



U N I T E D S T A T E S

National Science Foundation

FY 2021

BUDGET REQUEST TO CONGRESS

MISSION: To promote the progress of science; to advance the national health, prosperity, and welfare; secure the national defense; and for other purposes.

—*From the National Science Foundation (NSF) Act of 1950 (P.L. 81–507)*

VISION: A Nation that is the global leader in research and innovation.

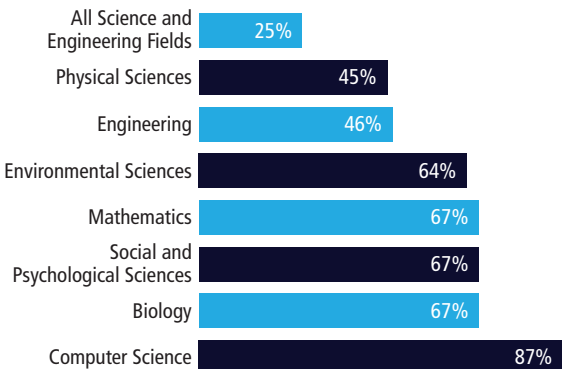
—*From “Building the Future: Investing in Discovery and Innovation” NSF’s Strategic Plan for FY 2018–2022*

ABOUT NSF

- Established by Congress in 1950 as an independent federal agency to promote American science and engineering (S&E).
- The only federal agency that funds basic non-biomedical research and education across all fields of S&E and at all levels of education.
- Seeks high-risk, potentially transformative research projects that will generate path-breaking discoveries and new technologies.
- Funds advanced instrumentation and facilities.
- Supports Arctic and Antarctic research, science operations.
- Encourages research partnerships between universities and industry, and U.S. participation in international scientific efforts.
- Ninety-three percent of appropriated funds directly support research and science, technology, engineering, and mathematics (STEM) education, 78 percent of actual obligations go to our Nation's colleges and universities.
- Has supported 242 Nobel Laureates since its inception.

NSF Support of Academic Basic Research in Selected Fields

(as a percentage of total federal support)



Note: Biology includes Biological Sciences and Environmental Biology. Biology and Psychological Sciences exclude National Institutes of Health funding from the total amount of federal support.

Source: NSF/National Center for Science and Engineering Statistics, Survey of Federal Funds for Research & Development, FY 2017.

Investing in America's Discoveries and Discoverers

FY 2021 BUDGET REQUEST

NSF Budget by Appropriation (Dollars in Millions)

Account	FY 2019 Actual	FY 2020 Enacted	FY 2021 Request	Change Over FY 2019 Actual	
				Amount	Percent
Research and Related Activities	\$6,578	\$6,737	\$6,213	-\$365	-6%
Education and Human Resources	\$935	\$940	\$931	-\$4	*
Major Research Equipment and Facilities Construction	\$285	\$243	\$230	-\$56	-19%
Agency Operations and Award Management	\$333	\$337	\$346	\$13	4%
Office of Inspector General	\$15	\$17	\$18	3	17%
Office of the National Science Board	\$4	\$5	\$4	*	-3%
TOTAL (NSF)	\$8,150	\$8,278	\$7,741	-\$409	-5%

Note: Totals may not add due to rounding. * indicates <\$500,000.

FY 2021 BUDGET HIGHLIGHTS

- NSF's \$7.7 billion in funding in FY 2021 will support approximately 8,100 new research grants.
- Prioritizes the Administration's Industries of the Future (IoF) initiative that supports breakthrough discoveries and workforce development needed to draw on the talents of all Americans, and sustain America's globally preeminent innovation ecosystem.
- FY 2021 Request prioritizes increases in Artificial Intelligence (AI) and Quantum Information Science (QIS);
 - AI funding increases to \$868 million (+\$403 million), which will support
 - An estimated 11 AI Research Institutes (\$44 million), and
 - \$35 million for AI education and workforce development;
 - QIS funding will more than double to \$226 million (+\$120 million).
- Builds and leverages a diverse, highly skilled American workforce for the 21st century economy.
- Funds strategic research, infrastructure, and instrumentation investments.
- Supports agency operations that enable the fundamental framework for the Foundation's scientific endeavors.

NSF'S BIG IDEAS

In FY 2021, NSF continues support for its Big Ideas, which are bold ideas that identify areas for future, long-term investment at the frontiers of science and engineering. Six of the Big Ideas focus on research, building on earlier investments in fundamental research. The remaining Big Ideas focus on process, which address NSF practices that could be altered or enhanced to capture the best research and expand the Nation's S&E community.

