

## FY 2012 BUDGET REQUEST TO CONGRESS

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

—From the *National Science Foundation (NSF) Act of 1950*

**VISION:** NSF envisions a nation that capitalizes on new concepts in science and engineering and provides global leadership in advancing research and education.

—From *Empowering the Nation Through Discovery and Innovation, FY 2011–2016*

### ABOUT THE COVER

#### **Microbe vs. Mineral—Life and Death Struggle in the Desert**

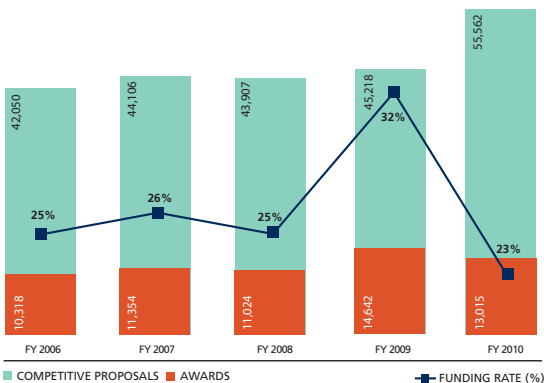
Although the bursts of rainbow colors in this photograph are mesmerizing, microbes fight for their lives in the background. Chemist Michael P. Zach of the University of Wisconsin–Stevens Point, snapped this image of a salt sample he collected in a hot, arid valley near Death Valley National Park in California. He crushed the salt, placed it under a microscope slide and added a drop of water. Suddenly a slew of microbes came to life as the salt crystals dissolved. Then when the water started evaporating, he took a picture. The colors come from light passing through the growing crystals, which act like prisms. This image received an Honorable Mention in the 2009 International Science and Engineering Visualization Challenge sponsored by NSF and the journal *Science*.

*Credit:* Michael P. Zach, University of Wisconsin–Stevens Point

## ABOUT NSF

- Created by Congress in 1950 as an independent federal agency to promote American science and engineering (S&E)
- Only federal agency that funds basic research and education across all fields of S&E and at all levels of S&E education
- Seeks high-risk, potentially transformative projects that will generate path-breaking discoveries and new technologies
- Funds advanced instrumentation and facilities
- Supports Arctic and Antarctic research, science operations, and other related activities for the U.S. polar research program
- Supports cooperative research between universities and industry and United States participation in international scientific efforts
- Nearly 90 percent of funding allocated through a merit review process as grants or cooperative agreements to individual researchers and groups at colleges, universities, academic consortia, nonprofit institutions, and small business
- Supported 191 Nobel laureates, including 19 in the last 5 years

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



# Empowering the Nation Through Discovery and Innovation

## FY 2012 BUDGET REQUEST

### NSF Budget by Appropriation (dollars in millions)

	FY 2010 Omnibus Actual	FY 2010 ARRA Actual	FY 2010 Enacted/ Annualized FY 2011 CR <sup>1</sup>	FY 2012 Request	Change Over FY 2010 Enacted	
					Amount	Percent
Research and Related Activities <sup>1</sup>	\$ 5,615.33	\$ 439.17	\$ 5,563.92	\$ 6,253.54	\$ 689.62	12.4%
Education and Human Resources	872.77	15.00	872.76	911.20	38.44	4.4%
Major Research Equipment and Facilities Construction	165.90	146.00	117.29	224.68	107.39	91.6%
Agency Operations and Award Management	299.85		300.00	357.74	57.74	19.2%
National Science Board	4.38		4.54	4.84	0.30	6.6%
Office of Inspector General	13.97	0.05	14.00	15.00	1.00	7.1%
<b>TOTAL, NSF</b>	<b>\$ 6,972.20</b>	<b>\$ 600.22</b>	<b>\$6,872.51</b>	<b>\$ 7,767.00</b>	<b>\$ 894.49</b>	<b>13.0%</b>

Totals may not add due to rounding.

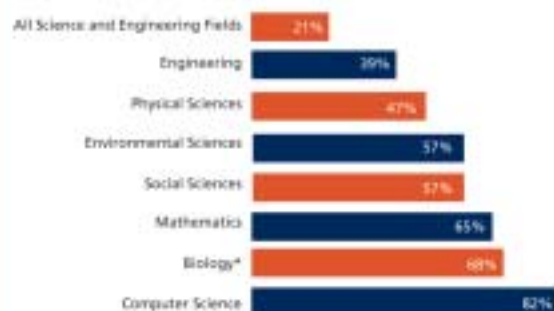
<sup>1</sup>Funding for FY 2010 excludes a one-time appropriation transfer of \$54.0 million to the U.S. Coast Guard per PL 111-117.

<sup>2</sup>A full-year 2011 appropriation was not enacted at the time the budget was prepared; therefore, NSF is operating under a continuing resolution (CR), PL 111-242, as amended. The amounts included for 2011 reflect the annualized level by account provided by the continuing resolution.

