

UNITED STATES  
National Science Foundation



FY 2007 PERFORMANCE HIGHLIGHTS

*Advancing Discovery, Innovation, & Education*

**On the cover:** An essential part of NSF's mission is support for science, math, and engineering education at all levels. Strengthening education and training the workforce are significant aspects of the President's American Competitiveness Initiative (ACI) and the recently enacted America COMPETES Act. In keeping with the ACI and America COMPETES Act, NSF promotes the development of a diverse and well-prepared workforce of scientists, technicians, engineers, mathematicians, and educators, and a well-informed citizenry who have access to the ideas and tools of science and engineering. NSF invests in programs that bolster K-12 science, technology, engineering, and mathematics education by enhancing understanding of how students learn and applying that knowledge to train teachers, develop curricula, and improve student learning.

*Credit:* Getty Images

**For more information:**

To find out more about NSF support of all levels of science and engineering education, visit [www.nsf.gov](http://www.nsf.gov)



## Excellence in Science Communications

NSF earned multiple honors in a recent competition held by the National Association of Government Communicators (NAGC) to recognize the best in government communications. "The Secret Lives of Wild Animals," which uses video and interactive features to describe research on animal behavior, won a first place Gold Screen Award. A second report, this one providing a virtual tour of the new high-tech U.S. South Pole Station in Antarctica, received another Gold Screen Award. NSF also received Gold Screen Awards for "A Galactic Cataclysm," an animated clip depicting star formation, and "The Discovery Files," a series of one-minute radio spots and podcasts. An illustrated news story on the outbreak of an infectious disease among Panamanian frog populations won first place in the Blue Pencil category for news releases. NSF's *FY 2005 Performance Highlights* report was selected for a Blue Pencil Award of Excellence in the annual reports category.

In addition, NSF's *FY 2006 Performance Highlights* report received a Vision Award from the League of American Communications Professionals. The report competed against more than 2,500 entries from around the world. NSF is the only federal government agency to receive six consecutive Vision Awards for annual report excellence.

In the photo, Peter West (*center*), of the National Science Foundation's Office of Legislative and Public Affairs, accepts a Gold Screen Award from NAGC's George Selby and Elizabeth Armstrong.

*Credit:* John Nash, NAGC

**For more information:**

To find out more about these award-winning NSF projects, visit [www.nsf.gov/news/news\\_summ.jsp?cntn\\_id=108991](http://www.nsf.gov/news/news_summ.jsp?cntn_id=108991)

## Statutory 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 Act of 1950*

## Vision

Advancing discovery, innovation, and education beyond the frontiers of current knowledge, and empowering future generations in science and engineering.

—From *NSF Investing in America's Future, Strategic Plan FY 2006–2011*

NSF by the Numbers	
\$5.88 billion	FY 2007 Budget (obligations)
4%	NSF's share of total annual federal spending for research and development
45%	NSF's share of federal funding for nonmedical basic research at academic institutions
45,000	Proposals evaluated in FY 2007 through a competitive merit review process
11,500	Competitive awards funded in FY 2007
1,900	Colleges, universities, and public and private institutions receiving NSF funding in FY 2007
248,000	Proposal reviews conducted in FY 2007
43,000	Students supported by NSF Graduate Research Fellowships since 1952
190,000	People (researchers, postdoctoral fellows, trainees, teachers, and students) NSF supports directly



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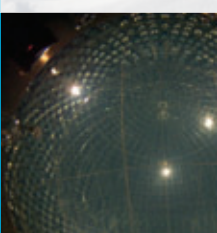
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**Right:** Because bridge failures have disastrous consequences, NSF-funded researchers from Washington University and the University of Virginia are working with the Missouri Department of Transportation to improve bridge safety by equipping vulnerable bridges with networks of sensors to monitor the bridge's structural condition. The research team developed a network of sensors—strain gauges coupled with tiny “mote” computers that can measure conditions at many structural points. This project takes advantage of recent developments in high data-rate sensor networks, in particular networks that can manage high-performance queries over wireless sensor networks. Such large and high-rate sensor networks are extremely difficult to design because data streaming from sensors can flood the analytic system. Sensing devices can fail and energy consumption must be carefully managed to sustain monitoring capability. Mission-critical sensor network applications, such as structural maintenance systems for bridges, must balance the conflict between tight resource constraints and the need to achieve real-time performance.

