

Advancing Engineering Education and Research: Outlook and Strategy for 2020

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Lewis-Burke and ASEE

- Lewis-Burke began representing ASEE in October 2017
 - 30 policy experts with range of expertise/backgrounds allow multi-layered issue teams with deep expertise in agencies and scientific/education areas
 - 41 clients: universities, scientific societies, managers of large federal facilities
- **Goals of ASEE Advocacy**
 - Conducting outreach to Congress to support funding and sound policy for engineering research and education
 - Supporting ASEE Councils to enhance advocacy goals of deans and other constituencies
 - Engaging the Administration and federal agency officials to inform future programs and create new opportunities
 - Elevating the role of ASEE within the Washington, DC-based scientific, STEM, and higher education advocacy communities and ensuring community advocacy reflects ASEE priorities
- **2019 Efforts and Successes**
 - Increased funding for the National Science Foundation and Department of Defense basic research
 - Building champions for new modes of NSF support
 - Outreach and awareness of engineering technology
 - Enhancing Department of Defense workforce and industry collaboration
 - Engagement on Higher Education Act reauthorization



ASEE/EDC Congressional Priorities

- Advocate for Funding at Critical Agencies
 - National Science Foundation research and education funding
 - Department of Defense basic and applied research
 - Specific research accounts for other mission agencies (e.g. DOE, NASA, NIH)
 - Pell and other student aid
- Protect Against Threats to Engineering Schools and Colleges
 - Science and Security
 - Immigration – high-skilled immigration and student talent pipeline (e.g. H1B visas, OPT, DACA)
- Inform Education, Research, and STEM Policy
 - Research agency reauthorizations (e.g. NSF, Defense, NASA, Applied Energy)
 - National Defense Education Act reauthorization
 - Higher Education Act reauthorization – student impacts, teacher training

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2019 Begins...



2019 Comes to a Close



Big Picture: Federal Outlook for Engineering



Federal S&T enterprise has enjoyed significant funding increases in recent years

- Consecutive bipartisan budget agreements enabled historic funding increases for research agencies in FY 2018-19 and moderate increases in FY 2020
- Trump Administration has identified priorities in artificial intelligence (AI), quantum, opioids, and STEM education and workforce development
 - OSTP Director Kelvin Droegemeier views universities as key stakeholders in U.S. innovation ecosystem
 - PCAST has been reestablished, nominees so far reflect emphasis on technology

BUT challenges and vulnerabilities remain on the horizon

- 2020 presidential election — issues surrounding universities part of larger debates
- Congress and federal agencies taking actions to prevent foreign influence, protect intellectual property
 - Additional immigration and visa threats emerging or expected; increased reporting and disclosure rules
- Personnel shakeup continues to undermine federal agencies
 - Loss of career staff reduces capacity and responsiveness with lasting effects
 - Continued attempts to dismantle regulatory agencies
- Rising deficits threaten longer term spending cuts

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Federal Funding for FY 2020



Agency	FY 2018 Final	FY 2019 Enacted	FY 2020 Enacted	FY 2020 vs. FY 2019
NSF	\$7.82B	\$8.08B	\$8.28B	2.5%
DOD Basic Research	\$2.26B	\$2.53B	\$2.60B	2.9%
DOE Science	\$6.26B	\$6.58B	\$7.00B	6.2%
ARPA-E	\$353M	\$366M	\$425M	16.1%
NIH	\$37.22B	\$39.08B	\$41.68B	6.65%
NASA Space Technology	\$760M	\$927M	\$1.10B	18.7%



Federal Funding in FY 2021 and Beyond

Outlook

- FY 2021 Budget Request to be released next week
 - Will propose investments in quantum, AI, and space through Industries of the Future push
 - Other areas will likely face major cuts
 - Sets tone for the appropriations cycle
- Very small cap increase between FY 2020 and FY 2021 – tough choices for appropriators ahead
- Presidential election likely to complicate process – could see CR into Spring 2021 or for the full year
- FY 2021 is last year of sequestration – new era for congressional budget making
 - Deficits have been growing rapidly now exceeding \$1T/year
 - Recent spending increases may not be sustainable and could see new renewed deficit cutting push

Why it Matters for Tomorrow

- Chance to stay positive and establish importance of key programs ahead of FY 2021 budget request release
- Urge Congress to continue momentum on key agencies

FY 2021 OSTP/OMB Priority Memo



Trump Administration Priorities in Science and Technology

While the FY 2020 president's budget request proposes significant cuts to science and technology programs across the federal government, increased investments are proposed in top research and development priorities, including:

- quantum information science,
- artificial intelligence and machine learning,
 - strategic computing,
 - autonomous systems,
- genomics and engineered biology,
- next-generation microelectronics,
 - space exploration, and
 - precision agriculture.

