NSF FY 2010 Budget Request to Congress

The National Science Foundation Act of 1950 (Public Law 81-507) sets forth our mission: ***To promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense.***

NSF's Strategic Plan 2006-2011 defines our vision: ***Advancing discovery, innovation, and education beyond the frontiers of current knowledge, and empowering future generations in science and engineering.***

The National Science Foundation is the only federal agency dedicated to the support of basic research and education across all fields of science and engineering. We explore the frontiers of scientific knowledge and extend the reach of engineering by encouraging, identifying, and funding the best ideas and most promising people. The high-risk, potentially transformative investments we make generate important discoveries and new technology, create and train a dynamic workforce, and spark the curiosity and creativity of millions. Our investments in research and education help ensure that our Nation remains globally competitive, prosperous, and secure.

NSF's FY 2010 Budget Request is $7.045 billion, an increase of $555 million (8.5 percent) over the 2009 plan. In addition, since investments in science and technology foster economic growth and create high-tech, high-wage jobs, NSF received a one-time appropriation of $3.0 billion from the American Recovery and Reinvestment Act of 2009, raising its overall FY 2009 appropriation to $9.49 billion.

NSF Funding by Account
(Dollars in Millions)

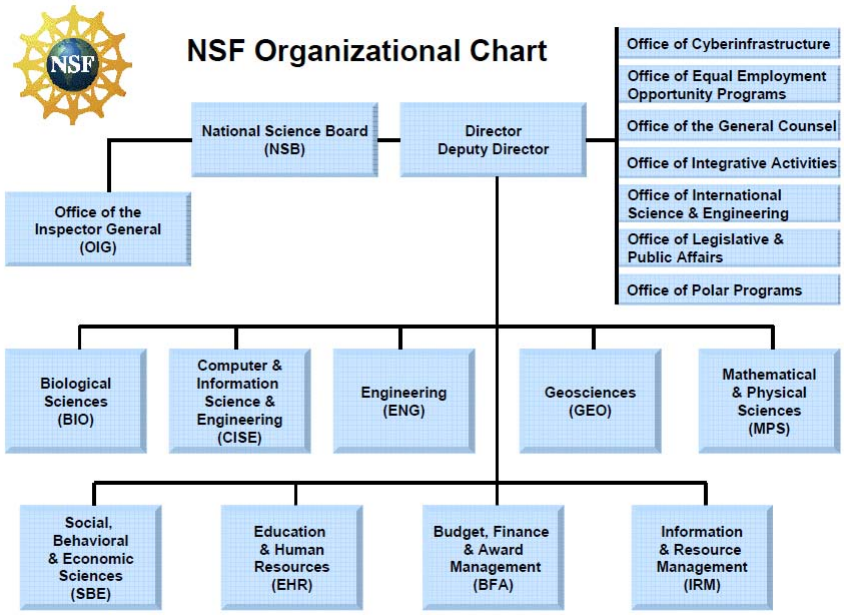
	FY 2008 Actual	FY 2009 Current Plan	FY 2009 Recovery Act	FY 2010 Request	Change over FY 2009 Current Plan Amount	Change over FY 2009 Current Plan Percent
Research and Related Activities	$4,853.24	$5,183.10	$2,500.00	$5,733.24	$550.14	10.6%
Education and Human Resources	766.26	845.26	100.00	857.76	12.50	1.5%
Major Research Equipment and Facilities Construction	166.85	152.01	400.00	117.29	-34.72	-22.8%
Agency Operations and Award Management	282.04	294.00	-	318.37	24.37	8.3%
National Science Board	3.82	4.03	-	4.34	0.31	7.7%
Office of Inspector General	11.83	12.00	2.00	14.00	2.00	16.7%
Total, NSF	$6,084.04	$6,490.40	$3,002.00	$7,045.00	$554.60	8.5%

Totals may not add due to rounding.

NSF's Organization and Role in the Federal Research Enterprise

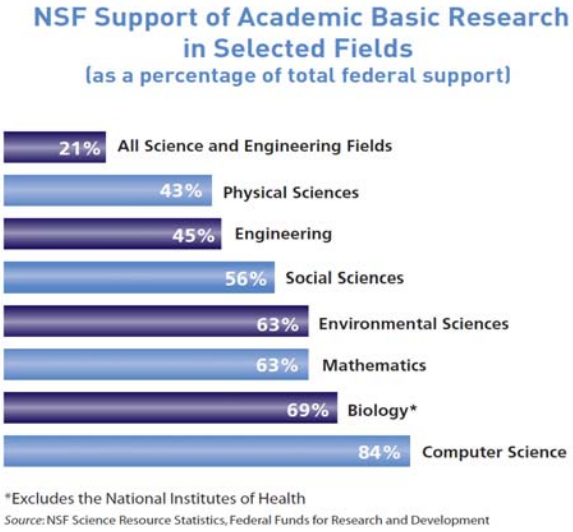
NSF-funded research is characterized by its breadth. NSF prioritizes the integration of education into its research programs, and takes into account the broader societal impacts of the work it funds, such as the training that students and young researchers receive in the research process, and the educational opportunities the work and its people can then provide to the larger community of K-16 students and teachers and the general public.