The sensors have been installed on the Bill Emerson Memorial Bridge in Cape Girardeau, Missouri, a main Mississippi River crossing that lies within an active seismic zone. This bridge experiences high traffic volume and is a crucial component of the U.S. transportation network. With a sensor network embedded within its structural elements, the bridge can be continuously monitored for changes that may predict component failures before they happen, thus helping to prevent a catastrophic collapse such as the one that occurred on the I-35W bridge in Minneapolis–St. Paul, Minnesota, in August 2007.

For more information:

[www.cse.wustl.edu/~lu/itr.htm](http://www.cse.wustl.edu/~lu/itr.htm)

For more information:

About the Director  
[www.nsf.gov/news/speeches/bement/bement\\_bio.jsp](http://www.nsf.gov/news/speeches/bement/bement_bio.jsp)

NSF's FY 2007 Annual Financial Report  
[www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf0802](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf0802)

NSF's FY 2009 Budget Request to Congress  
[www.nsf.gov/about/budget/](http://www.nsf.gov/about/budget/)



**Arden L. Bement, Jr.**  
Director

The National Science Foundation (NSF) is the only federal agency dedicated to supporting fundamental research and education across all fields of science and engineering and at all levels of education. In FY 2007, NSF received nearly 45,000 proposals and made 11,484 new awards to nearly 1,900 colleges, universities, and other public and private institutions throughout the country.

The discoveries resulting from these investments are both exciting and transformative, resulting in new discoveries and innovations that enable the United States to remain competitive in the global marketplace, sustain economic prosperity, protect the environment, maintain a high standard of living, and ensure national security. As an example, in FY 2007, NSF-supported researchers at Rensselaer Polytechnic Institute developed a nanocomposite paper—infused with carbon nanotubes—that was used to create printable, flexible batteries that are more resilient than many existing batteries yet can be cut, folded,

and worked just like paper. The rechargeable material could find uses in a range of devices, from portable electronics to automobiles. Since these nanotube batteries can withstand extreme temperatures and be powered by liquid salts, they are also ideal for medical applications. At the University of South Florida and the University of Florida, NSF-supported researchers are exploring new ways to reduce Internet energy consumption that could potentially save hundreds of millions of dollars annually in the United States alone.

Underlying NSF's programmatic achievements is a commitment to effective and efficient management practices and sound financial oversight.

- NSF received its tenth consecutive unqualified “clean” audit opinion from an independent audit of its financial statements, with no material weaknesses reported.

- NSF is in substantial compliance with the Financial Managers' Financial Integrity Act of 1982. A qualified management assurance over internal control is being reported because of the scope limitation of the internal review of financial reporting. This scope limitation is in line with the Foundation's new three-year program to meet Office of Management and Budget (OMB) requirements for agency internal control by the end of FY 2008.
- NSF maintained "Green" successful ratings in three of the five President's Management Agenda initiatives.
- NSF achieved all of its annual strategic outcome goals. I am pleased to report that the performance results presented by NSF are complete and reliable and, moreover, have been verified and validated by an external, independent management consultant.

Looking ahead, NSF welcomes the potential opportunities brought by the President's American Competitiveness Initiative and the recently enacted America COMPETES Act. Both call for expanded federal investment to drive innovation and sharpen the nation's competitive edge. NSF will direct its funding toward generating fundamental discoveries that produce valuable and marketable technologies; providing cutting edge infrastructure that will transform and enable discovery; and preparing the nation's workforce with the science, technology, engineering, and mathematics skills necessary in the 21st century global labor market.

NSF has a long record of success in leveraging its agile, motivated workforce, management processes, and technological resources to enhance productivity and effectiveness. The agency nonetheless has major challenges that place new requirements and expectations on its workforce and IT infrastructure. For example, multidisciplinary collaborative projects, international activities, and major research facility projects all add to the complexity of the agency's workload. Moreover, meeting new external administrative, oversight, and accountability requirements is an additional burden on limited staffing and operational resources. In recent years, the agency has undertaken efforts to address workload issues. NSF is continuing pilot activities to re-engineer major administrative functions, including the testing of new organizational structures and processes.

The NSF Inspector General has also identified management challenges in several areas, including award administration, human capital, information technology, and merit review. NSF management recognizes these as long-term, continuing issues, and significant efforts have been made in these areas. NSF has invested in essential business models and instituted policies and practices to safeguard public funds. A report on recent activities addressing the Inspector General's FY 2007 management challenges can be found in NSF's *FY 2007 Annual Financial Report*.

