Advancing Engineering Education and Research
Outlook and Strategy for 2019

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Lewis-Burke and ASEE

• Lewis-Burke began representing ASEE in October 2017
  – 27 policy experts with range of expertise/backgrounds allow multi-layered issue teams with deep expertise in agencies and scientific/education areas
  – 38 clients exclusively composed of non-profit entities: 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

• 2018 Efforts and Successes
  – Increased funding for the National Science Foundation and Department of Defense basic research
  – Engagement in federal STEM education strategic plan
  – Outreach and awareness of engineering technology
  – Enhancing Department of Defense workforce and industry collaboration
  – Ensuring engineering is included in federal K-12 education investments
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
  – Return of Sequestration
  – Science and Security
  – Immigration – high-skilled immigration and student talent pipeline (e.g. H1B visas, OPT, DACA)

• Inform Education, Research, and STEM Policy
  – Higher Education Act reauthorization – student impacts, teacher training
  – Research agency reauthorizations (e.g. COMPETES, Defense, Applied Energy)
Big Picture: Federal Outlook for Engineering

It was the best of times...
• Bipartisan budget deal enabled historic funding increases for defense and non-defense agencies in FY 2018 and 2019
• Trump Administration has quietly staffed up positively on science issues – focus on STEM education and workforce, cross-agency engagement for key technologies (quantum, AI), and regulatory changes to enable innovation
• Finally have an OSTP Director – Kelvin Droegemeier confirmed January 2, 2019

BUT, Challenges and Vulnerabilities Remain:
• Lingering shutdown impacts and potential for future brinkmanship in divided Congress
• Loss of Congressional science and engineering champions in 2018 elections
• Trump cabinet continues shake-up – Mattis, Zinke, and Sessions out, unclear path ahead
• Loss of career staff could hollow out agency abilities and responsiveness over next several years
• Continued attempts to dismantle EPA and other regulatory agencies
• Additional immigration and visa threats emerging and expected
• Increasing concerns about IP protection and “academic espionage”
• Sequestration returns: FY 2020 budget challenges
THIS MAY CHANGE THE LANDSCAPE...

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116th Congress

Outlook
- Democrats control the House for the first time since 2010, Republicans have a slightly expanded majority in the Senate
  - New territory – only four chairs remain in Congress since there was last a Democratic majority
  - R&D funding may face competing priorities (infrastructure, healthcare delivery, environmental issues, etc.)
  - Democrats will use oversight powers to investigate practices and policies at federal agencies to confront Trump Administration (EPA, ED, HHS, DOI, HUD, etc.)
- Many key figures in research policy were defeated or retired
  - Science champions: Comstock (VA), Hultgren (IL), Yoder (KS), Culberson (TX)
  - Committee chairmen: Smith (Science), Frelinghuysen (Appropriations)
- 2020 race has already begun – lots of Senators looking at close re-elections or running for President!

Why it Matters for Tomorrow
- Engage with new Committee and House leadership
  - Consider Democratic priorities and how engineering fits, but don’t forget Republicans!
- Many new Members to educate
  - Don’t assume knowledge of federal engineering investments and policies
- Need new engineering champions
  - Use visits to find excited members and ask them to step up on our issues
Shutdown Over, For Now

**Outlook**
- Partial shutdown was longest ever (35 days)
- Congress focused on resolving final FY 2019 appropriations
  - Funding runs until February 15, seven bills remain to be passed (including funding for NSF, NASA, and DHS)
  - Border security is focus of negotiations, other bills are finished
- Near to long-term impacts
  - Agencies cautious until final funding received
  - Staff are under water recovering from lost time – likely many months or even several years to fully catch up
  - Delays likely to award decisions, new solicitations, inter-agency initiatives, and other areas
  - President’s FY 2020 budget request to Congress is delayed