NSF's comprehensive and flexible support of meritorious projects with broad societal impacts enables the Foundation to identify and foster both fundamental and transformative discoveries within and among fields of inquiry. NSF has the latitude to support emerging fields, high-risk ideas, interdisciplinary collaborations, and research that pushes, and even transforms, the very frontiers of knowledge. In these ways, NSF's discoveries inspire the American public—and the world.



NSF's organization mirrors the major fields of science and engineering. These include biological sciences, computer and information science and engineering, engineering, geosciences, mathematics and physical sciences, and social, behavioral, and economic sciences. NSF also carries out specific responsibilities for education and human resources, cyberinfrastructure, integrative activities, international science and engineering, and polar programs. The 25-member National Science Board sets the overall policies of the Foundation.

NSF's annual budget represents 21 percent of the total federal budget for basic research conducted at America's colleges and universities, and this share increases to 45 percent when medical research supported by the National Institutes of Health is excluded. In many fields NSF is the primary source of federal academic support.



Presidential Initiatives and Major Investments

The President's Budget, "A New Era of Responsibility," will significantly expand three key NSF programs which support students and early-career researchers, and will create a fourth program to help develop the next generation of environmentally engaged scientists and engineers. The Budget also encourages high-risk research and supports critical priorities in global climate change. NSF's FY 2010 budget is an 8.5 percent increase over the FY 2009 level.

Potentially Transformative Research. Transformative research involves ideas, discoveries, or tools that radically change our understanding of existing scientific or engineering concepts or educational practices. Such research is risky but can be high-reward if it leads to breakthroughs or creates new paradigms or fields. NSF explicitly recognizes the critical importance of transformative research in its merit review process. In FY 2010, each research division will set aside a minimum of $2 million ($92 million Foundation-wide) to explore methodologies that help support transformative research.

New Faculty and Young Investigators. (11.6 percent increase to $203.80 million) NSF's Foundation-wide Faculty Early Career Development (CAREER) program supports junior faculty who integrate top-notch education with outstanding research. The five-year awards emphasize exploring new approaches and pursuing potentially transformative activities. (See Overview-4, "Data Centers.")

Graduate Research Fellowship. (6 percent increase to $122.0 million) This prestigious Fellowship is the flagship for the federal government in supporting the broad array of science and engineering disciplines across all fields as well as international research activity. To launch the Presidential initiative of tripling the number of new fellowships awarded annually by FY 2013, the Request supports 1,654 new Fellowships in FY 2010. (See Overview-4, "Supercapacitors.")

Advanced Technological Education (ATE). (24 percent increase to $64.0 million) Focusing on two-year colleges, ATE supports partnerships between academic institutions and employers to improve the education of science and engineering technicians. Career pathways between secondary schools, two-year, and four-year colleges are supported, as are curriculum and professional development activities. FY 2010 is the beginning of a growth trajectory reaching $100.0 million in FY 2013. (See Overview-4, "Wind.")

Climate Change Education Program. ($10.0 million each in FY 2009 and FY 2010) This new program will catalyze activity at the national level and help develop the next generation of environmentally engaged scientists and engineers by supporting awards in the following educational areas: increasing public understanding and engagement; development of resources for learning; informing local and national science, technology, engineering, and mathematics (STEM) education policy; and preparing a climate science professional workforce. (See Overview-10, "Rock," for a similar existing program.)

FY 2010 Presidential Priorities

(Dollars in Millions)

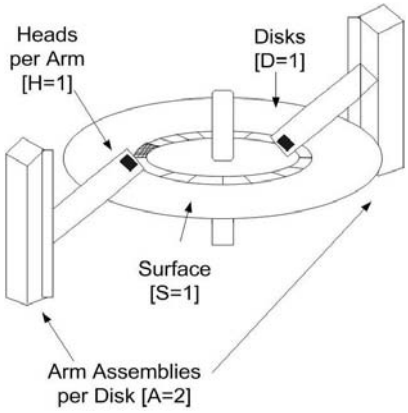
	FY 2008 Actual	FY 2009 Current Plan	FY 2009 Recovery Act	FY 2010 Request	Change over FY 2009 Current Plan Amount	Change over FY 2009 Current Plan Percent
Faculty Early Career Development (CAREER)	$203.17	$182.63	$165.00	$203.80	$21.17	11.6%
Graduate Research Fellowships (GRF)	96.02	115.06	45.56	122.00	$6.94	6.0%
Advanced Technology Education (ATE)	51.46	51.62	-	64.00	$12.38	24.0%
Climate Change Education Program		10.00	-	10.00	-	-

Highlights

Credit: Mitch Maxwell

► **Wind Energy Project Trains Turbine Technicians:** An Advanced Technological Education (ATE) program at Laramie County Community College (LCCC) in Wyoming is training and educating technicians to service the more than 25,000 wind turbines operating in the United States today. LCCC's "Wind Energy Technology" program is developing a wind energy technician certification program, mechanic diploma program, and associate of science degree option, and is holding community information seminars and workshops on wind energy technology and related renewable energy topics.

► **A Green Storage Solution for Data Centers:** Data centers, such as those used by Google™, Facebook™, and Youtube™, consumed 61 billion kWh in 2006, and a 2007 Environmental Protection Agency report estimated that they could consume over 100 billion kWh by 2011. In a typical data center, over 37 percent of the power is consumed by storage. NSF CAREER Award winner Sudhanva Gurumurthi, in collaboration with colleague Mircea Stan at the University of Virginia, has developed a new, more compact disk drive architecture that can reduce the energy consumption of data center storage systems by over 60 percent while still achieving high performance.



