will be held on **Friday, August 6 at 2 p.m. ET.**
- **Economic Adjustment Assistance** webinar will be held on **Monday, August 9 at 2 p.m. ET.**
- **Indigenous Communities** webinar will be held on **Tuesday, August 10 at 2 p.m. ET.**
- **Good Jobs Challenge** webinar will be held **Thursday, August 12 at 2 p.m. ET.**

For those interested in a more general overview of the opportunities, EDA will be hosting another informational webinar on **Wednesday, August 4 at 2 p.m. ET.**

**RFI Opportunity for NDEP STEM Consortia Future Solicitation**

The National Defense Education Program (NDEP) announced a request for information (RFI) for a Science, Technology, Engineering, and Mathematics (STEM) Consortia that addresses the Department of Defense’s mission of cultivating STEM talent to enrich the future workforce. The RFI focuses on “transitioning students from 2-year Community College science, technology, engineering, and mathematics (STEM) programs to a STEM degree at a 4-year institution through a consortium based approach” and “preparing an agile and diverse workforce through technical training and certificate programs and supporting these programs through
collaborative partnerships and consortia.” Interested applicants must answer a series of questions provided in the full announcement, addressing specific efforts in at least one of the following:

- “Reaching and attracting veterans, their dependents, and military connected students to STEM opportunities;
- Providing meaningful STEM experiences for students and faculty especially those from underserved populations;
- Fostering/leveraging partnerships and ecosystems to amplify reach and impact of STEM activity through multi-institution consortia;
- Promoting transition from 2-year colleges to 4-year degrees in STEM fields; and/or
- Technical training and certifications through 2-year degree programs, especially in AI, cyber, and advanced manufacturing.”

All qualified sources, especially consortia that include two-year colleges, community colleges, and other relevant partners, are highly encouraged to respond with examples of small- or large-scale programs to address the focus areas of interest. An event for “Questions regarding RFI” will be held on August 23, 2021 at 5:00 PM ET. All RFI responses are due no later than September 10, 2021 at 5:00 PM ET. To RSVP for the event and submit RFI responses, e-mail osd.dodstem@mail.mil. The full RFI can be found on www.grants.gov under Opportunity Number “RANDENDEPSTEMFY22RFI” or here.

NDEP will use RFI responses to develop the solicitation for a future funding opportunity. NDEP anticipates releasing the request for proposals on November 30, 2021, with an estimated proposal deadline on February 15, 2022.

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Funding Opportunity: USDA OPPE Releases Solicitation for Outreach and Assistance for Socially Disadvantaged and Veteran Farmers and Ranchers Program

The Department of Agriculture’s (USDA) Office of Partnership and Public Engagement (OPPE) released a solicitation for the Outreach and Assistance for Socially Disadvantaged and Veteran Farmers and Ranchers competitive grants program, also known as the 2501 Program. The 2501 program aims to assist socially disadvantaged, veteran, and beginning farmers and ranchers with ownership and operation of agricultural property and to facilitate equitable participation in USDA programs. This funding must be used to provide technical assistance, outreach, and education to assist and connect with socially disadvantaged and veteran farmers and ranchers to inform them of available USDA resources and improve participation in USDA programs.

Projects should address at least two of the following programmatic mission areas:
- Assisting socially disadvantaged, veteran, or beginning farmers and ranchers in owning and operating successful farms and ranches;
- Increasing participation in USDA programs among socially disadvantaged or veteran farmers and ranchers;
- Facilitating connections between current and prospective farmers and ranchers who are socially disadvantaged or veterans and USDA offices;
- Assisting in contacting and educating current and prospective socially disadvantaged farmers, ranchers, or forest landowners using a culturally competent approach; and
• Assisting with identifying barriers to participation and engagement that current and prospective socially disadvantaged farmers or ranchers face.

Priority is given to non-governmental and community-based organizations with demonstrable history of at least three years serving socially disadvantaged and veteran farmers and ranchers.

Due Date: Applications are due August 25, 2021 at 11:59 PM EST.