**Why it Matters for Today**
- Be extra nice to our federal speakers, they are making a huge effort to be with us!

**Why it Matters for Tomorrow**
- Congressional offices very interested in shutdown impacts on universities
- Note importance of passing final FY 2019 appropriations – NSF likely to get 4 percent increase
## Federal Funding for FY 2019

<table>
<thead>
<tr>
<th>Agency</th>
<th>FY 2017 Appropriations</th>
<th>FY 2018 Appropriations</th>
<th>FY 2019 Appropriations</th>
<th>FY 2019 Appropriations vs. FY 2018</th>
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<tbody>
<tr>
<td>NSF</td>
<td>$7.47B</td>
<td>$7.76B</td>
<td>House $8.17B</td>
<td>5.2% Senate $8.07B 3.9%</td>
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<td>DOD Basic Research</td>
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<tr>
<td>DOE Science</td>
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<td>$6.26B</td>
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<td>ARPA-E</td>
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<td>$353M</td>
<td>$366M</td>
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<tr>
<td>NIH</td>
<td>$34.1B</td>
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<tr>
<td>NASA</td>
<td>$19.65B</td>
<td>$20.74B</td>
<td>House $21.54B</td>
<td>3.9% Senate $21.32B 2.8%</td>
</tr>
</tbody>
</table>
Federal Funding in FY 2020 and Beyond

Outlook
• Congress will need to pass another budget deal to avoid the return of sequestration in FY 2020
  – No action expected until late 2019 or early 2020
• FY 2020 Budget Request delayed – will likely contain substantial cuts to domestic agencies
  – Congress likely to ignore, but will set tone for the appropriations cycle
• FY 2021 is last year of sequestration – new era for congressional budget making ahead

Why it Matters for Tomorrow
• Visits are early chance to emphasize need for new budget deal
• Chance to stay positive and establish importance of key programs ahead of FY 2020 budget request release
• Urge Congress to continue momentum on key agencies
Federal Funding Long-term View

Limits on Nondefense Spending Through 2021
Estimated percent change from current year, inflation adjusted

*Current law keeps the caps in place through 2021. © AAAS 2018

Source: AAAS R&D Budget Program; 2018
FY 2020 OSTP/OMB Priority Memo

• Memo expands on FY 2019 priorities with an emphasis on American leadership for specific technologies (Autonomy, AI, Computing etc.), STEM education, tech transfer and partnering between industry and academia

R&D Priority Areas
– **Security of the American People** – less military focus
  • New cyber capabilities
  • Expands quantum computing to quantum information sciences
  • Improve weather prediction
– **Energy Dominance** – similar, no mention of fossil, nuclear, renewables
– **Medical Innovation** – similar, no mention of way to provide efficient/effective healthcare
– **NEW Artificial Intelligence, Quantum Information Sciences, and Strategic Computing** – fundamental and applied research, machine learning, quantum theory, pathways in a post-Moore's Law era, computational infrastructure
– **NEW Connectivity and Autonomy** – necessary technologies, infrastructure to realize unmanned ground/air systems
– **NEW American Manufacturing** – investments in digital manufacturing, robotics, AI, advanced micro-electronics
– **NEW Space Exploration & Commercialization** – expands beyond space-based systems
– **NEW American Agriculture** - R&D that enables advanced and precision agriculture and aquaculture technologies

R&D Priority Practices
– Expands Managing and Modernizing R&D Infrastructure
– Educating and Training a Workforce for the 21st Century Economy
– **NEW**: Transferring Technology from Laboratory to Marketplace, Partnering with Industry and Academia
National Science Foundation

Outlook
• After years of flat funding, NSF likely to have consecutive years of growth: FY 2018 ↑ and likely FY 2019 ↑
• FY 2018 growth was focused on Big Ideas for Future Investment and facilities upgrades and repairs
• Director France Córdova thinking about her legacy – term ends in 2020
• Strong congressional protectors, but few champions make NSF a top priority
  – Signs of growing congressional interest in NSF and its role in global competitiveness – technology race with China
  – Change in House Commerce, Justice, Science Appropriations leadership – unclear who will take up the NSF mantle