Research Big Ideas:

- Harnessing the Data Revolution for 21st-Century Science and Engineering
- The Future of Work at the Human-Technology Frontier
- Windows on the Universe: The Era of Multi-messenger Astrophysics
- The Quantum Leap: Leading the Next Quantum Revolution
- Understanding the Rules of Life: Predicting Phenotype
- Navigating the New Arctic

Enabling Big Ideas:

- NSF INCLUDES
- Growing Convergence Research at NSF
- Mid-scale Research Infrastructure

70 YEARS BENEFITING AMERICAN SOCIETY

Over the past 70 years, NSF has allowed the Nation to harness ingenuity, foster innovation, and reap the benefits of the economic growth and progress that come with doing so. NSF investments in science and technology create high-tech, high-wage jobs that allow American workers to lead the global economy; improve the quality of life for all Americans; and strengthen our national security.

Examples of NSF Investments

New knowledge such as artificial intelligence, quantum computing, nanotechnology, gravitational waves, and resilient infrastructure

World-Class Facilities such as Daniel K. Inouye Solar Telescope, National Ecological Observatory Network, Regional Class Research Vessels, U.S. Antarctic Program facilities, and Vera C. Rubin Observatory.

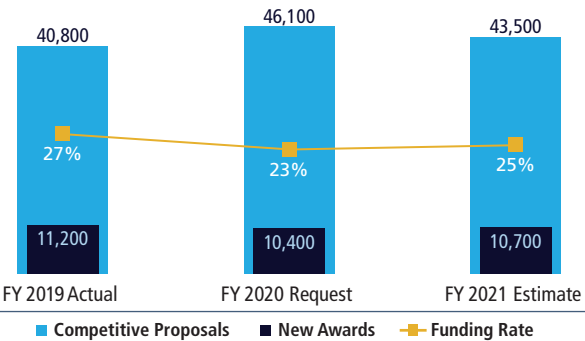
New Tools, Methods, and Processes such as the Internet, magnetic resonance imaging, more reliable prosthetics, 3-D printing, self-driving cars, advanced wireless, internet search engines, and smartphones.

Insights into National and Global Challenges such as advanced manufacturing, spectrum innovation, bioeconomy, cybersecurity, mid-scale infrastructure, and coastlines and people.

A Highly Trained Workforce through programs such as Advanced Technological Education, Graduate Research Fellowship, and NSF Research Traineeship.

Fostering Multisector Partnerships through the Convergence Accelerator and programs such as Small Business Innovation Research, Small Business Technology Transfer, Industry-University Cooperative Research Centers, and NSF Innovation Corps.

Number of NSF Competitive Proposals, New Awards, and Funding Rates



Note: New awards are a subset of competitive proposals.

DRIVING RESULTS AND INNOVATION

NSF's investments produce both near and long-term benefits that keep the United States at S&E's forefront. NSF invests in America's prosperity by supporting basic research and the people who make the discoveries that transform our future. These investments—

- Spur innovation and robust job creation.
- Support students and future-focused workforce through programs like CyberCorps®: Scholarship for Service and Advanced Technological Education.
- Lead to innovations that add billions of dollars to the U.S. economy through businesses and technologies.
- Provide understanding of all aspects of natural disasters including improving weather prediction; increasing resilience in housing and infrastructure; and responding to disasters.
- Enhance our understanding of the biological, behavioral, social, and environmental risks and implications of infectious disease.

NSF by the Numbers

\$8.2 billion	FY 2019 Actual Funding
1,800	Colleges, universities, and other institutions receiving NSF funding in FY 2019
41,000	Proposals evaluated in FY 2019 through a competitive merit review process
11,300	Competitive awards funded in FY 2019
192,000	Proposal reviews conducted in FY 2019
306,000	Estimated number of people NSF supported directly in FY 2019 (researchers, postdoctoral fellows, trainees, teachers, and students)
60,000	Students supported by NSF Graduate Research Fellowships since 1952

For More Information

NSF FY 2021 Budget Request to Congress
www.nsf.gov/about/budget

Research and Education Results Supported by NSF
www.nsf.gov/discoveries

NSF Budget and Performance
www.nsf.gov/about/performance

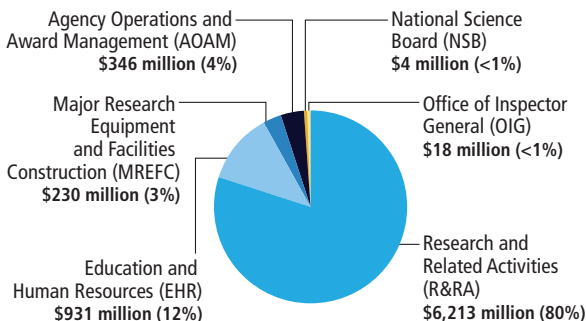
Building the Future: Investing in Discovery and Innovation NSF Strategic Plan for 2018–2022
www.nsf.gov/about/performance/strategic_plan.jsp