Intra-disk parallel drives use two sets of arms to improve efficiency. *Credit: Univ. of Virginia*

Credit: John Chmiola

► **Supercapacitors: Keys to a Green Energy Future:** The traditional power sources and batteries essential to our personal electronic devices and automobiles do not store much energy. Supercapacitors are electronic devices with great potential for such uses. Most commonly used in backup power applications because of their indefinite lifespans, short charging times, and reliability in low temperatures, supercapacitors are also finding increased usage in personal electronic devices, mobile phones, and hybrid electric/fuel cell vehicles. John Chmiola, who is funded through NSF's Graduate Research Fellowship and Integrative Graduate Education and Research Traineeship programs, has manipulated supercapacitors at the nanoscale level to increase capacity by 50 percent. This astounding result has direct and potentially far-reaching implications as it could help manufacturers create smaller and cheaper power packs for everything from cameras to cars. Chmiola's discovery was featured in the August 18, 2006, edition of the journal *Science*.

President's Plan for Science and Innovation

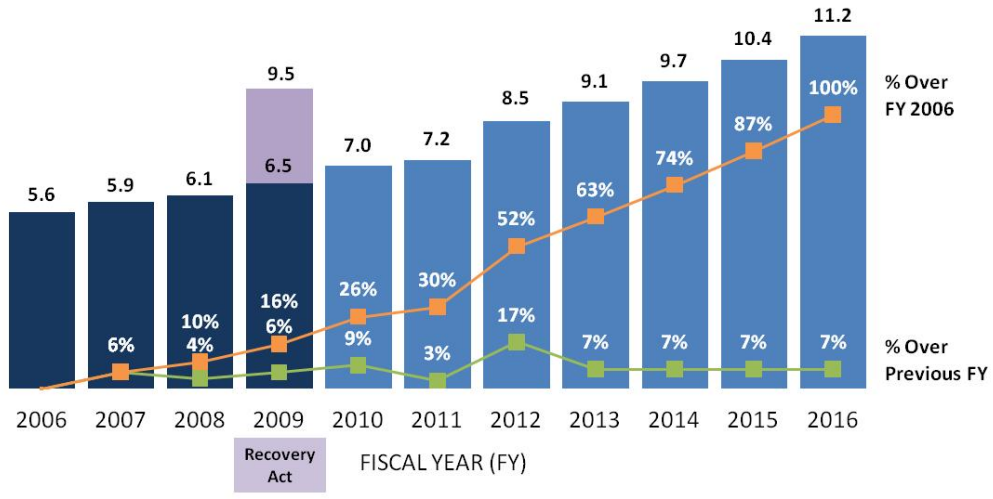
In addition to the targeted increases already described, the President's Plan for Science and Innovation aims to double the federal investment in basic research over a 10-year period. Such a commitment will reap dividends for the Nation for decades into the future.

In the process of supporting basic research and education in all science and engineering fields, NSF addresses national challenges such as climate change and maintaining an internationally competitive workforce. Due to its unique role in the scientific enterprise, NSF's funding levels will double relative to 2006 levels under the President's Plan for Science and Innovation. These sustained increases will enable NSF to:

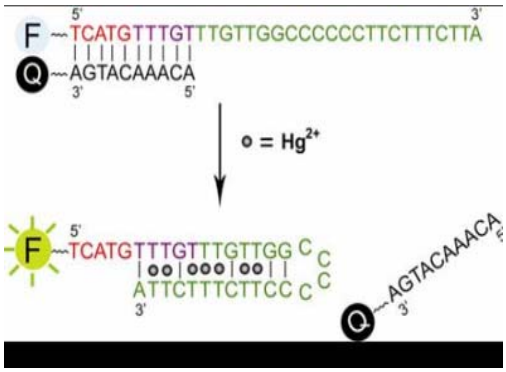
- Support a diversified portfolio of fundamental, high-risk, and transformative research.
- Support researchers at the beginning of their careers, and triple the number of new Graduate Research Fellowships awarded annually.
- Expand the STEM workforce and broaden participation from underrepresented groups and geographical regions.
- Improve the quality and widen the reach of its educational programs, including the expansion of efforts to recruit scientists and engineers to teach math and science in K-12 schools.
- Increase collaboration with other nations, other agencies, and other sectors, encouraging innovation to flourish and addressing grand challenges of the 21st century.
- Sustain the quality of NSF's business processes and development of its human capital.

The President's Plan is designed to sustain the momentum for investing in science and innovation which was generated by the American Recovery and Reinvestment Act of 2009 (Recovery Act). The largest increases occur in the early years of the plan, particularly in FY 2012, to maintain the momentum generated by the Recovery Act.