Why it Matters for Tomorrow
• Need more champions, especially members on appropriations committees
• Big Ideas resonate with congressional and Administration priorities, but balance is also important
  – Note potential to transform engineering and revolutionize medicine, agriculture, quantum, etc.
  – Must grow NSF overall to enable both Big Ideas and core investments
  – Focus on broadening participation is important for future US STEM workforce
• Stress need to keep growth momentum – what research areas are we still underfunding
• Highlight connections to congressional priorities – local impact, national security, economic development, and health
Department of Defense Research

Outlook
• Defense prioritized under Trump Administration but focus on readiness and operations
• Congressional Champions have helped keep basic research on a strong path
• Strong focus on priority technology areas: AI/machine learning, quantum, hypersonics, microelectronics, directed energy, space, autonomy, networked C3, and cybersecurity
• Growing concerns about workforce needs

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
• Be prepared for concerns about academic “espionage” and security of US research efforts
Infrastructure

Outlook
• Renewed interest with change in House leadership
• Democrats likely to push for infrastructure investments and new “Green Deal”
• Congressional Republicans continue to be skeptical
• Partisan differences over public versus private spending and how to pay for any package

Why it Matters for Tomorrow
• Deal is still low likelihood but high potential reward – worth pushing for inclusion of our priorities
• 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, DOT, NIST, etc.)
Higher Education Act Reauthorization

Outlook
• Controversial House PROSPER Act completely failed last year – would have reduced aid to students
• House Democrats will take different approach with AIM Higher Act – prioritizing access, student aid, and accountability
• Senate HELP Committee has a history of bipartisan bills – Chairman Alexander has expressed interest in a reauthorization
  – Bill would likely address aid simplification, campus safety, and wraparound services

Why it Matters for Tomorrow
• Lots of Members interested in access and student outcomes – share your success stories
• Big interest in innovation – and how higher education relates to workforce development
STEM and Workforce Development

Outlook
• New 5-year Federal STEM Education Plan released in early December
  – Agencies working on implementation
  – Many priorities related to engineering – STEM Literacy; Increasing Diversity, Equity, and Inclusion; STEM Workforce
• Lots of interest in Skilled Technical Workforce from Administration, Agencies, and Congress
• Concerns about the future of work with increased automation and enabling life-long learning

Why it Matters for Tomorrow
• Share contributions to workforce development, industry collaboration, and what students do after graduating
• Note importance of education at all levels in enabling workers with long-term skills
  – Continued need to support graduate education
Immigration

Outlook
• Administration has been exercising executive action to restrict immigration
• Regulatory changes to student visas, H-1Bs, H-4, OPT/STEM OPT
• DACA currently tied up in the courts
• Immigration reform likely to remain contentious

Why it Matters for Tomorrow
• Stress contributions of foreign students and faculty as well as DACA recipients
• Share concerns about chilling effect on international students which would be exacerbated by DHS proposals – international applications already down substantially
• Highlight the importance of attracting and maintaining the “best and the brightest” to economic competitiveness
Challenges and Opportunities Ahead

Challenges

• **Immigration and visas** – H1B and foreign student protections and perceptions
• **Anti-elite environment** – undermines credibility in some policy circles
• **Funding** – higher priority policies could complicate outlook for discretionary spending
• **Pro-industry/commercial mindset** – need to showcase role of universities in innovation
• **Paralysis** – divided nation and Congress likely to continue legislative paralysis hampering new funding

Opportunities

• **Funding**
  – Competitiveness and national security concerns driving growth at NSF, DOD, etc.
  – Infrastructure package could include “smart technologies” or research infrastructure
• **Reauthorizations** – COMPETES, National Defense Authorization, and Higher Education Act reauthorization are potential vehicles for our priorities
• **Workforce Development** – interest in new pathways and partnerships for engineering education
Discussion