Memo expands on FY 2020 priorities with an emphasis on a “Second Bold Era in S&T”; transformational leaps in science; focus on grand challenges and free from unnecessary admin burdens

R&D Priority Areas

– Security of the American People

- Military capabilities – Nuclear and Space
- **NEW** focus on critical minerals
- Critical infrastructure resilience & Semiconductors

– Industries of the Future

- AI, quantum science and computing
- Advanced communications and autonomy, including civil supersonic aircraft
- Advanced manufacturing

– **NEW** Earth and Environmental Leadership

- Nuclear energy R&D
- Oceans
- Earth systems predictability

– **Expanded** Health and Bioeconomic Innovation

- Biomedicine
- Veteran Health
- **NEW** Bioeconomy - Advancing biotechnology

– Space Exploration & Commercialization

Cross-Cutting Priorities

- Educating and Training a Workforce for the 21st Century Economy – build R&D capacity in HCU/MI
- **NEW** Research environments that reflect American values
- **NEW** Leveraging the power of data
- **NEW** High Risk High Reward research
- Expand multi-sector partnerships

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National Science Foundation

Outlook

- Disappointing FY 2020 increase was lower than either the House or Senate proposals
 - 3% increase for both Research (R&RA) and Education (EHR) accounts – first substantial increase for EHR in several years
 - Need for large amounts of Census funding was barrier to growth for all agencies in the Commerce, Justice, Science, Appropriations bill
- New NSF Director Nominee “Panch” expected to have smooth confirmation, may bring new priorities and emphasis
- Signs of new priorities beyond the Big Ideas – AI institutes, emerging engineering biology activities
- NSF authorization underway – Committees drafting legislation this spring
- Growing congressional focus on NSF and its role in global competitiveness – technology race with China
 - House Republicans SALSTA bill, Senator Schumer proposal, Industries of the Future bill, etc.

Why it Matters for Tomorrow

- Build on interest in NSF role in critical technologies – potential for major new investments but also important to continue foundational role
- Stress need for bigger growth – what research areas are we still underfunding, importance of bringing NSF into balance with other research agencies
- Highlight connections to congressional priorities – local impact, national security, health, environment, and energy



Department of Defense Research

Outlook

- Basic research continues to have strong congressional support
 - Small FY 2020 increase followed 8% increase in FY 2019
- Administration prioritizing *National Security Strategy* – modernize & invest in strategic weapons
 - Emphasis on prototyping and development rather than S&T
- Strong focus on priority technology areas: 5G, AI/machine learning, quantum, hypersonics, microelectronics, directed energy, space, autonomy, networked C3, and cybersecurity
- Growing concerns about workforce needs, domestic student pipeline, and retention of foreign STEM students

Why it Matters for Tomorrow

- Many members care deeply about national security but are less familiar with university roles supporting DOD and the defense industrial base through research and workforce dev.
- Highlight concerns over large technological investments by adversaries
 - Engineering support is essential to keeping US superiority and protecting the warfighter



Science and Security

Outlook

- Concerns continue about protections of IP in basic research related to critical technologies
- Continued attempts to add new restrictions in NDAA, but community successfully pushed alternative SASTA legislation
- Administration's focus has shifted to disclosure requirements, conflicts of interest policies, and information sharing
 - OSTP created JCORE; summit held Nov. 5
 - DOD roundtable with academia and continued assessment of policies, many voices in the Department want tougher restrictions
 - NSF commissioned JASON study released in December
 - DOE developed sensitive technologies matrix/policy and foreign talent program restrictions

Why it Matters for Tomorrow

- Be prepared for concerns about academic “espionage” and security of US research efforts
 - Speak to what you are doing to educate your faculty and assess risk
- Beyond regulatory efforts, need to strengthen our domestic research and education ecosystem
 - Growing calls to reauthorize the National Defense Education Act – if you find interested offices let us know, we have much more detail about what could be included
 - Need for new mechanisms to enable critical technology research at NSF



Engineering and Medicine

Outlook

- NIH continues to be major congressional priority with strong bipartisan support
- Small but growing concern about NIH's ability to adopt cutting edge technology and interest in the role engineering and the physical sciences can play in accelerating innovations related to health
 - Advisory Committee to the Director Working Group Report on AI/ML
 - FY 2020 congressional language on platform technologies and data science
 - NIBIB exploring new center mechanisms and funding approaches
- Early discussions around a "Cures 2.0," but not much traction this Congress
- Ongoing challenges with security, sexual harassment, and other regulatory issues