ARRA: American Recovery and Reinvestment Act of 2009.

### NSF Support of Academic Basic Research in Selected Fields

(as a percentage of total federal support)



\*Excludes the National Institutes of Health.  
Source: NSF Survey of Federal Funds for Research and Development

### NSF by the Numbers

\$7.6 billion	FY 2010 Obligations (includes ARRA)
2,100	Colleges, universities, and other institutions receiving NSF funding in FY 2010
55,600	Proposals evaluated in FY 2010 through a competitive merit review process
13,000	Competitive awards funded in FY 2010
287,000	Proposal reviews conducted in FY 2010
294,000	Estimated number of people NSF supported directly (researchers, postdoctoral fellows, trainees, teachers, and students) in FY 2010
42,000	Students supported by NSF Graduate Research Fellowships since 1952

# STRATEGY FOR AMERICAN INNOVATION

## Invest in the Building Blocks of American Innovation

- Growth in Research Grants: +2,000 new awards
- Integrated NSF Support Promoting Interdisciplinary Research and Education (INSPIRE): \$12 million
- Science and Engineering Beyond Moore's Law (SEBML): \$96 million
- Research at the Interface of the Biological, Mathematical, and Physical Sciences (BioMaPS): \$76 million
- Science, Technology, Engineering, and Mathematics (STEM) Education Programs
  - Teacher Learning for the Future (TLF): \$20 million
  - Widening Implementation and Demonstration of Evidence-based Reforms (WIDER): \$20 million
  - Transforming Broadening Participation through STEM (TBPS): \$20 million
- Faculty Early CAREER Development: \$222 million
- Graduate Research Fellowships (GRF): \$198 million
- Community College Funding: \$100 million

## Promote Competitive Markets that Spur Productive Entrepreneurship

- Advanced Manufacturing: \$190 million
- Wireless Innovation (WIN) Fund: \$150 million
- Enhancing Access to the Radio Spectrum (EARS): \$15 million
- Engineering Research Centers (ERCs) and Industry/University Cooperative Research Centers (I/UCRCs): \$96 million
- Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs: \$147 million

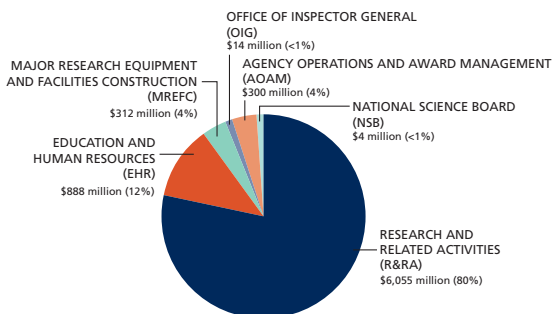
## Catalyze Breakthroughs for National Priorities

- Cyberinfrastructure Framework for 21st Century Science and Engineering (CIF21): \$117 million
- Science, Engineering, and Education for Sustainability (SEES): \$998 million
- Clean Energy: \$576 million
- National Nanotechnology Signature Initiatives: \$117 million
- National Robotics Initiative (NRI): \$30 million

This is an illustrative list of NSF programs that contribute to the three pillars of the Administration's recently released report, *A Strategy for American Innovation* ([www.whitehouse.gov/innovation/strategy](http://www.whitehouse.gov/innovation/strategy)).

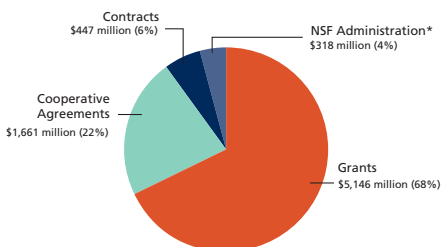
# FOLLOWING THE MONEY

## WHERE IT COMES FROM FY 2010 Obligations by Account—\$7,572 million\*

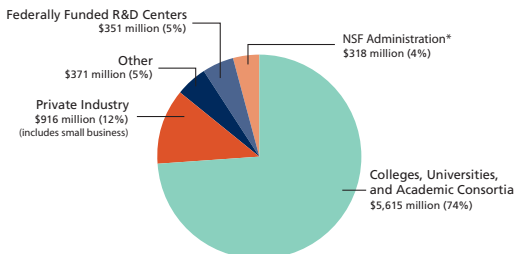


Note: Totals may not add due to rounding.  
\*Includes ARRA

## HOW IT GETS THERE: AWARD MECHANISMS FY 2010 Budget Obligations—\$7,572 million



## WHERE IT GOES: INSTITUTIONS FUNDED BY NSF FY 2010 Budget Obligations—\$7,572 million



\*NSF Administration includes three appropriation accounts—AOAM, OIG, and NSB—that support salaries, general operating expenses, and the activities of the OIG and NSB. NSF also funds other operational activities—totaling \$112 million in FY 2010—through the R&RA and EHR appropriations. These are principally associated with staff working at NSF under the Intergovernmental Personnel Act and certain NSF-wide activities, including information technology investments that are directly related to programmatic investments. This larger portfolio is captured by the NSF *Stewardship* goal, which was \$430 million for FY 2010, or 6 percent of NSF's total obligations.

