Engagement with Federal Funding Agencies for Multidisciplinary Funding Opportunities

Lewis-Burke Associates, LLC

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LEWIS–BURKE ASSOCIATES LLC

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About Lewis-Burke

- Twenty-eight policy experts with range of expertise/backgrounds allow multi-layered issue teams with deep expertise in agencies and scientific/higher education areas
- Support federal relations activities to develop and implement federal strategies to pursue, shape, and create new sources of funding to increase and diversify research portfolio
- Able to engage on multiple levels:
  - Individual faculty (including early career faculty)
  - Teams of faculty
  - Associate Deans for Research
  - Deans and Center Directors
  - University leadership and campus-wide priorities/activities

Federal Funding Landscape

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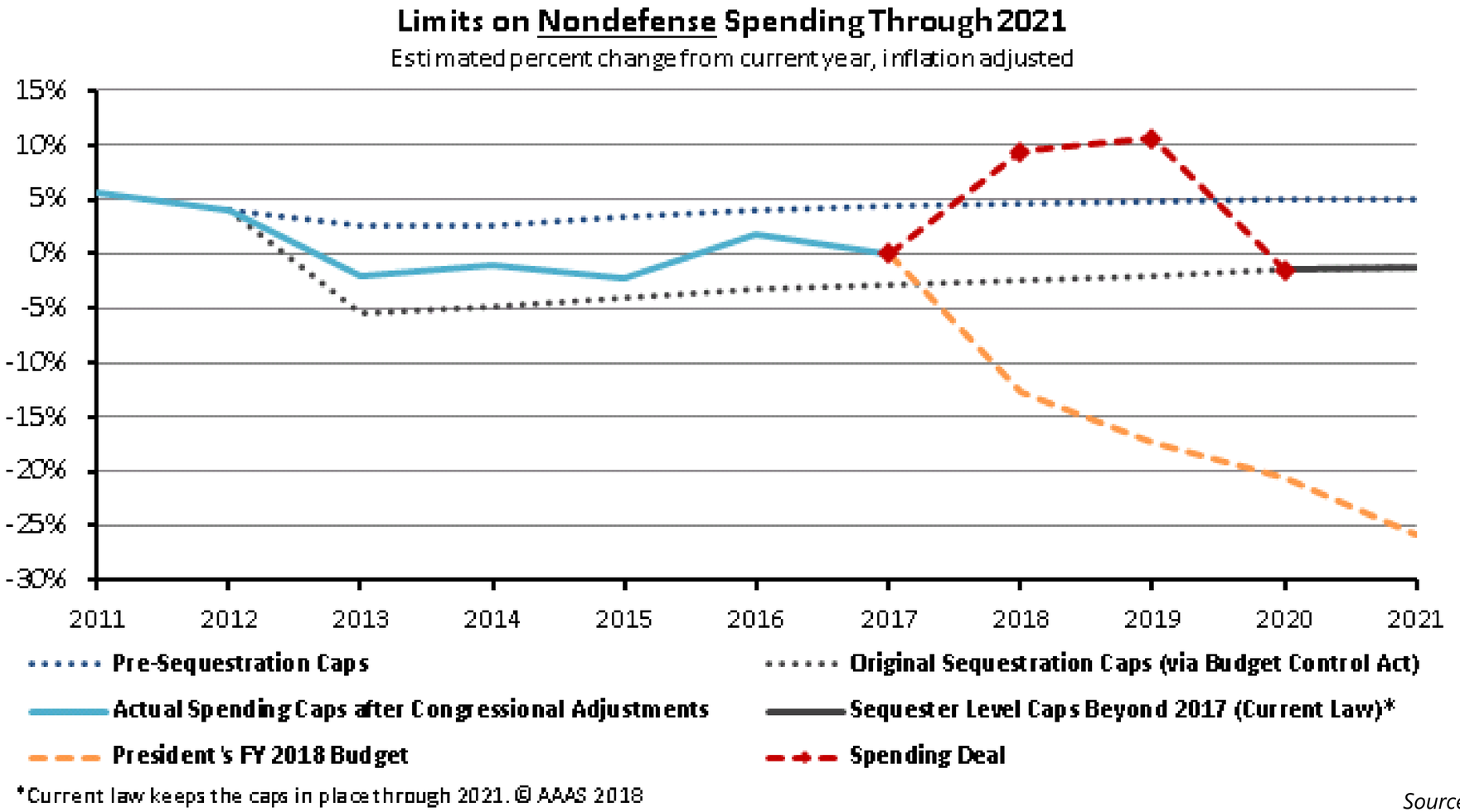
Federal Funding: Status and Outlook