A final item of note is NSF's participation in the pilot program led by OMB for performance and accountability reporting. This *Performance Highlights* report is one part of this activity. On November 15, 2007, the Foundation issued an *Annual Financial Report* that focused on the agency's financial condition, the results of the agency's financial audit, and its systems, controls, and legal compliance. NSF's *FY 2009 Budget Request to Congress*, available on February 4, 2008, will include the Foundation's FY 2007 performance report. Both can be found on NSF's website, [www.nsf.gov](http://www.nsf.gov).

Thank you for your interest in the National Science Foundation. To learn more about the latest discoveries emerging from NSF's investments in science, engineering, education, and technology, visit [www.nsf.gov/discoveries/](http://www.nsf.gov/discoveries/).



Arden L. Bement, Jr.  
January 2008

**Right:** Diverse mixtures of native prairie plant species have emerged as a leader in the quest to identify the best source of biomass for producing sustainable, bio-based fuel to replace petroleum. A new NSF-funded study shows that mixtures of native perennial grasses and other flowering plants provide more usable energy per acre than corn grain ethanol or soybean biodiesel and are far better for the environment. Fuels made from prairie biomass are "carbon negative," which means that producing and using them actually reduces the amount of carbon dioxide (a greenhouse gas) in the atmosphere. Using prairie biomass to make fuel would lead to the long-term removal and storage of from 1.2 to 1.8 U.S. tons of carbon dioxide per acre per year.

For more information:

[www.nsf.gov/news/news\\_summ.jsp?cntn\\_id=108206](http://www.nsf.gov/news/news_summ.jsp?cntn_id=108206)

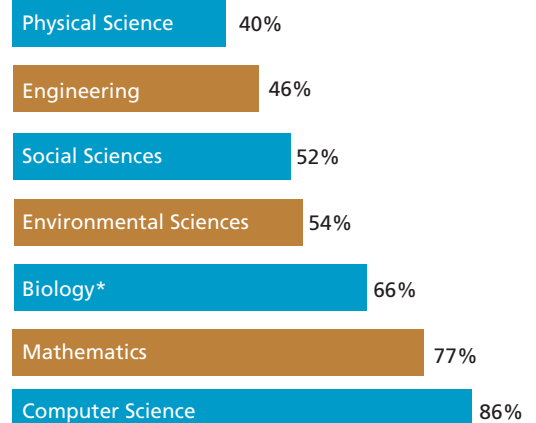


## ADVANCING THE FRONTIER

The National Science Foundation (NSF) was created by Congress in 1950, with a mission of promoting the progress of science and engineering in America. With a budget of about \$6 billion, NSF supports research across all fields of fundamental science and engineering and all levels of science and engineering education. NSF funds the best ideas and most promising people, searching out the frontiers of science and engineering to foster high-risk, potentially transformational research that will generate important discoveries and new technology.

Although NSF's annual budget represents less than 5 percent of the total federal budget for research and development, NSF provides nearly half of the federal support for non-medical basic research at the nation's colleges and universities. In many fields, including computer science, mathematics, environmental sciences, the social sciences, and non-medical biology, NSF is the primary source of federal academic support.

### 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

For more information:

*American Competitiveness Initiative*

[www.whitehouse.gov/stateoftheunion/2006/aci](http://www.whitehouse.gov/stateoftheunion/2006/aci)

*America COMPETES Act*

[www.whitehouse.gov/news/releases/2007/08/20070809-6.html](http://www.whitehouse.gov/news/releases/2007/08/20070809-6.html)

*Nobel Laureates*

[www.nsf.gov/news/news\\_summ.jsp?cntn\\_id=100683&org=NSF&from=news](http://www.nsf.gov/news/news_summ.jsp?cntn_id=100683&org=NSF&from=news)

*Report to National Science Board on NSF's Merit Review Process, FY 2006*

[www.nsf.gov/nsb/documents/2007/2006\\_merit\\_review.pdf](http://www.nsf.gov/nsb/documents/2007/2006_merit_review.pdf)

*President's Management Agenda*  
[www.Results.gov](http://www.Results.gov)

### Public Benefits of a Strong Science and Technology Enterprise

The results of U.S. investments in science and technology have long driven economic growth and improved the quality of life for successive generations. Science and technology have generated new knowledge and industries, created new jobs, provided new sources of energy, developed new modes of communication and transportation, and improved medical care.