# A NEW STRATEGIC PLAN

## Empowering the Nation Through Discovery and Innovation

NSF's FY 2011–2016 strategic plan sets the agency's direction for the next 5 years. It builds on previous plans, refining and refocusing the agency's vision statement and strategic goals to better integrate them with the concepts of research and learning, and more closely align with NSF's merit review criteria of intellectual merit and broader impacts. The plan also draws upon new approaches and methods for assessing and evaluating the performance of NSF's investments in science and engineering research and education.

Three interrelated strategic goals provide the programmatic and operational underpinning for all NSF programs and activities, and they apply to the entire portfolio spanning research, education, and infrastructure.

- **Transform the Frontiers:** Emphasizes the seamless integration of research and education as well as the close coupling of research infrastructure and discovery.
- **Innovate for Society:** Points to the tight linkage between NSF programs and societal needs, and highlights the role that new knowledge and creativity play in economic prosperity and society's general welfare.
- **Perform as a Model Organization:** Emphasizes importance to NSF to attain excellence and inclusion in all operational aspects.

### For More Information:

NSF FY 2012 Budget Request

[www.nsf.gov/about/budget](http://www.nsf.gov/about/budget)

Research and Education Results

Supported by NSF

[www.nsf.gov/discoveries](http://www.nsf.gov/discoveries)

NSF Budget and Performance website

[www.nsf.gov/about/performance](http://www.nsf.gov/about/performance)

American Recovery and Reinvestment Act of 2009

[www.nsf.gov/recovery](http://www.nsf.gov/recovery)

[www.Recovery.gov](http://www.Recovery.gov)

Cutting Nanotubes

[www.nsf.gov/news/news\\_summ.jsp?cntn\\_id=118277](http://www.nsf.gov/news/news_summ.jsp?cntn_id=118277)

Bringing Engineering to K–12 Classrooms

[www.nsf.gov/discoveries/disc\\_summ.jsp?cntn\\_id=117563](http://www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=117563)

[www.stompnetwork.org](http://www.stompnetwork.org)

Cyberinfrastructure for Research

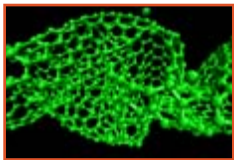
<http://cybershare.utep.edu/index.htm>

Microbe vs. Mineral (cover)

[www.nsf.gov/news/special\\_reports/scivis/winners\\_2009.jsp](http://www.nsf.gov/news/special_reports/scivis/winners_2009.jsp)

# RESEARCH AND EDUCATION HIGHLIGHTS

## Cutting Nanotubes



*Credit: Kim Lab/Brown University*

Researchers at Brown University and in Korea have described the dynamics behind cutting single-walled carbon nanotubes, cylindrical structures just 1/50,000th the width of a human hair. The tubes are compressed by potent sonic booms, causing them to buckle at certain points at helical, 90° angles.

The finding could lead to better quality nanotubes for potential use in the automotive, electronic, optics and other fields. Results appear in the *Proceedings of the Royal Society A*. NSF and the Korea Institute of Science and Technology funded the work.

## Bringing Engineering to K–12 Classrooms



*Credit: Elsa Head, Tufts University*

With NSF support, engineers from Tufts University are bringing engineering to young students. Shown at left are fifth grade students participating in the Student Teacher Outreach Mentorship Program (STOMP), which enlists undergraduate engineering students to mentor K–12 teachers and students.

The STOMP program has been successful, expanding to 18 universities. Various studies have found that participating in engineering service opportunities had a prominent effect on the students' learning of technical and professional skills; teachers participating in the program increased their confidence in teaching technical concepts and content knowledge; and students using an engineering design-based science curriculum scored higher on science exams than students using traditional science curricula.

## Cyberinfrastructure for Research



*Credit: USDA ARS Image Gallery*

Researchers and students at the NSF CREST Cyber-ShARE Center of Excellence at the University of Texas at El Paso are developing the cyberinfrastructure required to collect environmental data and telemeter it to computer systems. This advances the research efforts at the Jornada Experimental Range, a Long-Term Ecological Research (LTER) site in the northern Chihuahuan Desert in southern New Mexico. The new instrumentation measures more than 200 variables

including the exchange of energy, water, and carbon dioxide across the land–atmosphere boundary; facilitates linking these measurements with observations made from satellites; and employs software that is based on algorithms first developed for managing large space missions. These measurements contribute to understanding how desert shrub lands are responding to environmental change and how these changes interact with the climate system.



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