Pre-application Webinar: Two webinars are scheduled to provide additional information on this opportunity. The first will take place on July 28, 2021 at 2:00 PM EST, and the second will take place on August 10, 2021 at 2:00 PM EST.

Eligibility: The 2501 Program is open to: non-profits, community-based organizations, tribal entities, or a coalition of community-based organizations with at least 3 years of documented expertise in working with socially disadvantaged farmers or ranchers or veteran farmers or ranchers; land-grant institutions of higher education; Hispanic-Serving institutions of higher education; and any other institution of higher education with experience providing agricultural education or other agricultural-related services to socially disadvantaged or veteran farmers or ranchers.

Total Funding and Award Size: The total funding provided for this competitive program is approximately $16.6 million as provided in the 2018 Farm Bill. The maximum amount of requested federal funding for projects shall not exceed $750,000 over the 3-year project period.

Matching Requirements: There are no cost matching requirements for this program.

Sources and Additional Information:
• The first webinar on July 28 can be accessed at https://ems8.intellor.com/login/839760.
• The second webinar on August 10 can be accessed at https://ems8.intellor.com/login/839761.
• The funding opportunity can be found at https://www.grants.gov/web/grants/view-opportunity.html?oppId=334799.

Funding Opportunity: AFRL Releases BAA for Regional Research Hubs; Solicitation for Midwest and Northeast Regions
The Air Force Research Laboratory (AFRL) released a Broad Agency Announcement (BAA) soliciting white papers from universities to establish Regional Research Convergence Hubs (ARRCH). AFRL also released a specific call under the BAA for proposals to establish ARRCs in the Northeast and Midwest regions. AFRL’s timeline and projected funding indicate that the Air Force anticipates funding two additional awards for the South and West regions beginning in fiscal year (FY) 2024.

The ARRC program seeks to develop regional research and innovation partnerships that will enable new, transformational capabilities across the span of technology areas relevant to both the U.S. Air Force and U.S.
Space Force. AFRL intends for each ARRCH to be led by a performer who demonstrates a validated record of research and development, business incubation/entrepreneurship, and workforce development efforts. Performers will engage in a cooperative relationship with the AFRL and implement operations that enable substantive collaboration across a regional network which will include additional academic institutions, industry, venture firms, national laboratories, and other R&D organizations.

For the current solicitation, eligible applicants include accredited higher education institutions and consortiums of these institutions. Please note that calls for this solicitation are split into regional hubs. The active solicitation is for institutions located in the Northeast and Midwest Regions. Geographic regions are as follows:

- **Northeast**: PA, NJ, NY, CT, RI, VT, NH, MA, ME
- **Midwest**: OH, MI, IN, IL, WI, MN, IA, MO, ND, SD, NE, KS
- **South**: DE, MD, VA, DC, WV, NC, SC, GA, FL, KY, TN, AL, MS, AR, OK, LA, TX
- **West**: MT, WY, CO, MN, ID, UT, AZ, WA, OR, CA, NV, HI, AK

The Midwest and Northeast solicitation is a two-step closed call. Under this solicitation, white papers must be submitted by **August 3, 2021 at 4:00 PM ET**. If selected by AFRL, proposers must submit a full proposal by **September 8, 2021 at 4PM ET**. AFRL anticipates awarding two awards at $1 million per award for FY 2021, $3 million per award for FY 2022, and $5 million per award for FY 2023. AFRL has laid out a similar timeline and funding levels for two additional awards beginning in FY 2024.

AFRL’s BAA can be found at [https://sam.gov](https://sam.gov) under solicitation number “FA875021S7007,” and the Midwest and Northeast solicitation can be found here or at [https://sam.gov](https://sam.gov) under solicitation number “FA875021S7007-CALL001.”