As other countries increase support for science and engineering, the United States must work to maintain its leadership in discovery and innovation in order to remain globally competitive. In



keeping with the President's American Competitiveness Initiative and the America COMPETES Act (P.L. 110-69), NSF invests in fundamental research that helps generate discoveries that spur innovation and lead to new technologies. NSF also supports world-class facilities and tools that are essential for transformational research, and develops students with the science and mathematics skills that will enable them to participate in the 21st century global workplace.

For more than 50 years NSF has had an extraordinary impact on the nation's scientific knowledge and capacity. NSF has funded the groundbreaking research of thousands of distinguished scientists and engineers, including nearly 200 Nobel Prize recipients. NSF-supported research led to an array of important discoveries, among them the Internet, Doppler radar, magnetic resonance imaging, and DNA fingerprinting. Moreover, advances at the frontiers of knowledge are critical for strengthening national security. Advanced capabilities in materials science, sensors and sensor network architecture, cybersecurity, and data mining have a direct impact on our national, homeland, and economic security.

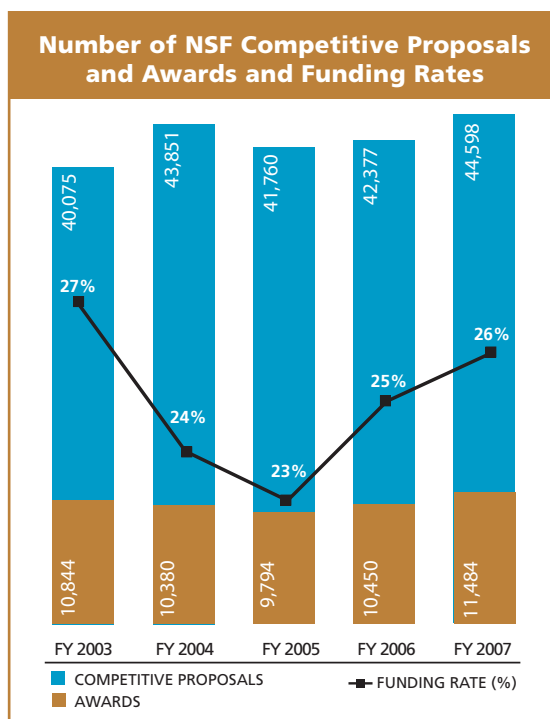
Featured throughout this report are results reported in FY 2007 by researchers funded by the Foundation. Given the nature of basic research, the full impact of many of these discoveries will not be known for years or even decades, but the excitement of their potential is apparent now. As an example, researchers have engineered printable, flexible batteries made from a nanocomposite paper infused with carbon nanotubes. This rechargeable material, which can be cut and folded like paper, could be used in devices ranging from portable electronics to automobiles. With support from NSF, another team of researchers has developed a way to coat surfaces on medical implants and surgical tools with penicillin, creating a life-saving weapon against bacteria-caused infections that can follow surgery.

People Involved in NSF Activities (estimated numbers for FY 2007)	
Senior Researchers	41,000
Other Professionals	13,000
Postdoctoral Associates	6,000
Graduate Students	35,000
Undergraduate Students	23,000
K-12 Students	11,000
K-12 Teachers	61,000
<b>TOTAL</b>	<b>190,000</b>

## A Catalyst for Innovation

NSF is widely recognized as a catalyst for basic research. NSF supports research and education through a competitive, merit-based review process that is recognized throughout government as the exemplar for effective and efficient use of public funds. Some 90 percent of NSF funding is allocated through this process. Each year, approximately 46,000 members of the science and engineering community participate in the merit review process as panelists and proposal reviewers.

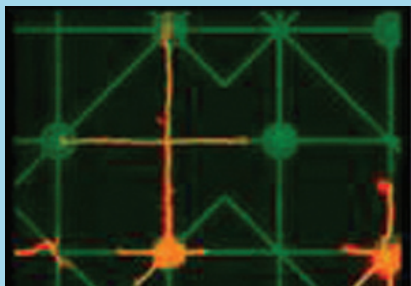
In FY 2007, NSF received nearly 45,000 proposals and awarded 11,484 new grants to individuals or small groups of investigators at nearly 1,900 U.S. colleges, universities, and other public and private institutions. These awards involve an estimated 190,000 people, including researchers, teachers, and students from kindergarten through graduate school.



## Meeting Future Opportunities and Challenges

NSF faces significantly increased responsibilities in light of the President's American Competitiveness Initiative and the recently enacted America COMPETES Act. Both call for expanded federal investment to drive innovation and sharpen the nation's competitive edge. Of highest priority is the support of frontier research that meets pressing national needs in economic and national security, energy, health, and the environment.