Source: AAAS R&D Budget Program; 2018

Emerging Cross-Agency Priorities

- Artificial Intelligence, Machine Learning, and Automation
- Quantum Information Science
- Genome Editing
- Digital Manufacturing
- Advanced Materials
- Biotechnology
- Space technology

Opportunities Ahead

- **National Science Foundation (NSF)**
  - Midscale Infrastructure – Solicitation potentially fall 2018
  - NSF ERC –full solicitation anticipated late calendar year (CY) 2018
  - NSF STC – Solicitation anticipated early CY 2019
  - New cross-foundational program focused on coastal resilience (extreme weather); "Coastlines and People (COPE)"
- **Department of Defense (DOD)**
  - ARL Collaborative Technology Alliances & Collaborative Research Alliances 2019 —AI/machine learning; Human Teaming
  - New Air Force Centers of Excellence- Aeronautical Sciences; High Electric Field Strength materials; FY19 Quantum Computing
  - DARPA – emphasis on AI/ML; trusted microelectronics; marine sensing; bio-inspired materials; human-machine interface for neuroscience; nanostructures and materials; electronics and energy conversion
  - Social and Behavioral Sciences—Minerva, emphasis on national security
- **Department of Energy (DOE)**
  - EFRCs—next competition in CY 2019 (fiscal year (FY) 2020) to move to a two year competition cycle
- **National Institutes of Health (NIH)**
  - Cooperative Agreements – Alzheimer's Disease, aging, pain management, addiction (opioids)
- **Cyber**:
  - Secure the federal enterprise, protect critical infrastructure, and provide tools for law enforcement
  - Cyber for manufacturing and Devices
  - Cyber-Physical Systems Program
  - Smart and Autonomous Systems;

Agency Priorities and Opportunities

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National Science Foundation (NSF)

- FY 2019 Funding: $8.1B focus on ***10 Big Ideas for Future Investment***
  - Research: Data; Quantum; Astrophysics; Human-Technology Frontier; Rules of Life; New Arctic
    - Proposals are meant to be multidisciplinary and are not driven by only one directorate
  - $30M proposed for each research idea
  - New "**Convergence Accelerators**" proposed - Harnessing the Data Revolution ($30M) and Work at the Human-Technology Frontier ($30M) – multiple phases
  - Several open competitions under Big Ideas— recent BIO solicitations on Rules of Life
  - NSF is looking at education and workforce, research, and infrastructure investments associated with the Big Ideas
    - Not all the funding will come out in one solicitation and each Big Idea will have different scales of investment depending on maturity.
  - Research traineeships will also be focused around the Big Ideas
  - Process: Mid-scale infrastructure; NSF 2026 (next Big Ideas); INCLUDES (diversity); Convergence

National Science Foundation (NSF)

Other Important Trends

- How does NSF leverage partnerships, new effort to expand those types of solicitations (e.g. NSF-Simons; NSF-Boeing; NSF-Air Force)
- Reshaping large center opportunities to include more institutionally diverse teams; Interest in harmonizing large center mechanism best practices
- International offices closed this summer (Brussels, Tokyo, and Beijing) – expect more ad-hoc international engagement
- Relatively new leadership in ENG, GEO, MPS, EHR, and SBE Directorates and NSF Deputy Director will drive new priorities
  - Search ongoing for BIO AD
- Shift to no-deadline grant submissions continues across NSF; some directorates even experimenting with limited submission per PI per year

Department of Defense (DOD)