Total NSF Funding: President's Plan for Science and Innovation
FY 2006-FY 2016 (dollars in billions)



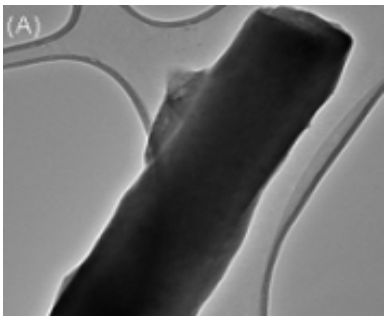
Highlights



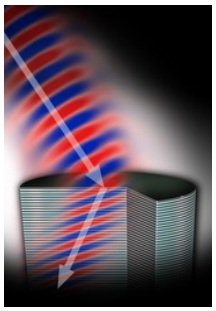
Credit: Yi Lu

► **Fluorescent Mercury Detector:** Sensitive and selective mercury detection in the environment and in the food industry is in high demand, especially in environmental monitoring applications such as mercury detection in drinking water. Professors Mark Shannon and Yi Lu at the University of Illinois at Urbana-Champaign have successfully tested a simple DNA-based "turn-on" fluorescent sensor with high sensitivity and selectivity. The sensing process can be completed onsite in less than five minutes. Its detection limit of 0.6 parts per billion (ppb) is far lower than the EPA limit of approximately two ppb.

► **Nano-Bone:** By mimicking the natural processes of biomineralization, the structure of bone has been reproduced for the first time. The nanocomposites are so similar to natural bone that the cells recognize them as bone tissue and respond accordingly. The composites may provide a commercializable product with orthopedic and dental applications, such as bone graft substitutes to replace or augment the use of autograft or allograft bone tissues, tissue engineering scaffolds, and model systems for the study of bone diseases such as osteogenesis imperfecta.



Credit: Sang Soo Jee, University of Florida



Credit: Claire Gmachl

► **Where are you, Harry Potter?** In nature, light waves and other forms of electromagnetic radiation bend when they pass from one medium into another, but they continue to move forward. Using alternating layers of different semiconductors, Princeton University researchers have created a new optical "metamaterial" that causes light to bend backwards. This behavior has significant potential for optical components such as lenses for magnification and imaging. The metamaterial could help form the basis for higher resolution optical imaging, nanocircuits for high-powered computers, and, to the delight of science-fiction and fantasy buffs, cloaking devices that could render objects invisible to the human eye.

► **Improving the Efficiency of Distributing Critical Supplies in Disasters:** Response to disasters must be timely and focus on delivering only the most needed supplies. An interdisciplinary team of civil engineers and sociologists from Rensselaer Polytechnic Institute and the University of Delaware has determined that enhancing visibility of the response networks is vital to identifying the roles played by each organization within it. This team found three key ways to improve network visibility: identify organizations to serve as information bridges between other organizations or clusters, develop partnerships with community organizations with perspective on needs and resources, and develop technologies to visually represent emergent networks in real time.

Credit: Jose Holguin-Veras

American Recovery and Reinvestment Act of 2009

A primary purpose of the American Recovery and Reinvestment Act of 2009 is to "increase economic efficiency by spurring technological advances in science and health." NSF's role in stimulating the American economy was acknowledged by its inclusion in the Act, which will fund the Nation's best and brightest researchers, train its most deserving graduate students, and develop the advanced scientific tools and infrastructure that the research community needs.

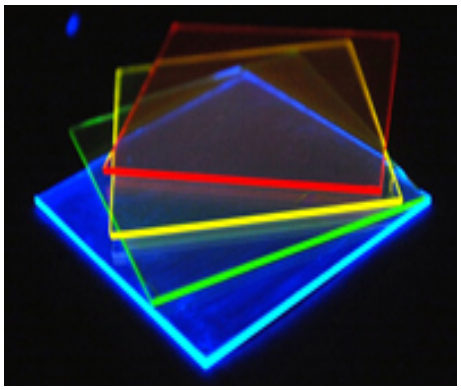
The American Recovery and Reinvestment Act of FY 2009 increases NSF's FY 2009 funding by $3.0 billion for a FY 2009 total appropriation of $9.49 billion. In FY 2009 NSF will maintain its commitment to its established merit review processes and will continue to focus on its current goals and priorities. With Recovery Act funds, NSF will:

- Support highly-rated proposals that would otherwise be declined
- Encourage high-risk, transformative research with the potential to grow the Nation's economy
- Create and sustain research jobs through new awards, graduate research fellows, and early-career researchers
- Train and develop the careers of STEM undergraduates, teachers, and professionals
- Strengthen the Nation's overall cyberinfrastructure and enhance institutional broadband access connectivity
- Meet facilities and infrastructure needs, including deferred maintenance

NSF Activities Funded by the Recovery Act
(in millions)

Research and Related Activities	**$2,500**
• Core research, facilities and infrastructure investments	$2,000
• Major Research Instrumentation	$300
• Academic Research Infrastructure	$200
Education and Human Resources	**$100**
• Robert Noyce Scholarship Program	$60
• Math and Science Partnership Program	$25
• Science Masters' Program	$15
Major Research Equipment and Facilities Construction	**$400**
• Alaska Region Research Vessel	$148
• Advanced Technology Solar Telescope	$146
• Ocean Observatories Initiative	$106
Office of Inspector General	**$2**
TOTAL	**$3,002**

Highlights

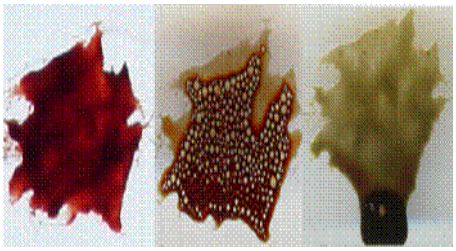


Credit: Donna Coveney, MIT

► **A Colorful Approach to Affordable Solar Energy:** Engineers and graduate students at the Massachusetts Institute of Technology have developed a novel, simple method to turn ordinary pieces of glass into efficient solar concentrators. Dye-coated glass absorbs incoming light and re-emits the energy, which is channeled to solar cells placed along its edges. This technique uses affordable and easily scalable starting materials, and will effectively enable smaller solar cells to harvest the same amount of energy as larger, more costly solar cells. The researchers, who announced their findings in the July 11, 2008, issue of *Science*, believe the technology could soon find its way to the marketplace.