NEURONS: FINDING THEIR WAY?



Individual brain cells must make two different kinds of specialized branches, called axons and dendrites, to transmit and receive information respectively. Too few or too many branches or branches in the wrong place can cause serious neurological problems. To observe cell development, NSF-funded researchers at Whitman College constructed patterns of growth-promoting molecules on glass coverslips that act like a micro-trellis to guide cell growth. They combined this approach with live cell imaging to analyze neurons as they grew along the trellis. By observing how growth was altered as branches encountered different patterns, the researchers were able to tease apart the rules that govern cell growth and branch formation, making this the first project to combine nanofabrication, nerve cell culture, and live cell imaging to understand how molecules or geometric patterns guide neuron growth.

For more information:  
[www.whitman.edu/biology/dendrite/grants.html](http://www.whitman.edu/biology/dendrite/grants.html)

CARBON NANOTUBES



By weaving black carbon nanotubes into paper, researchers from NSF's Nanoscience and Engineering Center for Directed Assembly of Nanostructures at Rensselaer Polytechnic Institute have created printable, flexible batteries that are more resilient than many existing batteries, yet can be cut, folded, and worked just like paper. The rechargeable material could find uses in a range of devices from portable electronics to automobiles. These nanotube batteries can withstand extreme temperatures and can be powered by liquid salts, making them ideal for medical applications.

For more information:  
[www.nsf.gov/news/news\\_summ.jsp?cntn\\_id=109868](http://www.nsf.gov/news/news_summ.jsp?cntn_id=109868)

Currently, as the lead federal agency for the International Polar Year, NSF supports research to understand Earth's extreme latitudes at scales from the global to the molecular. In its leadership role in the Networking and Information Technology Research and Development initiative, NSF continues to explore the computing frontier, stimulating research advances in new algorithms, architectures, languages, and systems and in emerging models of computing, paving the way for applications yet to be imagined. NSF also continues to provide critical support for the National Nanotechnology Initiative and for the overall U.S. nanotechnology research effort.

Another area where NSF provides valuable leadership across the government is in e-Government, specifically in advancing systems and solutions for the management of federal grant-making activities. NSF is a co-managing partner and a consortium leader for the Grants Management Line of Business and recently launched a Web portal, Research.gov, to improve service to applicants and grantees by streamlining and standardizing grant business processes among partner agencies.

These activities contribute directly to the President's Management Agenda (PMA), the government-wide effort to improve the management, performance, and accountability of federal agencies. NSF's FY 2007 results are presented to the right. In the fourth quarter of FY 2007, NSF maintained its "Green" status in three of five primary initiatives. In the Human Capital initiative, NSF had maintained "Green" status since 2005 but moved to "Yellow" in the third quarter of 2007. NSF continues to engage the Office of Personnel Management on a number of strategic human capital

initiatives that NSF is undertaking, including an extensive human capital, workforce, and succession planning effort. The "Yellow" progress score on the e-Gov initiative reflects OMB's decision to downgrade all agencies for not being fully compliant with the security and privacy requirements of OMB Memorandum M-07-06. NSF is currently working toward full compliance with these requirements. NSF's "Red" status in Competitive Sourcing remains unchanged. A more detailed discussion of NSF's PMA efforts is included in NSF's FY 2007 *Annual Financial Report*, and related information is available at [www.Results.gov](http://www.Results.gov).

President's Management Agenda Scorecard			
	Baseline	Status	Progress
	9/30/01	9/30/07	
Strategic Management of Human Capital	▲	■	●
Competitive Sourcing	▲	▲	▲
Improving Financial Performance	●	●	●
Expanded Electronic Government	■	●	■
Performance Improvement Initiative	▲	●	●

Note: For the Eliminating Improper Payments Initiative, OMB has moved NSF from an annual to a 3-year reporting cycle because of the agency's low improper payments.

● Indicates success   ■ Indicates mixed results   ▲ Indicates unsatisfactory

Ratings are issued quarterly by OMB.

Management Challenges

NSF has a long record of success in leveraging its workforce, management processes, and technological resources to enhance productivity and effectiveness and in maintaining costs for internal operations at roughly 5 percent of the agency's annual budget. However, the opportunities provided by the America COMPETES Act come at a time when the NSF workforce and infrastructure are being challenged by workload issues. The rise in multidisciplinary collaborative projects, international activities, and major research facility projects has increased the volume as well as the complexity of the Foundation's workload. Both the budget and number of competitive proposals have increased significantly over the past decade, while staffing levels have not kept pace.