**Funding Opportunity: ED Announces Education Innovation and Research Program (EIR) Early-Phase Award Competition**

The U.S. Department of Education’s (ED) Office of Elementary and Secondary Education released, on July 27, a notice inviting applications (NIA) for the fiscal year (FY) 2021 Education Innovation and Research (EIR) for Early-Phase program grants. The EIR program supports efforts to create, implement, and evaluate innovative, evidence-based solutions to academic challenges facing high-need students. The EIR program has three tracks: Early-Phase, Mid-Phase, and Expansion. Each track requires a different level of prior evidence of effectiveness and level of scale. Higher education institutions may apply as part of a consortium led by a state education agency (SEA), local education agency (LEA), the Bureau of Indian Education (BIE), or as a non-profit organization recognized under 34 CFR 75.71. ED intends to issue a total of $180 million in awards across all three phases of EIR grants with $4 million as the estimated average size of an award.

Proposals must demonstrate an evidence base that justifies exploration into the topic and focus on field-initiated innovations. The FY 2021 Early-Phase grant competition includes a special focus on K-12 STEM and computer science education, as well as expanding opportunities in computer science for underserved populations such as minorities, girls, and youth from rural communities and low-income families. For the Early-Phase competition, ED intends to award an estimated $35 million in funds for STEM projects and $35 million in funds for social and emotional learning (SEL) projects.

UMN Washington Update
Prepared by Lewis-Burke Associates LLC
July 30, 2021
The NIA for the Early-Phase program grant includes four absolute priorities and three competitive priorities. All applicants must address Absolute Priority 1 and must also address one of the other three absolute priorities. Applicants who choose to address Absolute Priority 3 also have the option of addressing Competitive Priority 1, and applicants applying to any of the Absolute Priorities are able to address Competitive Priorities 2 or 3. There is no limit to how many Competitive Priorities applicants are able to address.

- **Absolute Priority 1:** Demonstrates a Rationale
  - Applicants should develop, implement, and test the feasibility of their projects and must submit prior evidence of effectiveness that meets the “demonstrates a rationale” evidence standard.

- **Absolute Priority 2:** Field-Initiated Innovations – General
  - Projects that are designed to create, develop, implement, replicate, or take to scale entrepreneurial, evidence-based, field-initiated innovations to improve student achievement and attainment for high-need students.

- **Absolute Priority 3:** Field-Initiated Innovations – Promoting Science, Technology, Engineering, or Mathematics (STEM)
  - Projects that “create, develop, implement, replicate, or take to scale entrepreneurial, innovations to improve to student achievement for high need students” in STEM, or computer science.
  - **Competitive Preference Priority 1 – Computer Science (up to 5 points):** Within Absolute Priority 3, projects designed to improve student achievement, expand access to, and participation in computer science coursework for underrepresented students such as racial or ethnic minorities, women, and low-income individuals.

- **Absolute Priority 4:** Field-Initiated Innovations — Fostering Knowledge and Promoting the Development of Skills That Prepare Students To Be Informed, Thoughtful, and Productive Individuals and Citizens
  - Projects should “create, develop, implement, replicate, or take to scale” evidence-based innovations to improve student achievement for high-need students and promote SEL skills that improve academic performance and prepare students for responsible citizenship.

Within Absolute Priorities 2, 3, and 4, competitive preference is given to applications that address the following competitive preferences.

- **Competitive Preference Priority 2 — Innovative Approaches to Addressing the Impact of COVID-19 on Underserved Students and Educators (up to 5 points):**
  - Projects that are designed to address the needs of underserved students most impacted by COVID-19. Some examples of projects that develop and implement strategies to address those needs may include:
- Providing evidence-based supports and educational opportunities to accelerate grade-level in-class student learning (especially for underserved students);
- High-quality tutoring and other forms of expanded learning time;
- Provision of targeted supports to prepare students for success in postsecondary education; and
- Creating or supporting equitable and inclusive learning environments in schools.

- **Competitive Preference Priority 3 — Promoting Equity and Adequacy in Student Access to Educational Resources and Opportunities (up to 5 points):**
  - Projects that are designed to promote equity and adequacy in access to critical resources in Pre-K-12 for underserved students. Some examples of project activities that support this competitive priority are:
    - Addressing inequities of access to fully qualified teachers and improving their retention;
    - Increasing access to middle school courses that are foundational to success in high school, advanced high school coursework, high-quality early college programs, and high-quality career and technical education pathways; and
    - Developing programs designed to provide a well-rounded education.