► **"Giant Fossil Frog from Hell" Discovered in Madagascar:** A team of researchers led by Stony Brook University paleontologist David Krause has discovered the remains in Madagascar of what may be the largest frog ever to exist. The 16-inch, 10-pound ancient frog, named *Beelzebufo*, or "devil frog," lived 65 to 70 million years ago. "*Beelzebufo* appears to be a very close relative of a group of South American frogs known as 'ceratophyrines,' or 'Pac-Man' frogs, because of their immense mouths," said Krause.

An artist's depiction. *Credit: David Krause, Stony Brook University*



Credit: David Tyler, Chemistry Department, University of Oregon

► **Light-degradable Plastics:** "Photodegradable" plastics, plastics which degrade or decompose with light, are one way to reduce plastic waste and make plastics more environmentally benign. David Tyler, a NSF-funded Professor of Inorganic Chemistry at the University of Oregon, and his research group have designed a plastic that degrades into a water-soluble liquid after being exposed to sunlight or room light for three days. Photodegradable plastics could have profound consequences for our environment in terms of pollution management as well as the recycling of natural resources.

► **Investors See Green Firms as Less Risky :** NSF-supported research from the University of Oklahoma suggests that a company's decision to go green can result in more willingness by financial markets to invest in them, thereby helping improve their bottom line. The finding is one of several from a study that shows improved green performance benefits corporations in ways previously not considered by economic analysts, running contrary to currently prevailing theories.

Credit: Morguefile

Learning and Workforce Development

The integration of research and education has been a hallmark of NSF since its inception. The Foundation's investments do double duty – generating new knowledge and producing the next generation of scientists, technologists, engineers, mathematicians, and educators. This highly-trained cadre is a vital national asset – forming the "knowledge vectors" that transfer the latest concepts between academe and industry.

Integrative Graduate Education and Research Training (IGERT) (9 percent increase to $68.88 million) awardees prepare doctoral students by integrating research and education in innovative ways that are tailored to the unique requirements of newly emerging interdisciplinary fields and new career options.

Discovery Research K-12 ($108.50 million) develops more effective tools and resources for teachers and students that will support inquiry-based classroom practices and a more intensive scientifically-based assessment of the efficacy of these resources.

Robert Noyce Teacher Scholarship Program ($55.0 million) enables institutions to develop and implement programs to prepare STEM undergraduate majors--and mid-career STEM professionals--to become K-12 science and mathematics teachers.

The Math and Science Partnership (MSP) program (4.6 percent decrease to $58.22 million) links K-12 teachers with their colleagues in higher education. In FY 2010, MSP will continue to build capacity and integrate the work of higher education with that of K-12 to strengthen and reform science and mathematics education.

NSF estimates that in FY 2010 over 215,000 people will be directly involved in NSF programs and activities, receiving salaries, stipends, or participant support. Additionally, NSF programs indirectly impact many millions of people through activities including workshops, public outreach (including online social networking tools), informal science activities such as museums, television, videos, and journals, and dissemination of curricula and other teaching materials.

Number of People Involved in NSF Activities

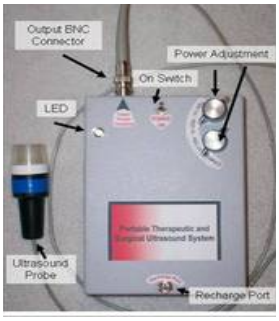
	FY 2008 Estimate	FY 2009 Estimate	FY 2009 ARRA Estimate	FY 2010 Estimate
Senior Researchers	43,019	45,290	12,910	48,850
Other Professionals	12,499	13,030	4,160	14,020
Postdoctoral Associates	6,013	6,480	1,990	7,190
Graduate Students	37,308	39,110	12,405	42,780
Undergraduate Students	24,407	25,210	6,275	27,000
K-12 Students	62,375	62,405	1,165	62,465
K-12 Teachers	12,801	12,760	570	12,790
Total, Number of People	198,422	204,285	39,475	215,095

Highlights

Credit: Heather Almquist, University of Montana

► **Finding Dinosaur Fossils by Satellite:** K-12 students and teachers from underserved frontier communities across Montana's vast eastern plains have harnessed the power of geographic information systems (GIS) to explore the region's extraordinary geologic past and wealth of fossil deposits. The technique, designed by Dr. Heather Almquist at The University of Montana, Missoula, led participants to discover fossils of *Tyrannosaurus rex*, *Triceratops*, and the duck-billed *Edmontasaurus*, as well as fossils of many species of reptiles, invertebrates, and plants. This NSF ITEST (Innovative Technology Experiences for Students and Teachers) program, "Project DinoMap," has provided otherwise cost-prohibitive GIS software to all K-12 schools in Montana, awarded graduate credit to 52 teachers to further their careers, trained high school, college and graduate students in science communication, disseminated materials nationally and internationally, and engaged participants from small, isolated communities, including those within the Fort Peck, Fort Belknap, and Rocky Boys Indian reservations.

