

# United States Senate

WASHINGTON, DC 20510

April 8, 2019

The Honorable Jerry Moran  
Chairman  
Subcommittee on Commerce, Justice  
Science, and Related Agencies  
U.S. Senate Committee on Appropriations  
Washington, DC 20510

The Honorable Jeanne Shaheen  
Ranking Member  
Subcommittee on Commerce, Justice,  
Science, and Related Agencies  
U.S. Senate Committee on Appropriations  
Washington, DC 20510

Dear Chairman Moran and Ranking Member Shaheen:

As the Subcommittee begins deliberations on the Fiscal Year (FY) 2020 Commerce, Justice, Science, and Related Agencies Appropriations Legislation, we write to respectfully request that the National Science Foundation (NSF) receive at least \$9 billion in FY 2020 funding.

NSF provides a critical foundation for our nation's scientific and engineering ecosystem, generating transformative discoveries, catalyzing innovation and new technologies to drive economic development, improving education, and preparing the 21<sup>st</sup> century STEM workforce. NSF-supported research has led to scientific and technological breakthroughs that have long-term domestic economic benefits and support our security, health, and national competitiveness. Agencies such as the Department of Defense and National Institutes of Health depend on the NSF-supported scientific and engineering ecosystem to fulfill their missions as they build on NSF-funded breakthroughs and leverage the workforce trained using NSF support.

Each day NSF-supported inventions make our lives better and safer. These inventions include technologies used to detect chemical and biological weapons, and models that have dramatically improved storm forecasting. Other breakthroughs have assisted our military through stealth camouflage, enabled better understanding and predictions of likely adversarial decisions, and helped veterans transition home through advanced trauma research. NSF discoveries have seeded whole industries such as broadband and mobile communications, robotics, and nanotechnology. These technologies have transformed our economy and daily lives, while also providing strategic advantages in research and development, and even protecting our soldiers.

NSF support is the bedrock of the nation's innovation ecosystem. We thank the Committee for its diligent work in the FY19 minibus to ensure that NSF received an increase in funding. However, we believe that more can be done to address the effects of historical underinvestment in fundamental research in the United States. According to the National Science Board, approximately \$3.92 billion of cutting-edge research deemed "very good or higher" in NSF's merit criteria was unfunded in FY 2017. The potential impact of these missed opportunities is even more stark when considering the return on investment of fundamental scientific research and the significant investments that other nations – both allies and adversaries – are making in comparable research areas. Findings in the National Science Board's *Science and Engineering Indicators for 2018* found that China's research and development expenditures have grown more than 350 percent over the ten years between FY 2005 and FY 2015 and the National Science

Board estimates that China outpaced the US in overall research and development spending for the first time in 2018.

A bold approach to NSF funding is necessary in FY 2020 to provide needed support for the potentially transformational Big Ideas initiatives, to protect core programs that sustain broad science and engineering fields, to build and operate world-class research infrastructure, and to train the future STEM workforce for the United States to remain globally competitive. For example, funding for the Education and Human Resources (EHR) Directorate has stagnated for many years, leaving critical gaps in our ability to address fundamental challenges for K-12, undergraduate, and graduate STEM education. This stagnation comes as our education system must adapt to dramatic changes in technology that will require learners to acquire new skills, colleges and universities to create new opportunities for retraining and lifelong learning, and for education research to adapt and transform its own methods. Additionally, the Big Ideas for Future Investment initiatives have the potential to dramatically propel research and education forward while revolutionizing drug development, quantum communications, human-AI collaboration, and other areas. These investments should not come at the expense of NSF's essential core research and education programs. Outside of research and education, past investments in NSF facilities have led to incredible discoveries and the creation of whole new fields of science such as gravitational wave astronomy. NSF must have the resources available to build the next great generation of facilities to continue US leadership in science and engineering.

NSF funding helps support our nation's brightest scientists and engineers in their endeavors to address our greatest challenges. As the foundational agency supporting our innovation ecosystem, we respectfully request that the National Science Foundation receive at least \$9 billion for FY 2020. This level of funding is critical to ensuring our nation's health, security, and economic strength.