Further details on requirements of the absolute and competitive priorities can be found in the Notice Inviting Applications.

**Due Dates:** Full proposals are due **August 27, 2021**. Applicants are encouraged to submit a notice of intent to apply by **August 17, 2021**.

**Total Funding and Award Size:** ED intends to award a total of up to $180 million in EIR grants across all phases of the program, funding up to $4 million for Early-Phase projects over a period of up to 60 months. Between 12 and 23 program grants are expected to be awarded in the Early-Phase track.

**Eligibility and Limitations:** SEAs, LEAs, non-profit organizations, and BIE are eligible to apply and may do so partnership with other entities, including higher education institutions. The grant requires cost sharing by recipients of at least 10 percent of the award amount.

**Sources and Additional Information:**
Agency Engagement: OSTP and NSF Request Information on the New National Artificial Intelligence Research Resource

The White House Office of Science and Technology Policy (OSTP) and the National Science Foundation (NSF) have issued a Request for Information (RFI) on the newly established National Artificial Intelligence Research Resource (NAIRR) Task Force. NAIRR is “a shared research infrastructure providing AI researchers and students across all scientific disciplines with access to computational resources, high-quality data, educational tools and user support.” The Task Force is directed by Congress to study the feasibility of creating and supporting NAIRR and developing an implementation roadmap.

The NAIRR Task Force is due to submit an interim roadmap report to Congress and the Administration by May 2022, with a final report to be issued in November 2022. The issues to be addressed in the NAIRR roadmap are described in the RFI and include the following components: goals, ownership and administration, governance and oversight, capabilities for shared computing infrastructure, access to government data sets, security requirements, privacy, and sustainability plans.

The RFI includes six questions (that include references to the full RFI) to inform the development of the roadmap:

1. “What options should the Task Force consider for any of roadmap elements A through I above, and why? [Please take care to annotate your responses to this question by indicating the letter(s) of the item (A through I in the list above) for which you are identifying options.]
2. Which capabilities and services (see, for example, item D above) provided through the NAIRR should be prioritized?
3. How can the NAIRR and its components reinforce principles of ethical and responsible research and development of AI, such as those concerning issues of racial and gender equity, fairness, bias, civil rights, transparency, and accountability?
4. What building blocks already exist for the NAIRR, in terms of government, academic, or private-sector activities, resources, and services?
5. What role should public-private partnerships play in the NAIRR? What exemplars could be used as a model?
6. Where do you see limitations in the ability of the NAIRR to democratize access to AI R&D? And how could these limitations be overcome?”

Comments in response to RFI should be emailed to NAIRR-responses@nitrdf.gov by September 1, 2021.

Sources and Additional information:

Agency Update: Upcoming Department of Energy Funding Opportunities
The Department of Energy (DOE) is finalizing and about to release the last of its fiscal year (FY) 2021 funding opportunities and starting to turn to FY 2022. While many of the FY 2022 funding calls will be contingent on final congressional appropriations, DOE is already starting to collect information from stakeholders to help shape future opportunities. Below are highlights of major planned funding opportunities.

Planned Funding Opportunities

- **August 2021: $15 million for Advanced Building Construction**
  - This would fund research that could accelerate the renovation and construction of affordable, appealing, and energy-efficient buildings.
  - The objectives for the FY 2021 funding call are to benefit underserved communities by advancing energy-efficient buildings with low-carbon footprints and lower energy bills; faster renovation and construction with less disruption to building occupants; increased affordability for developers and consumers; and improved indoor air quality and comfort while reducing maintenance.
  - The three topic areas in the funding call will include:
    - Quick and inexpensive process to zone central air systems in existing homes, focusing on solutions that maximize zoning and minimize distribution losses for central systems in single family and multifamily homes with forced air systems.
    - Quick and inexpensive hidden-issue detection methods for retrofits, to develop tools and/or a process to both detect the presence of substantial moisture, mold or mildew without removing a substantial amount of the existing cladding and identify a way to mitigate any problems that were found.
    - Quick, low cost and reliable connections for new construction and retrofits, focusing on finding low-cost solutions that speed up the connection process of modules, panels and equipment on site.
  - DOE plans to fund up to 15 awards up to $2 million each over two years. In FY 2020, of 40 DOE project awards, eight, or 20 percent, went to research universities. Additional information on topic areas can be found [here](#).