To meet this challenge, NSF management is analyzing workload requirements and administrative functions, and a pilot program is currently under way to test the new organizational structure





and operations procedures. A key facet of NSF's current human capital management activities is succession planning. A committee chaired by the Deputy Director was formed to examine current succession planning and define new strategies to enhance NSF's ability to develop and recruit high-quality candidates for critical positions and quickly orient new staff.

The 2007 financial statement audit for NSF found no material weaknesses in the agency's financial statements, but did identify two significant deficiencies—in Contract Monitoring and Property, Plant, and Equipment Accounting and Reporting. In both of these areas, NSF is developing corrective action plans to resolve the deficiencies.

The NSF Office of Inspector General (OIG) submits an annual statement detailing what it considers the most serious management challenges facing NSF in the coming years. Challenges for FY 2007 are categorized in six broad areas: award administration; human capital; budget, cost, and performance integration; information technology; the U.S. Antarctic Program; and merit review. The OIG notes that NSF continues to make significant progress in meeting these challenges. Following is a brief summary of some key accomplishments. The complete statement and a full report can be found in NSF's *FY 2007 Annual Financial Report*.

- **Award Administration.** NSF refined its post-award monitoring program; implemented a requirement to eliminate program-specific cost sharing; enhanced management of large infrastructure projects through increased staff, staff training, tracking and reporting on facility obligations, and creation of guidance manuals; improved monitoring with reviews of quarterly expenditure reports, an update to the contracting manual, and improved training efforts; and promoted the integrity of NSF research through ethics training of future scientists and engineers.
- **Human Capital.** NSF continues to make progress in developing and implementing an effective workforce planning process and establishing a comprehensive succession planning process. NSF has implemented new procedures to hire staff, reducing the time-to-hire by more than 30 percent from 2006 to 2007. NSF also is working with rental management and the Government Services Administration to find new spaces for lease to address the problem of inadequate space for staff and meetings and is improving procedures to enhance ease of use for staff making travel arrangements.
- **Budget, Cost, and Performance Integration.** NSF has revised the performance reporting process to better address the agency's strategic goals. NSF continues to improve its project reporting capabilities through IT and policy document enhancements. To improve cost information, NSF tracks costs of its operations at the highest and lowest levels and has adopted efficiency goals that constantly challenge staff to develop and implement the most efficient work processes.
- **Information Technology.** To enhance the agency's enterprise architecture (EA)—the blueprint for organizational change in operational and technological terms—NSF established an agency policy for EA development, maintenance, and compliance and created a formal advisory group responsible for directing, overseeing, and approving EA. NSF reports progress to this group and has obtained approval of the current EA version. NSF received high ratings from OMB for the quality of its EA efforts.
- **U.S. Antarctic Program.** An external group of experts has provided recommendations on the logistics and infrastructure needed to sustain the high priority research program and to enable research in new regions or on new subjects. NSF has requested funding to begin implementation of these recommendations. Work on these efforts continues.
- **Merit Review.** In FY 2006, proposals received from women and minorities increased by 3.2 percent as compared to the previous year. The 1.6 percent overall increase in submissions suggested that some progress is being made in attracting more applicants from underrepresented groups. Because those who submit proposals tend not to report demographic information, NSF has formed an agency-wide working group to develop a plan for increasing participation among underrepresented groups and broadening the pool of proposal reviewers.

**Right:** Peering backward in time to an instant after the big bang, physicists at the University of Wisconsin-Madison have devised an approach that may help unlock the hidden shapes of alternate dimensions of the universe. A new study demonstrates that the shapes of extra dimensions can be “seen” by deciphering their influence on cosmic energy released by the violent birth of the universe 13 billion years ago. The method provides evidence that physicists can use experimental data to discern the nature of these elusive dimensions—the existence of which is a critical but as yet unproven element of string theory, the leading contender for a unified “theory of everything.” Scientists developed string theory, which proposes that everything in the universe is made of tiny, vibrating strings of energy, to encompass the physical principles of all objects from immense galaxies to subatomic particles. Though currently the front-runner to explain the framework of the cosmos, the theory remains, to date, untested. The image at right shows the surface of a cross-section of a six-dimensional object which is a likely candidate of the shape of the six hidden dimensions of space that must exist in addition to four-dimensional space-time.