Thank you for your consideration of this request.

Sincerely,



Edward J. Markey  
United States Senator



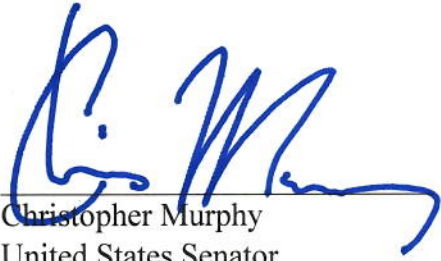
Richard Blumenthal  
United States Senator



Martin Heinrich  
United States Senator

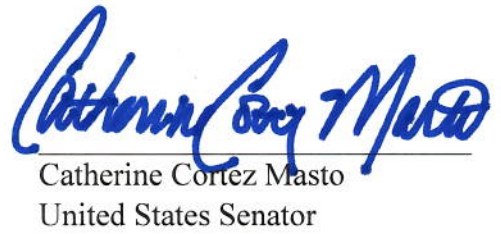


Margaret Wood Hassan  
United States Senator



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Christopher Murphy  
United States Senator



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Catherine Cortez Masto  
United States Senator



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Mazie K. Hirono  
United States Senator



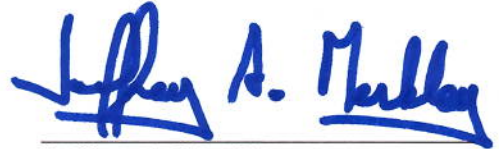
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Dianne Feinstein  
United States Senator



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Elizabeth Warren  
United States Senator



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Jeffrey A. Merkley  
United States Senator



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Kirsten Gillibrand  
United States Senator



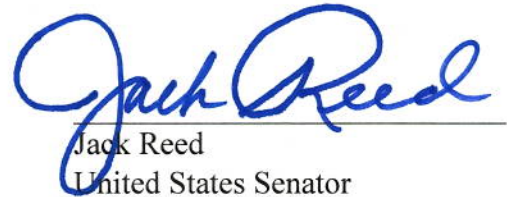
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Sheldon Whitehouse  
United States Senator



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Ron Wyden  
United States Senator



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Jack Reed  
United States Senator



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Richard J. Durbin  
United States Senator




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Kamala D. Harris  
United States Senator



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Debbie Stabenow  
United States Senator



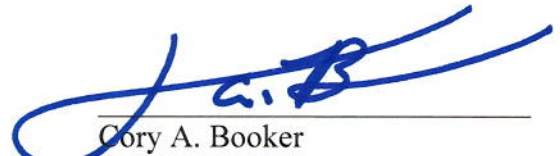
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Jacky Rosen  
United States Senator

  
Tammy Baldwin  
United States Senator


  
Mark R. Warner  
United States Senator

  
Doug Jones  
United States Senator

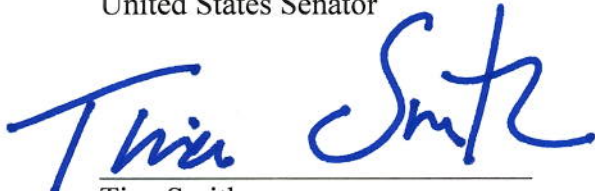
  
Cory A. Booker  
United States Senator

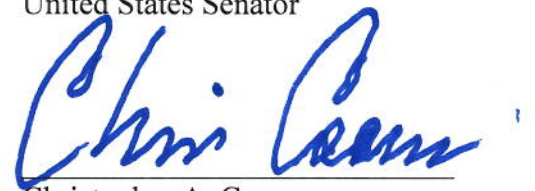
  
Tom Udall  
United States Senator

  
Robert P. Casey, Jr.  
United States Senator

  
Tim Kaine  
United States Senator

  
Amy Klobuchar  
United States Senator


  
Tina Smith  
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Gary C. Peters  
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Sherrod Brown  
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Michael F. Bennet  
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Bernard Sanders  
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Chris Van Hollen  
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