- **September 2021: $8.5 million for Technology Innovation to Increase Hydropower Flexibility**
  - This will fund next-generation technologies that can improve the flexible capabilities of the U.S. hydropower fleet.
  - Areas of interest include:
    - Technologies that can expand the operational flexibility of the hydropower unit to provide grid services, such as expanded operating range, faster ramping and start-stops, and improved frequency and voltage control.
    - Capabilities to reduce the negative impacts, such as accelerated machine wear-and-tear, associated with operating the unit more flexibly.
    - DOE would like to support technology innovations that can advance to the prototype testing or demonstration stage, preferably including partnership with a hydropower owner or operator.
    - The funding call will also encourage the participation of underserved communities and underrepresented groups on project teams.

- **September 2021: $15 million for Direct Air Capture Combined with Dedicated Long-Term Carbon Storage, Coupled to Existing Low-Carbon Energy**
  - DOE will fund front-end engineering design (FEED) studies of direct air capture combined with dedicated carbon storage and coupled to existing low-carbon energy.
o This would be led by DOE’s Office of Fossil Energy and Carbon Management in collaboration with the Office of Nuclear Energy and the Geothermal Technology Office.

o Projects will require at least a 20 percent cost share.

- November 2021: $100 million for Energy Frontier Research Centers
  o DOE plans to fund 30 to 40 new or renewed centers ranging from $2 million to $4 million per year over four years.
  o Topic areas are likely to include transformative manufacturing, clean energy technologies (direct air capture, hydrogen, solar, and energy storage), microelectronics, chemical upcycling of polymers, and cryogenic electron microscopy.

- November 2021: $15 million for Atmospheric System Research and $8 million for Environmental System Science
  o The focus is on climate programs supported by the DOE Office of Science Biological and Environmental Research program.

- Fall/Winter 2021: ARPA-E Energy Technology Programs
  o Highest priority programs in the $30 million to $40 million range include:
    ▪ materials for carbon-neutral or carbon-negative buildings,
    ▪ technologies to dramatically reduce high-level nuclear waste,
    ▪ advanced battery electrodes and conductors for high capacity and rapid charge,
    ▪ grid resilience, reliability, and flexibility, and
    ▪ advanced fusion approaches for energy applications.

- Spring 2021: Clean Energy Manufacturing Institute (CEMI) for Industrial Decarbonization
  o In its FY 2022 President’s budget request, DOE proposed launching at least one new CEMI focused on industrial decarbonization. These are typically $140 million Institutes ($14 million a year in DOE funding and $14 million a year in cost share over 5 years). Congress appropriated $14 million in FY 2021 to launch a new CEMI Institute and the FY 2022 budget request includes $14 million for a second year of funding. Congress has not yet completed FY 2022 appropriations. This would be DOE’s seventh CEMI.
  o In preparation for this funding opportunity announcement and to seek feedback from stakeholders, DOE released a Request for Information with responses due on September 7 on two specific areas of interest:
    ▪ Electrification of industrial processes, including technologies for electrification of manufacturing process, materials for more effective and efficient electrification, scale-up and design for integration into manufacturing processes, and life cycle assessment tools and methodologies, and
    ▪ Decarbonization of metals manufacturing, including technical solutions in metallic manufacturing, improved alloy material performance, and accelerating the adoption of existing technologies.
  ▪ The CEMI would be funded through DOE’s Energy Efficiency and Renewable Energy Advanced Manufacturing Office.

Agency Update: DOE Highlights Upcoming Opportunities and Future Research Directions for Advanced Scientific Computing Research

The report below provides advance intelligence on future research directions for the Department of Energy (DOE) Office of Science (SC) in applied math, computer science, and high performance computing. The analysis is based on information from the July 29 Advanced Scientific Computing Advisory Committee (ASCAC) meeting
and discussions with DOE program managers. ASCAC provides advice to SC to advance the research and infrastructure priorities of the Advanced Scientific Computing Research (ASCR) program.