Driving Federal Performance
www.performance.gov

NSF FUNDING: APPROPRIATIONS AND INVESTMENTS

Where It Comes From

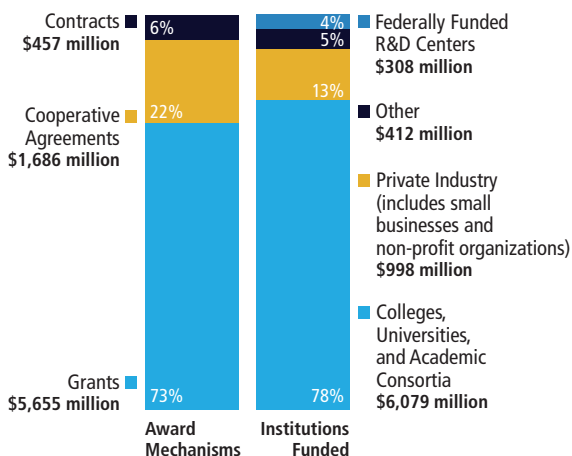
FY 2021 NSF Budget Request by Account—\$7.7 billion



Note: Totals may not add due to rounding.

Where It Goes and How It Gets There

FY 2019 Obligations for Research and Education Programs—\$7.8 billion



This chart shows the distribution of NSF's obligations by institution type and funding mechanism. While the data shown are based on FY 2019, the relative shares should provide a good indication of the FY 2021 distribution.

Note: NSF Research and Education Programs include R&RA, EHR, and MREFC appropriations. Other institutions funded include federal, state, and local governments; and international organizations. Totals may not add due to rounding.

R&D = Research and Development



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RESEARCH AND EDUCATION HIGHLIGHTS

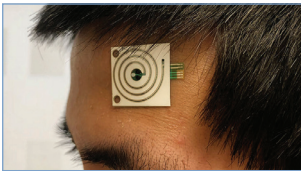
Astronomers capture first image of a black hole



Credit: Event Horizon Telescope Collaboration et al.

The Event Horizon Telescope (EHT) was designed to see the unseeable. Black holes exert such strong gravitational forces that even light can't escape them. It took EHT, a planet-scale array of eight ground-based radio telescopes linked through international collaboration, to gather the first direct visual evidence of a supermassive black hole and its shadow, 55 million light-years from Earth. EHT uses very-long-baseline interferometry (VLBI), which synchronizes telescope facilities around the world to form one huge, Earth-size telescope. Decades of NSF investments in VLBI and radio astronomy technologies led to the creation of EHT and the black-hole image. In 2019, EHT's members received the Breakthrough Prize in Fundamental Physics, an annual recognition of scientific achievements. Their next goals include imaging the supermassive black hole at the center of the Milky Way and capturing video of a black hole.

Wearable sensors read your sweat



Credit: Bizen Maskey, Suncheon National University

What if all you had to do to get a diagnosis at the doctor's office was to work up a bit of a sweat? A team of NSF-funded scientists is developing wearable skin sensors that can analyze your sweat to get the same kind of information that currently requires a more invasive procedure, like taking blood. The researchers essentially print sensors onto plastic, which can then be applied to the body. Currently, the scientists are gathering data from their new sensors, so they can learn what sweat composition can tell us about people's health and wellness. By being able to analyze sweat – and knowing what to look for in that analysis – this research has the potential to improve and simplify diagnoses.

World's largest outdoor shake table



Credit: UC San Diego

Earthquakes don't just shake the ground horizontally. They heave it vertically and twist it in ways that can tear buildings apart. Now, thanks to a \$16.5 million award from NSF, the world's largest outdoor earthquake simulator, located at the University of California (UC) San Diego, does too. The upgrade will enable this "shake table" to more realistically recreate the ground motions of an earthquake. It will allow engineers to test structures from multi-story buildings to bridge columns and wind turbines to find out how resilient they are to earthquake conditions. The enhanced shake table would teach researchers new lessons. The engineers working on the upgrade already have a plan for the first structure they'll test with it – a 10-story building made from cross-laminated timber.