- **FY 2019 Appropriations** – DOD would receive $95.1 billion within the Research, Development, Test, and Evaluation (RDT&E) account a 7.7 % increase vs. FY 2018
  - Science and Technology (S&T) accounts – Basic Research (6.1), Applied Research (6.2), and Advanced Technology Development (6.3) – received $15.4 billion, a 3.8 % increase
  - Basic Research would receive $2.7 billion, a 19 % increase
- DOD continues to consider new methods of engaging with the extramural research community, like ARL's Open Campus Initiative and the Air Force's on-going S&T study to consider new methods of conducting research
- **FY 2019 NDAA**: emphasizes secure microelectronics; quantum information science; artificial intelligence; cyber; manufacturing; Small Business Innovation Research (SBIR) programs and accessing non-traditional partners; and test and evaluation research for strategic weapons.
- **NDAA POLICY areas tasks SecDef to:**
  - Establish initiative to support the protection of academic researchers working on sensitive research from undue influence, including through foreign talent programs, and other security threats by developing policies, training, and regulations and procedures with academic organizations
  - Develop a S&T strategy including a comprehensive medical research plan (Defense Health Program & Congressionally Directed Medical Research Program (CDMRP).

Department of Defense (DOD)

- **Major Areas of Interest**:
  - Hypersonics
  - DE Weapons (FY18 - $661 million)
  - Quantum (FY18 - $96 million)
  - Autonomy and Robotics (FY18 - $1.9 billion)
  - AI and Machine Learning
  - Space capabilities (FY18 - $619 million)
  - Cybersecurity/Information Assurance (FY18 - $8.3 billion)
  - Trusted Micro-electronics (FY18 - $42 million)
  - Materials/Manufacturing
  - Test and evaluation science
  - Expedited tech transition and acquisition
  - STEM Education

Opportunities

- **Air Force Centers of Excellence (COEs):** Recent competition Aeronautical Sciences; High Electric Field Strength materials; Assured Autonomy in Contested Environments; FY19 Quantum Computing
- **ARL Collaborative Technology Alliances & Collaborative Research Alliances 2019**: Agency considering two new competitions focused on Human Agent Teaming, AI/ML
- **Naval Engineering Education Consortium (NEEC)** - soliciting applied research of interest to the Naval Sea Systems Command (NAVSEA) Warfare Centers for materials, big data analysis, exploiting quantum phenomena to strengthen Navy capabilities, unmanned systems for undersea and surface warfare, and robotics for Navy shipyards
- **OSD**: **Multidisciplinary University Research Initiatives (MURI) Program:** $1.25 to $1.5 million over a 3 year award period to research topics of interest to the Services. Research topics vary by year – BAA FY 19 open now: materials, quantum sciences, bio-inspired basic research, societal impacts on plants, population dynamics: Pitch topics in Winter/Spring 2019
- **Annual Programs: DURIP, Manufacturing Engineering Grant Programs, MINERVA, CDMRP topics, Icorps, Rapid Innovation Fund**

DARPA

FY 2019 ~ $3.4 B

Areas of Focus:

- *Controlling Electro Magnetic (EM) Spectrum*
- *Distributed Lethality*
  - *Sensing in difficult environments*
- *Space*
  - Small satellite constellations
- *Hypersonics*
  - Missiles
- *Artificial Intelligence*
  - Machine Learning
  - Neural Networks
  - Human-Machine interactions
- *Biology*
  - Neuroscience
  - Infectious Diseases
  - Synthetic Bio

- *Trusted microelectronics*
- *Machine learning and Artificial Intelligence – 3rd Wave/AI Next $2 billion*
- *Cyber, information assurance*
- *Autonomous systems and counter-UAS*
- *New materials programs in FY 2019*

Department of Energy (DOE)

