



# 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

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# 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)

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# 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

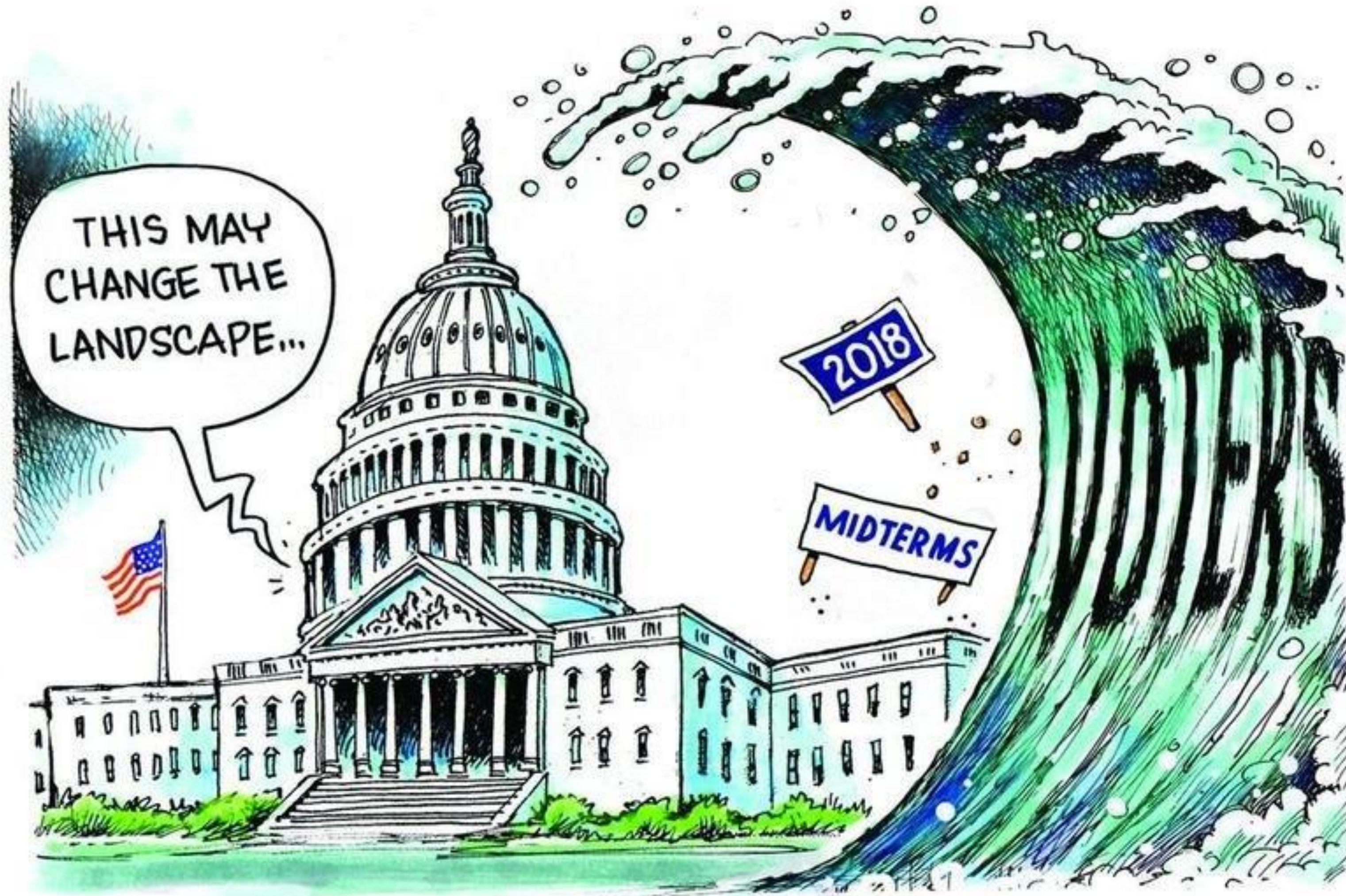
## **BUT, Challenges and Vulnerabilities Remain:**

- 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

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# 116<sup>th</sup> 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

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# 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

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# Federal Funding for FY 2019