**FY 2022 Funding Priorities**
Congress has not yet completed fiscal year (FY) 2022 appropriations. However, based on funding directions in the House-passed FY 2022 Energy and Water bill and DOE’s FY 2022 budget request, ASCR is likely to advance the following funding opportunities between October 2021 and March 2022:

- Up to $25 million to support early-stage research, including novel devices and hardware, to continue building out and testing the first dedicated Quantum Internet and Communications Network. This includes basic research in quantum information networks that overcomes challenges in transporting and storing quantum information over interconnects and networks.
- $15 million for the Computational Science Graduate Fellowship Program, an increase of $5 million over prior years. The increased funding is focused on increasing the number of fellows in Artificial Intelligence (AI) and quantum information science as well as outreach to under-represented groups.
- Up to $20 million for applied mathematics and computer science in support of the science of AI, including domain-aware, interpretable, and robust machine learning systems as well as data-intensive, machine-learning enhanced modeling and simulation, and intelligent automation and decision support capabilities.
- $5 million for the DOE national labs to launch a Biopreparedness Research Virtual Environment (BRaVE), which would be an evolution of the National Virtual Biotechnology Lab (NVBL) that was used to leverage DOE capabilities to address the COVID-19 pandemic. BRaVE would be a virtual platform to rapidly mobilize DOE’s bioscience R&D assets in response to future pandemics and other national crises. The purpose would be to provide DOE research teams rapid access to high performance computing resources and x-ray and neutron characterization facilities; collaborative design-build-test-lean workflows using DOE’s biological, chemical, and materials databases; and medical radioisotopes. This capability would also help DOE further develop future biotechnology capabilities, such as analytical technologies, new instruments, and medical isotope processing.
- Up to $2 million for the planning of a new High Performance Computing Data Facility (HPDF) at a DOE national lab on the East Coast. The purpose is to support high performance, real-time data processing; data handling; and scientific computing workflow management. The facility would also be integrated with edge computing at remote sites to provide real-time access to computing resources that are architecturally diverse than other ASCR facilities as well as support acquisition and distribution of data of existing ASCR facilities.
- Another $1 million (for a total of $2 million) for DOE national labs to expand collaborations with the National Institute of Health Bridge2AI program focused on privacy-preserving algorithms for AI datasets.

**Future Research Directions**
ASCR’s future research directions and funding opportunities are influenced by advisory committee and community workshop report recommendations. The most recent ones are highlighted below.

**Software Stewardship**

In October 2020 ASCAC released its “Transitioning ASCR after ECP” report with recommendations to DOE on how to take advantage of new exascale computing investments and transition funding to new research
programs that will shape the future of high performance computing. The report made four main recommendations:

1) **Advance and build on the Exascale Computing Project (ECP).** ASCR should launch a software stewardship program to develop key applications to take advantage of exascale computing. This includes new and expanded evaluation systems, software libraries, demonstration applications, and software engineering.

2) **Grow ASCR applied mathematics and computer science research.** In addition to research supporting new emerging areas such as quantum computing and machine learning, ASCAC recommended a significant expansion of core ASCR research investments and a more stable funding environment to support research efforts at both DOE national labs and research universities. ASCAC highlighted the following research areas that should be supported: algorithms, programming languages, compilers, optimization, productivity, networking, streaming, edge computing, correctness and formal verification, computer architecture, specialization, devices, heterogeneity, modeling and simulation, workflows, security, visualization, automation, distributed computing, and cloud computing.

3) **Maintain the workforce.** ASCAC recommended new efforts to develop a diverse, multi-generational workforce, including better ties to research universities to help sustain a pipeline of diverse, talented, and well-trained professionals.

4) **Sustain national and international leadership.** ASCAC recommended that DOE maintain national and international leadership in advanced computing. This requires continuing to leverage public-private partnerships between research universities, industry, national laboratories and other federal agencies. In particular, the rise of a large private-sector market for large-scale computing, the proliferation of applications and the diversification of an international supply chain all require a new strategy for maintaining leadership.