- DOE saw big funding increase in FY 2018 and a slightly more modest 3.4 percent in FY 2019 - **$35.7 billion**
- Single largest increases have been for the **Office of Science** (22 percent growth over two fiscal years) because of bipartisan support for basic research in the physical sciences
  - Top priorities: exascale computing, quantum information science, new and upgraded science facilities, Energy Frontier Research Centers
- **ARPA-E** is not eliminated; increased by 16% to $353 million in FY 2018, additional 3.6 percent to $366 million in FY 2019
  - Current topics include long duration stationary energy storage, energy-smart farm, and machine-learning enhanced energy-product development, and wind and marine-hydrokinetic energy systems
- All **applied energy** programs saw increases in both FY 2018 and FY 2019
  - DOE moving forward with a fifth Energy Innovation Hub on Desalination, two Clean Energy Manufacturing Centers were not extended beyond FY 2019
- **Renewed focus on technology transfer and commercialization:** first Innovation Expo on energy storage at SLAC in September and grid technologies at PNNL in December
- **Upcoming larger-scale funding opportunities**: Desalination Hub, QIS R&D centers (lab-led), Energy Frontier Research Centers

National Aeronautics and Space Administration (NASA)

- **Budget: $20.7B FY 2018 Enacted; Congress likely to provide a sizable increase for FY 2019**
  - –FY 2018 omnibus fully funds all missions and research across SMD and sets high-water mark for overall science funding ($6.2B)
  - –Congress continues to reject many of the proposed Administration's proposed reductions
- **Future Trends and Opportunities**
  - –Science priorities continue to be large astrophysics and planetary flagship missions
  - –Increasing emphasis on the role of SmallSats/Cubesats; each division funding efforts to utilize
  - –Steady cadence of PI-led mission opportunities:
    - **Planetary:** Forthcoming Lunar Payload and Small Lunar Rover SALMON PEAs FY 2019; Discovery Q2 FY 2019
    - **Earth Science:** EVI-5 Out; EVM-3 Q3 FY 2019; EVI-6 FY 2020
    - **Astrophysics:** SMEX, MO Q3 FY 2019
    - **Heliophysics:** Helio MIDEX, MO forthcoming; LWS, MO Q4 (all FY 2018)
  - –Mixed reception to the Administration's proposal to eliminate the Space Technology Mission Directorate
- **Leadership Changes**
  - –Congressman Jim Bridenstine (R-OK) confirmed as Administrator
  - –Deputy Director James Morhard nominated, set to be confirmed
- **National Space Council**
  - –Chaired by VP Mike Pence, advised by Users' Advisory Group

National Institutes of Health (NIH)

- NIH on track to receive a fourth consecutive increase: **$39.1 billion in FY 2019**
  - –Strong bipartisan support for the agency smooths defeat of damaging policy changes (e.g. F&A costs)
- **Areas of trans-agency emphasis**
  - –Opioids, addiction, pain management: $1.1 billion total in FYs 2018 and 2019
  - –Alzheimer's Disease: $2.34 billion proposed for FY 2019
  - –BRAIN Initiative: $429 million in FY 2019, including $115 million in *Cures* funding
  - –Precision Medicine *All of Us:* $376 million in FY 2019
  - –Cancer Moonshot: $400 million in FY 2019
- **Award trends:** agency focused on "research productivity and efficiencies"
  - –Administrative supplements in areas of emphasis (e.g. opioids; aging)
  - –Fewer program project grants; collaborative funding mechanisms enhance program officers' input on project (U awards)
- **Support for early and mid-career researchers**
  - –Next Generation Researchers Initiative: final ACD report out in December
  - –NIH still struggling with how to prioritize support for Early Stage Investigators (ESI), no longer concerned with Early Established Investigators (EEI)
- **Threats to the integrity of biomedical research:** diversion of IP in grant applications; sharing of confidential information; foreign affiliations and resources
  - –August 20 letter to over 10,000 grantee institutions; follow up with specific institutions
  - –Likely to lead to new policies on disclosures and conflict of interest, among others

Agency for Healthcare Research and Quality (AHRQ)