Why it Matters for Tomorrow

- Opportunity to build on FY 2020 language for increased funding of NIBIB or new Common Fund effort
- Push for real NIH action on AI/ML report



Higher Education Act Reauthorization

Outlook

- The House Education and Labor Committee approved the *College Affordability Act* (H.R 4674) in October, could be considered by full House early this year:
 - Increases student financial aid, including a \$625 increase to the max Pell Grant award
 - Support for graduate students: Pell eligibility, return of subsidized loans, GAANN extension
 - Several other ASEE priorities such as repeal of student unit record ban, support for MSIs, federal work study pilot, and competency-based education demonstration projects
- The Senate education committee (HELP) is still at an impasse in their negotiations
- Huge focus on college access and cost in elections complicates congressional dynamic

Why it Matters for Tomorrow

- Many Members interested in STEM access and success for underrepresented populations
- Support for engineering education is important part of the larger HEA conversation



STEM and Workforce Development

Outlook

- Several federal agencies are addressing workforce demands and are supporting opportunities including DOD, DOL, DOE, NSF, and others.
- Administration continues to implement STEM strategic plan, priorities are infusing new STEM opportunities (e.g. DOD STEM BAA)
- The Workforce Innovation and Opportunity Act (WIOA) is up for reauthorization this year. As the main legislation authorizing workforce development and employment programs, there is an opportunity to support efforts like apprenticeships, cooperative education, skills training, short-term credentialing programs, and other areas designed to prepare students and employees for the future of work.

Why it Matters for Tomorrow

- Note industry connections, Public-Private partnerships, and the success of connecting education with education through research and talent
- Note importance of education at all levels in enabling workers with long-term skills
 - Continued need to support graduate education



Immigration

Outlook

- Administration has continued to pursue regulatory changes to student visas, H-1Bs, H-4, OPT/STEM OPT, TPS
- Some hearings but very limited action on immigration this Congress
- Supreme Court DACA decision is expected this spring or early summer
 - A decision to allow the Administration to end the program may spur Congress to act
- Immigration is major issue for 2020 elections – makes any larger deal very difficult

Why it Matters for Tomorrow

- Highlight the contributions of foreign students and faculty as well as DACA recipients
- Note the chilling effect restrictions and rhetoric are having on international students/faculty – international applications down
- Highlight the importance of attracting and maintaining the “best and the brightest” to economic competitiveness

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Infrastructure



Outlook

- Funding and authorization for major surface transportation programs (including research activities) at DOT expire at the end of the fiscal year
- House Democrats unveiled an ambitious framework last week combining traditional DOT reauthorization with an expansive green infrastructure stimulus
- Senate has pursued standard DOT reauthorization, awaits additional committee consideration
- Multiple issues (election year politics, funding pay-fors, divergent policy approach and scope, etc.) make final compromise difficult until after the 2020 election

Why it Matters for Tomorrow

- Worth pushing our priorities – inclusion early increases likelihood of adoption in any final compromise
- Emphasize research and workforce dev. needed to ensure smart, resilient, sustainable, connected infrastructure
- Research Infrastructure is also needed to support academic engineering – test beds, academic buildings, cyberinfrastructure, etc.
- If you find offices interested in these areas, let us know – we have much more detail on programs they can plus-up to accomplish these goals (at NSF, DOE, DOT, NIST, etc.)

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Challenges and Opportunities Ahead

Challenges

- **Immigration and visas** – H1B and foreign student protections and perceptions
- **Uncertainty** - 2020 elections may lead to legislative paralysis, universities part of larger debate
- **Anti-elite environment** – undermines credibility in some policy circles
- **Funding** – relatively flat year ahead makes increases for ASEE priorities difficult
- **Pro-industry/commercial mindset**– need to showcase role of universities in innovation

Opportunities

- **Funding**
 - Competitiveness and national security concerns potential to drive growth at NSF, DOD, etc.
 - Interest in new mechanisms for engineering at NIH
 - Infrastructure package could include “smart technologies” or research infrastructure
- **Reauthorizations** – NSF reauthorization, National Defense Authorization, other science agencies, and Higher Education Act reauthorization are potential vehicles for our priorities
- **Workforce Development** – interest in new pathways and partnerships for engineering education, National Defense Education Act

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Discussion