In response to the first recommendation, in March 2021, ASCR established an internal Software-Stewardship Taskforce to study the challenges posed by the increasing complexity of the software ecosystem for scientific and high-performance computing users and manage the upcoming transition from ECP. The Taskforce will issue recommendations at the end of the year, but preliminary recommendations include:

- training on software usage and best practices for development;
- support for building and maintaining a diverse, skilled workforce;
- infrastructure for software packaging, hosting, and testing;
- establishing governance processes and standards to enable effective resource allocation;
- collecting information from users and facilities, and providing information for future planning;
- software-engineering resources to assist with maintenance activities of key projects; and
- providing support for the continued development of key projects.

Within the next two months, ASCR plans to issue a **Request for Information on software stewardship** to seek broad feedback from the science community.

**Operating Systems Research**

In January 2021, ASCR sponsored a Roundtable Discussion on Operating-Systems Research. This led to the publication of two whitepapers that identified future research opportunities---Research Opportunities in Operating Systems for High-Performance Scientific Computing and Research Opportunities in Operating Systems for Scientific Edge Computing. The first focuses on research opportunities related to full-stack co-
design for extreme heterogeneity and scalability, adaptive management and partitioning of resources, and smart supercomputer systems and facilities. The second white paper focuses on deploying large numbers of edge resources, with scalable access control mechanisms, to support much more heterogeneous computing resources and more complex organizational structures as well as supporting smart systems, instruments and facilities to support science breakthroughs with autonomous experiments, “self-driving” laboratories, smart manufacturing, and AI-driven design, discovery and evaluation.

NIH Collaboration

Earlier this year, the Office of Science and the National Nuclear Security Administration renewed for another five years with the NIH National Cancer Institute (NCI) a Memorandum of Understanding for the Joint Design of Advanced Computing Solutions for Cancer (JDACS4C). The purpose is to accelerate progress in cancer research through the application of high performance computing and AI. To help guide the next phase of this research effort, Dr. Barbara Helland, the Associate Director for ASCR, directed ASCAC to form a working group to review the activities under this collaboration and submit a report identifying new opportunities that might contribute significantly to these efforts and any major challenges that are preventing the efforts from delivering on their potential. Beyond cancer research, DOE also formally joined the National Science Foundation (NSF) Collaborative Research in Computational Neuroscience (CRCNS) that allows NSF, NIH, and now DOE to jointly review and fund proposals in computational neuroscience.

Funding Outlook for ASCR

In FY 2021, Congress appropriated $1.015 billion, an increase of $35 million or 3.6 percent above the FY 2020 enacted funding level. With the Exascale Computing Project winding down, the priority and majority of new funding was directed at mathematical and computer sciences research, including AI, machine learning, and big data, and new computational partnerships, like SciDAC. Congress also supported new investments in quantum information science to fully fund the five DOE National Quantum Science Centers and help launch a quantum internet and communications initiative. In FY 2021, ASCR released 10 funding solicitations, of which three were open only to DOE national laboratories, focused on quantum information science, microelectronics, AI and machine learning, data science, advanced wireless networks, and integrated computational and data infrastructure.

At the time of this writing, only the House passed its FY 2022 Energy and Water bill, which includes funding for ASCR. Below is current funding guidance.
The House bill would provide ASCR with $1.025 billion, an increase of $10 million or nearly 1 percent above the FY 2021 enacted level. This includes at least $250 million for Mathematical, Computational, and Computer Sciences Research, the same as the FY 2021 enacted funding level. The bill would increase funding to support the Leadership Computing Facilities at Argonne (ALCF) and Oak Ridge National Laboratories (OLCF), the National Energy Research Scientific Computing Center (NERSC) at Lawrence Berkeley National Laboratory, and ESnet. The bill would also provide $15 million, an increase of $5 million or 50 percent, for the Computational Science Graduate Fellowship (CSGF) program. The House bill also would provide at least $10 million and up to $40 million “for the development of AI-optimized emerging memory technology for AI-specialized hardware allowing for new computing capabilities tailored to the demands of artificial intelligence systems.”

For further reference, the ASCAC meeting agenda, including presentations, is available here.