- AHRQ creates and disseminates effective tools and measures for health care systems to improve care and outcomes
- Focus areas: opioids, digital health, investigator-initiated research
  - –Special Emphasis Notice (SEN): Health Services Research to Address the Opioid Crisis *(* highlights rural populations)*
- New leadership: Director Gopal Khanna specializes in "data-driven" strategies
  - –Emphasis on harnessing and disseminating data into "usable" formats
- Agency is "reimagining" it direction and funding priorities:
  - –Patient Safety – hospital-acquired infections (HAIs)
  - –Practice – evidence-based practices, patient-reported outcomes and quality
  - –Data and Insight – interactive maps on opioids (prescribing practices; overdose events)
- If PCORTF is not reauthorized before September 30, 2019, AHRQ will face an approximate 25 percent budget reduction starting in FY 2020

Centers for Disease Control and Prevention (CDC)

- CDC protects the nation from health, safety, and security threats, both foreign or in the U.S.
- Large national agenda focused on a state and local level
- Focus areas: support for opioid use prevention, AMR stewardship, emergency preparedness
- Opioid abuse and overdose prevention
  - -Partnerships with states and localities
  - -Surveillance
  - -Prescription Drug Monitoring Program (PDMP)
- Antibiotic resistance initiatives
  - -Competitively award research activities to address aspects of AMR related to “One Health” among entities, including public academic medical centers
  - -Continue to pursue research opportunities in AMR stewardship and identify best prescribing practices
- Emerging infectious diseases
  - -New Emergency Reserve Fund
- Funding typically distributed by block grants to states and localities; universities can have difficulty “breaking-in”
- Leverage state government relations/connections

Cross-Agency Thematic Slides

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Big Data/AI/Machine Learning

- Data-related research is a priority for the Trump Administration, including artificial intelligence (AI), machine learning, and high-performance computing advances.
- In May, 2018, the White House hosted a summit on Artificial Intelligence for American Industry
- **NSF** has Big Ideas in *Harnessing the Data Revolution for 21st-Century Science and Engineering (HDR) and the Future of Work at the Human-Technology Frontier (FW-HTF).* NSF plans to invest an additional $30 million in FY 2019 on top of existing investments in all the Big Ideas.
  - HDR and FW-HTF would be the two topics of the new "Convergence Accelerators." *Convergence Accelerators* are a new mechanism for NSF, which will be focused on translational and applied research. NSF plans to invest $30 million in each of the two topic areas
  - HDR and FW-HTF are also a big focus of NSF education programs, including the NSF Research Traineeship (NRT) program
- **DOE** – top research priorities include exascale computing (hardware and software), quantum information science, and machine learning/AI applications for DOE missions
- **DOD** – Machine Learning / AI is a priority area for the new Research and Technology directorate – focus on technologies to operations. DOD formed the Joint Artificial Intelligence Center (JAIC) to facilitate the delivery of new AI enabled capabilities.
  - Michael Conlin, the former chief technology officer for DXC Technology's public sector arm, leads DOD's data management and governance practice
  - DARPA $2B over next 5 years in ***AI Next***
- **NIH** – released new Strategic Plan for Data Science in June 2018, but data management remains fragmented across agencies; NIH is recruiting new Chief Data Strategist and Director; BRAIN Initiative includes focus on data and machine learning; new NIBIB Director, Bruce Tromberg, is biomedical engineer with background in biophotonics