Agency	FY 2017 Appropriations	FY 2018 Appropriations	FY 2019 Appropriations	FY 2019 Appropriations vs. FY 2018
NSF	\$7.47B	\$7.76B	House \$8.17B Senate \$8.07B	5.2% 3.9%
DOD Basic Research	\$2.27B	\$2.34B	\$2.52B	8.0%
DOE Science	\$5.39B	\$6.26B	\$6.59B	5.2%
ARPA-E	\$306M	\$353M	\$366M	3.6%
NIH	\$34.1B	\$37.08B	\$39.08B	5.4%
NASA	\$19.65B	\$20.74B	House \$21.54B Senate \$21.32B	3.9% 2.8%





# 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

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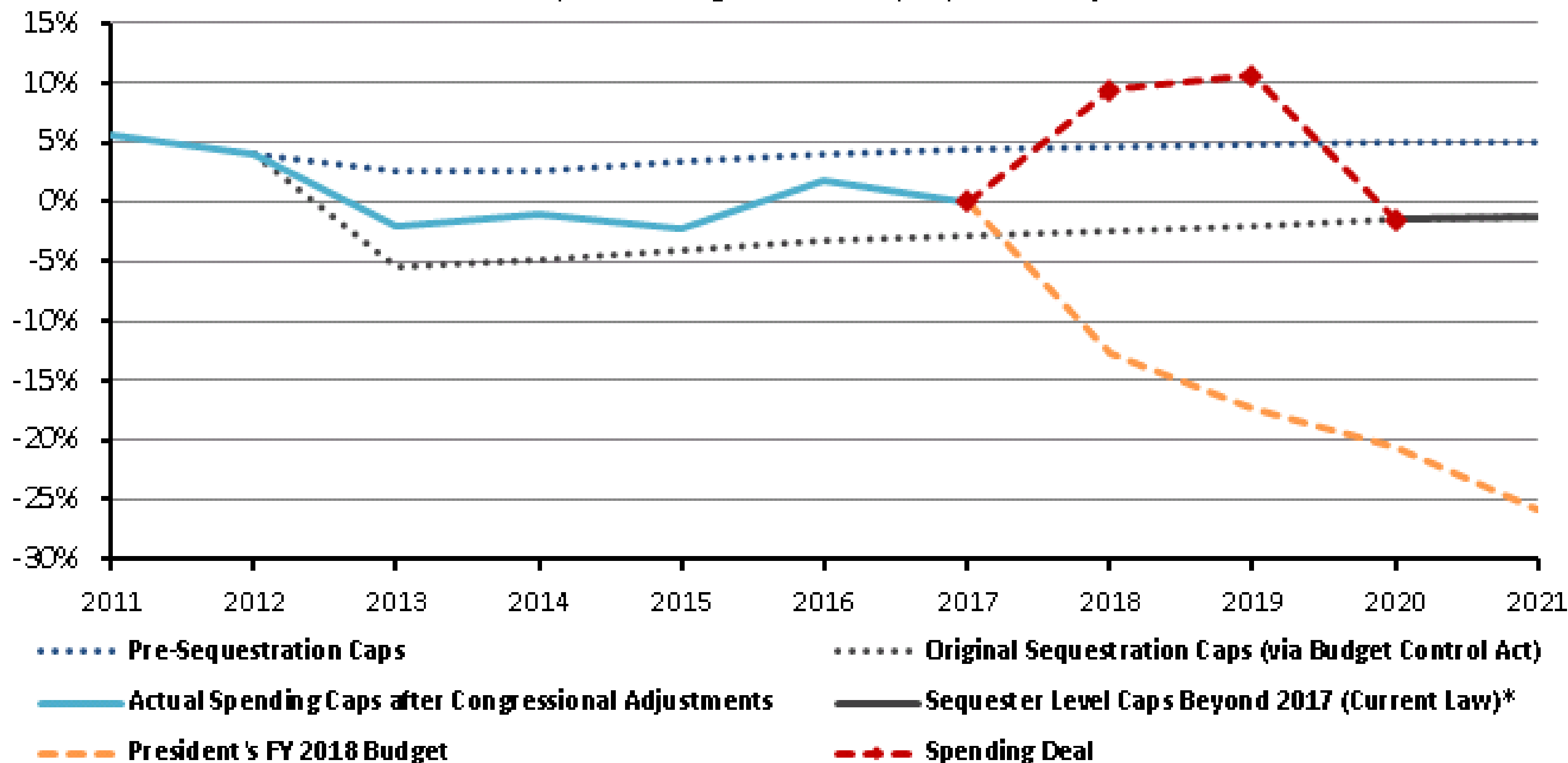




# Federal Funding Long-term View

## 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

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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

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# 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

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# 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

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# 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.)

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# 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

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# 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

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# 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

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