## MEASURING PERFORMANCE

**For more information:**

[www.nsf.gov/news/news\\_summ.jsp?cntn\\_id=110195&org=NSF&from=newsField](http://www.nsf.gov/news/news_summ.jsp?cntn_id=110195&org=NSF&from=newsField)

**For more information:**

*NSF Investing in America's Future: Strategic Plan FY 2006–2011*  
[www.nsf.gov/publications/pubsumm.jsp?ods\\_key=nsf0648](http://www.nsf.gov/publications/pubsumm.jsp?ods_key=nsf0648)

*NSF Research Highlights and Discoveries*  
[www.nsf.gov/discoveries/](http://www.nsf.gov/discoveries/)

*NSF's FY 2009 Budget Request to Congress*  
[www.nsf.gov/about/budget/](http://www.nsf.gov/about/budget/)

*Program Assessment Rating Tool (PART)*  
[www.ExpectMore.gov](http://www.ExpectMore.gov)

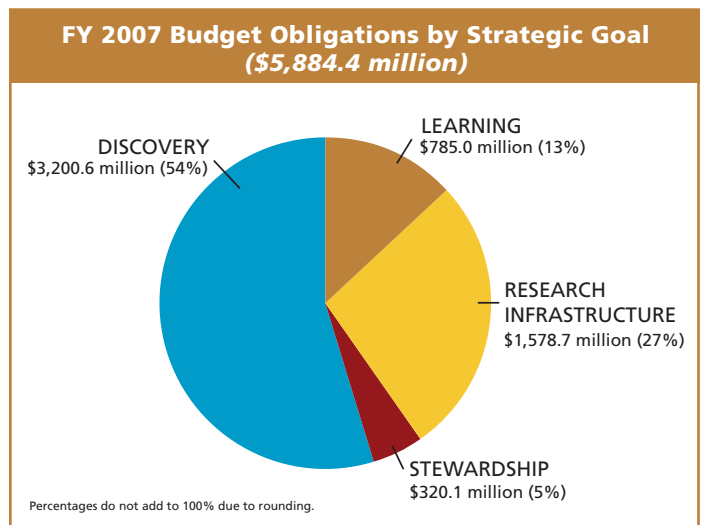
*e-Gov and the Grants Management Line of Business initiative*  
[www.whitehouse.gov/omb/egov/](http://www.whitehouse.gov/omb/egov/)

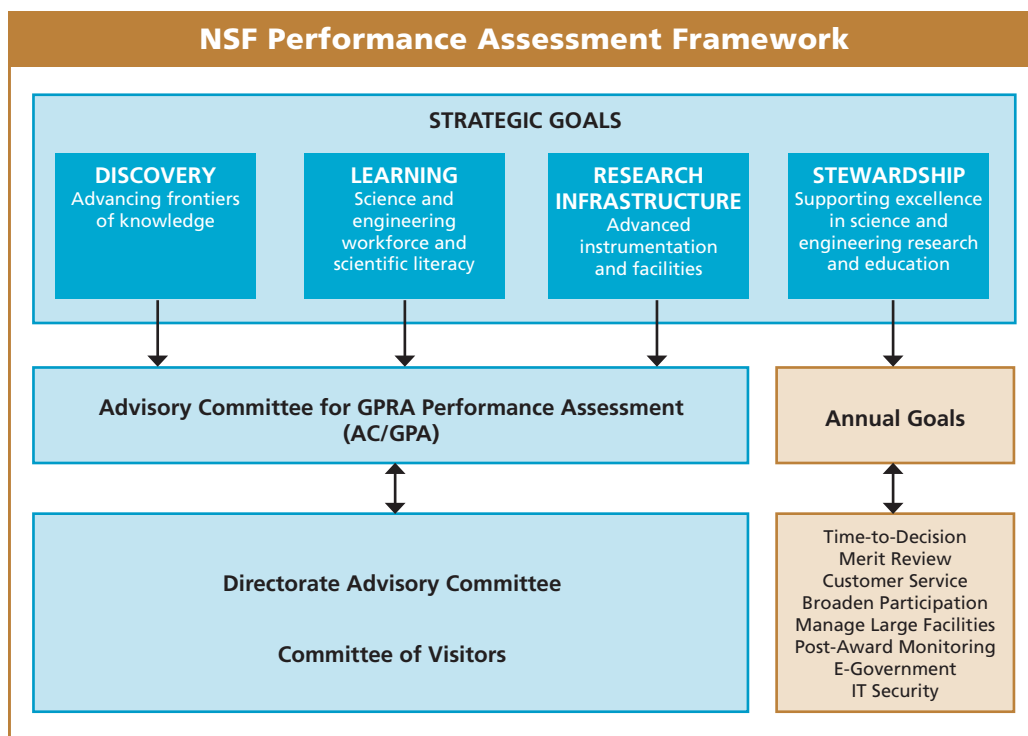
*FY 2007 Report from the Advisory Committee on GPRA Performance Assessment*  
[www.nsf.gov/publications/pubsumm.jsp?ods\\_key=nsf07207](http://www.nsf.gov/publications/pubsumm.jsp?ods_key=nsf07207)