► **Ultrasound In Your Pocket:** NSF Graduate Research Fellow George Lewis has developed the first pocket-size ultrasound system for commercial, medical, military, and research applications. The novel approach reduces the device's size and cost compared with traditional ultrasonic devices. This transformative research has the potential to replace expensive shoe-box size systems with inexpensive compact cell-phone type devices and make ultrasound technology readily available for students, researchers and ultrasound practitioners.



Credit: George Lewis

Credit: Consortium for Ocean Leadership

► **The School of Rock:** In just three years, 60 U.S. educators have attended professional development programs at the "School of Rock" aboard the ocean drilling vessel JOIDES Resolution and at the Gulf Coast Core Repository at Texas A & M University. This School of Rock (SOR) provides an ocean-going, hands-on experience for the educators, who then go on to share their new knowledge with others. The SOR graduates and staff members have conducted over 100 outreach programs for another 2,000 participants in more than 30 states.

Additional FY 2010 Investments

The following activities are notable for being interdisciplinary, supported by multiple directorates, and/or wide-ranging in their impact on the Foundation. Many aim to have a transformative impact across science and engineering, often in fields where focused research and education can further national priorities. All are integral to the Foundation's mission and vision.

Climate Change Science Program (CCSP). (36.6 percent increase to $299.91 million) This interagency activity is coordinated through the National Science and Technology Council (NSTC). NSF's role is to provide a comprehensive scientific foundation for CCSP through support of a broad and basic research portfolio, which can provide insight into the fundamental processes underlying climate.

Climate Research. ($197.26 million; new NSF-wide focus) This is a new Foundation-wide investment that builds upon CCSP and previous NSF efforts. It focuses on multidisciplinary research that deepens our current understanding of complex interactions that influence climate, through expanded observing capabilities, modeling and simulation, and fundamental research on ways to mitigate and adapt to the impacts of a changing climate. Investments will address smart adaptation and mitigation science, regional and decadal-scale climate modeling, ecosystem vulnerability, the carbon and water cycles, ocean acidification, abrupt climate change, and weather extremes.

Cyber-enabled Discovery and Innovation (CDI). (44.7 percent increase to $102.63 million) CDI supports transformative, multidisciplinary science and engineering research outcomes made possible by innovations and advances in computational concepts, methods, models, algorithms, and tools. CDI breakthroughs advance one or more of the three themes: From Data to Knowledge; Understanding Complexity in Natural, Built, and Social Systems; Building Virtual Organizations.

Cybersecurity. (8.6 percent increase to $126.70 million) The FY 2010 Request includes $126.70 million for cybersecurity research and education, with $40.0 million specifically devoted to research in usability, theoretical foundations, and privacy in support of the Comprehensive National Cybersecurity Initiative.

Experimental Program to Stimulate Competitive Research (EPSCoR). (10.6 percent increase to $147.12 million; $50.0 million from the Recovery Act.) NSF remains a leader in efforts to broaden participation in science and engineering in all states and regions. In response to previous Congressional direction, in FY 2010 EPSCoR will receive the same percentage increase as will the Research and Related Activities Appropriation.

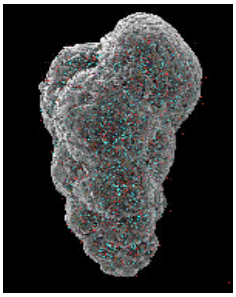
Homeland Security Activities. (2.2 percent increase to $385.50 million) NSF programs apply to homeland security priorities in two areas: protecting critical infrastructure and key assets and defending against catastrophic threats.

Networking and Information Technology R&D. (10.6 percent increase to $1,110.80 million) This interagency activity is coordinated through the NSTC. Major funding increases for FY 2010 are in such areas as large scale networking, high-end computing research, human computer interaction, and research on social, economic, and workforce aspects of advanced computing and communications technologies.

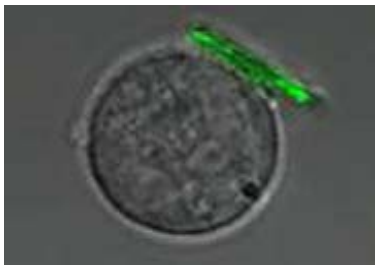
National Nanotechnology Initiative. (6.5 percent increase to $422.96 million) This multiagency initiative seeks systematic understanding, organization, manipulation, and control of atomic, molecular, and supramolecular levels of matter in the size range of 1-100 nanometers. A $2.0 million increase for the Environmental, Health, and Safety area will support decision analysis research.

Highlights

► **Clues to Waterproof Glue Found in Antarctic Creature:** Sam Bowser, a scientist at the New York State Department of Health's Wadsworth Center, studies the calcium carbonate shells of Foraminifera, single-celled marine creatures. Not only do the shells absorb carbon from the water, neutralizing the acidifying effects of dissolved carbon dioxide, but these tiny organisms use an extremely effective underwater adhesive to build their miniscule yet sophisticated shells. Understanding the chemistry of the naturally produced glue could lead to the development of stronger biological adhesives for use in dentistry, neurological surgery, or the development of artificial limbs.