Quantum

- Quantum research is a priority for the Trump Administration; OSTP held September 24, 2018 quantum summit
- House Science Committee introduced the ***National Quantum Initiative Act*** - would establish a 10-year interagency effort to accelerate QIS and technology development across the federal government.
  - Language directs DOE, NSF, and NIST to spend $1.3 billion on QIS R&D during the first five years of the initiative
- **NDAA** authorizes SecDef to establish a Defense quantum information science and technology R&D program to coordinate all DOD activities, provide for interagency cooperation and collaboration, accelerate the transition and deployment of technologies.
  - DOD is requested to establish appropriate facilities and infrastructure needed for quantum information science and technology.
  - Authorizes $10 million increase for the Army and Navy in their respective extramural basic research program funding for QIS.
- **NSF** has Big Idea in the *Quantum Leap*. NSF plans to invest an additional $30 million in FY 2019 on top of existing investments in all the Big Ideas.
  - In August, NSF released solicitation for Quantum Foundries to support 1-5 awards at $20-$25M over 6 years
- **DOE** – FY 2019, DOE plans to invest $105 million to support fundamental research in quantum materials, computing, sensors, and communication
  - DOE plans to convene a workshop in Fall 2018 with participants from the national laboratories, universities, and industry, as well representatives from NSF and NIST, to provide guidance and research directions for up to five QIS, multi-disciplinary, multi-institutional research centers focused on DOE mission needs
- **DOD** –priority for the new UnderSec for Research and Technology directorate – will appoint Assistant Director for Quantum Sciences. DOD funding most efforts out of AFOSR, ARO, and ONR
  - DARPA conducting workshops and listening sessions that has led to the recent release of an RFI on *Quantum Computing Applications with State of the Art Capabilities*
  - FY 2019, $7.5 million for Air Force Quantum computing Center of Excellence

Cancer

- **NCI Director Dr. Ned Sharpless joined October 2017**
  - –Interest in big data
  - –New mechanisms for early stage investigators: MERIT Award (R37)
  - –Seeking feedback from extramural community throughout transition
- **New NCI Working Groups**
  - –Informing future NCI investment and developing research strategies/priorities:
    - Global Health
    - Informatics
    - SBIR/STTR
- **Cancer Moonshot Update**
  - –Continuous bipartisan support for cancer research
  - –Preparing FOAs to be issued in FY 2019 covering all 10 recommendation areas
  - –$400 million in FY 2019

Opioids and Pain

- **Congressional activities:**
  - House and Senate reconciled opioid package:
    - House passed opioid package, *Substance Use-Disorder Prevention that Promotes Opioid Recovery and Treatment (SUPPORT) for Patients and Communities Act* (H.R. 6); Senate expected to pass bill soon
    - Pending legislation could expand NIH authority to use "other transactional authority" for public health emergency research (not traditional peer review process)

- **NIH:**
  - $500 million split evenly for NIDA/NINDS in FY 2018 and FY 2019
  - *Helping to End Addiction Long-term Initiative (HEAL)*: $1.1 billion trans-NIH initiative
    - NEW NIDA-SAMHSA HEALing Communities Study
      - "Scaling up" community level interventions
      - Awards Expected in December 2019
    - Pain management: Understand the transition from acute to chronic pain (longitudinal studies)
    - Medications Development: Develop more medication-assisted treatments for opioid addiction and overdose reversal
    - Criminal Justice: Building ties with law enforcement
    - CTN: Expanding and leveraging nodes to address gaps in research

Neuroscience

- **Alzheimer's Disease (AD) and age-related dementia**
  - –$2.34 billion in FY 2019 to the National Institute on Aging (NIA)
  - –NIA's research priorities are guided by National Alzheimer's Project Act (NAPA) and the National Plan to Address Alzheimer's Disease.
  - –Priorities: precision medicine approaches to AD; predictive drug development; biomarkers; clinical trials; expand SBIR/STTR portfolio; support for caregivers
- **Neurodegeneration**
  - –Priorities: biomarkers; Lewy Body Dementia; vascular dementias; proteomics and protein folding/trafficking
- **BRAIN Initiative**
  - –NIH: only agency actively continuing this Obama Administration Initiative towards 2025
    - •$429 million in FY 2019; more than $4.2 billion over 10 years
    - •NINDS/NIMH launching effort to assess BRAIN Initiative progress, a set of assessment questions and metrics being developed to assess BRAIN Initiative progress towards its stated goals.
    - •In the process of hiring BRAIN Initiative director
  - –NSF: formal NSF plan for BRAIN ended in 2017, identified the human-technology frontier as one of "Ten Big Ideas" for priority investment in the future
  - –DOE: collaborations with NIH to leverage DOE high-performance computing, nano-fabrication, and modeling
  - –DARPA: Biological Technologies Office (BTO) continues support through BAAs, but no new programs at this time

Questions & Discussion

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