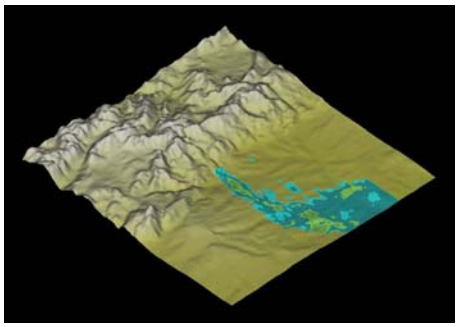
Credit: U.S. Geological Survey



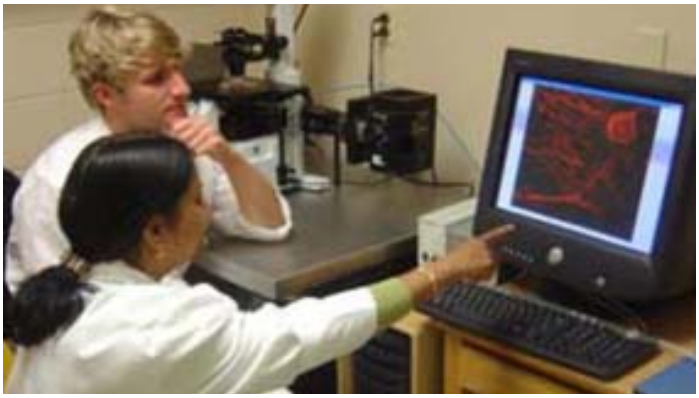
Credit: American Chemical Society

► **Researchers Build Drug-Delivering Backpacks for Cells:** Massachusetts Institute of Technology (MIT) engineers have outfitted cells with tiny polymer "backpacks" that could allow them to deliver drugs, diagnose tumors, or become building blocks for tissue engineering. Using magnetic fields to move the cells around, researchers had immune cells hone in on various tissues in the body, including tumors, infection sites and lymphoid tissues–a trait that could be exploited to achieve targeted drug or vaccine delivery.

► **Scientists Test System to Forecast Flash Floods along Colorado's Front Range:** People living near vulnerable creeks and rivers along Colorado's Front Range may soon get advance notice of potentially deadly floods thanks to a new forecasting system which was tested last summer by the National Center for Atmospheric Research (NCAR) in Boulder, CO. Known as the NCAR Front Range Flash Flood Prediction System, it combines detailed atmospheric conditions with information about stream flows to predict floods along specific streams and catchments.



Credit: U.S. Geological Survey



Credit: AR Science and Technology Authority and AR ASSET Initiative

► **Neural Prosthetic Devices Offer Life-Altering Possibilities:** Project investigators at three universities in Arkansas are collaborating to create neural prosthetic devices from 3-D nanostructures. Neural prosthetic devices do exist, but the excellent biocompatibility of nanowire electrodes could drastically improve reliability and utility. These prosthetics have myriad applications: they could provide deep brain stimulation for Parkinson's or Tourette's patients, restore urinary tract function, or regain control of a paralyzed limb. One aspect of the research involves implantation of networked wireless nanosensors, which would give the patient the freedom to live their life while health-care professionals can monitor them outside of a hospital setting.

Additional FY 2010 Investments, continued

Major Research Equipment and Facilities Construction. ($117.29 million)

- Advanced Laser Interferometer Gravitational Wave Observatory: $46.30 million.
- Atacama Large Millimeter Array: $42.76 million.
- IceCube Neutrino Observatory: $950,000.
- Advanced Technology Solar Telescope: $10.0 million.
- Ocean Observatories Initiative: $14.28 million.
- Judgment Fund: $3.0 million.

Regaining our Energy Science and Engineering Edge (RE-ENERGYSE). This set of investments, part of the President's New Energy for America plan, focuses on preparing students for careers related to research and education on clean energy. NSF, working with the Department of Energy, will leverage existing programs and partnerships to train scientists and technicians, educate K-12 and undergraduate students, and inform the public.

Science and Engineering Beyond Moore's Law. (197.7 percent increase to $46.68 million) In 10 to 20 years, current silicon technology will reach the limits of Moore's Law – the empirical observation that computing power doubles roughly every 18 months. Activities in FY 2010 will encourage transformational activities as well as creating partnering opportunities with the private sector and national laboratories to accelerate innovation.

Science and Technology Centers (STC). (6.2 percent decrease to $57.79 million) STCs integrate cutting-edge research, excellence in education, targeted knowledge transfer, and development of a diverse workforce across all disciplines of science and engineering. STCs conduct research through partnerships among academic institutions, national laboratories, industrial organizations, and/or other public/private entities, and via international collaborations, as appropriate. Up to five new STCs are expected to be funded in FY 2010, for a total of 17.

Stewardship. (8.8 percent increase to $447.66 million) To manage the growing and increasingly complex workload being experienced throughout the Foundation, the Request increases the NSF workforce by 15 to 1,350 FTEs. Investments in Program-Related Technology increase 8 percent to $56.0 million.

FY 2010 Selected Major Investments

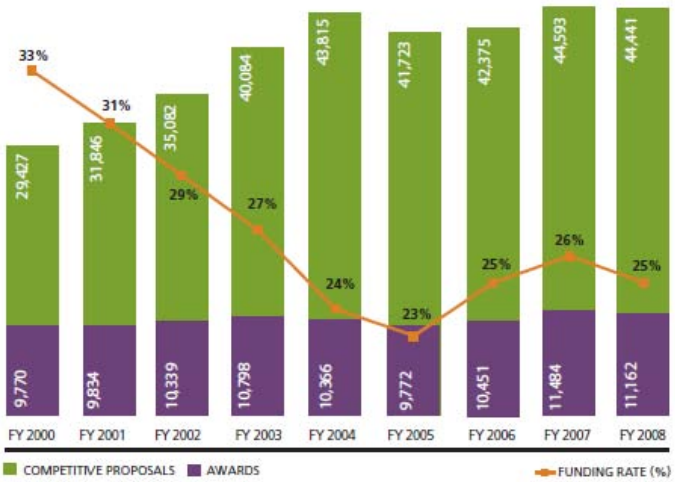
(Dollars in Millions)

	FY 2008 Actual	FY 2009 Current Plan	FY 2009 Recovery Act	FY 2010 Request	Change over FY 2009 Current Plan Amount	Change over FY 2009 Current Plan Percent
Climate Change Science Program (CCSP)	$206.70	$219.57	$95.46	$299.91	$80.34	37%
Climate Research	0.00	0.00	0.00	197.26	197.26	N/A
Cyber-enabled Discovery and Innovation (CDI)	53.18	70.94	6.37	102.63	31.69	44.7%
Cybersecurity	106.90	116.70	20.00	126.70	10.00	8.6%
Experimental Program to Stimulate Competitive Research	120.00	133.00	50.00	147.12	14.12	10.6%
Homeland Security Activities	366.09	377.23	29.40	385.50	8.27	2.2%
National Nanotechnology Initiative (NNI)	408.56	397.18	107.81	422.96	25.78	6.5%
Environment, Health, and Safety (EHS)	29.22	27.91	2.69	29.90	1.99	7.1%
Networking and Information Technology R&D (NITRD)	946.54	1,004.28	339.90	1,110.80	106.52	10.6%
Science and Engineering Beyond Moore's Law (SEBML)	8.18	15.68	3.98	46.68	31.00	197.7%

NSF by the Numbers

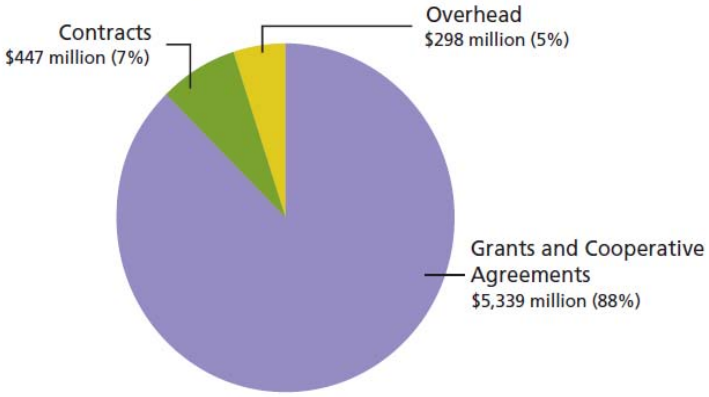
In FY 2008, the NSF evaluated over 44,400 grant proposals and made 11,162 new awards, a funding rate of 25 percent. The majority were made to individual investigators or small groups of investigators at nearly 1,900 colleges, universities, and other public and private institutions throughout the United States. Ninety percent of NSF's funding was allocated through a merit-based review process that is recognized throughout government as the exemplar for effective and efficient use of public funds. 248,000 proposal reviews were conducted.

NUMBER OF NSF COMPETITIVE PROPOSALS AND AWARDS AND FUNDING RATES



HOW IT'S SPENT: AWARD MECHANISMS

(FY 2008 Budget Obligations—$6,084 million)

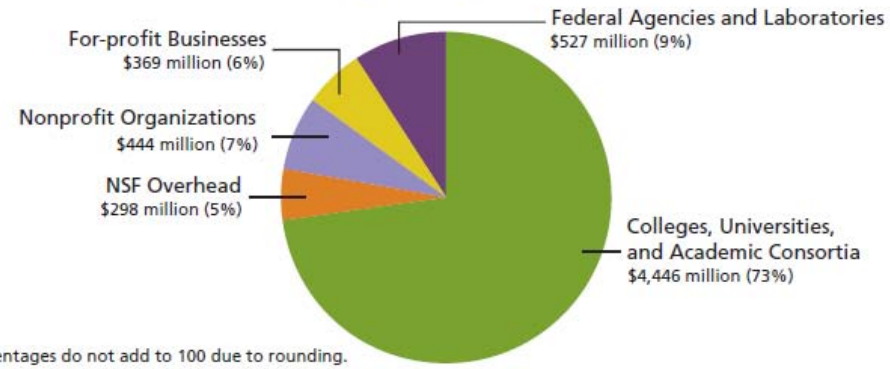


Most NSF projects are funded using grants or cooperative agreements. Grants can be funded either as standard awards in which funding for the full duration of the project is provided in a single fiscal year, or as continuing awards, in which funding for a multi-year project is provided in increments. Cooperative agreements are used when the project requires substantial agency involvement during the project performance period (e.g., research centers, multi-user facilities, etc.). Contracts are used to acquire products, services, and studies (e.g., program evaluations) required primarily for NSF or other government use.

Most NSF awards are to academic institutions. Nonprofit organizations include state and local governments and international organizations. For-profit businesses include private and small businesses. Federal agencies and laboratories include funding for Federally Funded R&D Centers.

WHERE IT GOES: INSTITUTIONS FUNDED

(FY 2008 Budget Obligations—$6,084 million)



Percentages do not add to 100 due to rounding.