NSF's leadership in advancing the frontiers of science and engineering research and education is demonstrated, in part, through internal and external performance assessments. The results of this process provide stakeholders and taxpayers with vital information about the return on their investments. In FY 2007, performance assessment was guided by the Government Performance and Results Act of 1993 (GPRA) and by NSF's *FY 2006–2011 Strategic Plan*. GPRA requires agencies to develop a strategic plan, establish annual performance goals, and report annually on the progress made toward achieving those goals.

NSF's *FY 2006–2011 Strategic Plan* outlines the strategic outcome goals by which NSF measures its annual performance: *Discovery*, *Learning*, *Research Infrastructure*, and *Stewardship*. These four interrelated goals—shown in NSF's Performance Assessment Framework on the opposite page—establish an integrated strategy to deliver new knowledge at the frontiers, meet vital national needs, and work to achieve the NSF vision. The first three goals focus on NSF's long-term investments in science and engineering research and education. The fourth goal—*Stewardship*—is an internally focused goal that emphasizes management of the investment process.

This chart shows NSF's budget by strategic goal. In FY 2007, NSF invested \$3,200.6 million to foster research that will advance the frontiers of knowledge (*Discovery*), \$785.0 million to support activities to cultivate a world-class science and engineering workforce (*Learning*), and \$1,578.7 million to build the nation's research capability through critical investments in advanced instrumentation, facilities, cyberinfrastructure, and experimental tools (*Research Infrastructure*). Just over 5 percent of NSF's budget supports administration and management activities (*Stewardship*).





## Assessment Framework

The assessment framework shown above allows NSF to gather meaningful information on performance while also recognizing the inherent limits to assessing long-term investments in basic research. This framework accounts for the fact that outcomes from basic research are unpredictable and difficult to measure, with impacts often emerging many years after the research was conducted. NSF has developed an assessment approach that relies on retrospective reviews by external experts, in keeping with the recommendations from the 2001 National Academies report, *Implementing the Government Performance and Results Act for Research: A Status Report*.

The Advisory Committee for GPRA Performance Assessment (AC/GPA) leads the assessment of NSF’s three externally-facing goals of *Discovery*, *Learning*, and *Research Infrastructure*. Assessment of the *Stewardship* goal is based on a set of annual goals and milestones that address administration, management, and customer service activities.

The work of the AC/GPA is integrated with other external review processes at NSF, notably the agency’s Advisory Committees and Committees of Visitors (COVs). The Foundation relies on these reviews to maintain its high standards of program management, to provide continuous improvement of performance, and to ensure openness to the research and education community served by the Foundation. COVs are responsible for evaluating and reporting on one-third of NSF’s programs every year.

## FY 2007 Results

For the seventh consecutive year, NSF achieved all of its annual strategic goals. In assessing outcomes, the AC/GPA reviewed over 1,100 outstanding accomplishments compiled by NSF program officers, as well as award abstracts, investigator project reports, and COV reports. The committee determined that during FY 2007, NSF made significant achievements in the *Discovery*, *Learning*, and *Research Infrastructure* goals. Moreover, the committee’s assessment process was itself reviewed and validated by an independent, external management consulting firm. Some of the results reported by NSF-funded researchers in FY 2007 appear throughout this report.

## PERFORMANCE REPORT

NSF’s FY 2007 Government Performance and Results Act (GPRA) performance report includes a more detailed discussion of NSF’s performance evaluation framework, performance assessment process, use of the Administration’s research and development criteria, extensive data verification and validation process, trend data, results of Program Assessment Rating Tool (PART)-related goals, as well as other performance-related information. NSF’s FY 2007 GPRA performance report is integrated with the agency’s *FY 2009 Budget Request to Congress* and is available at [www.nsf.gov/about/budget/](http://www.nsf.gov/about/budget/).



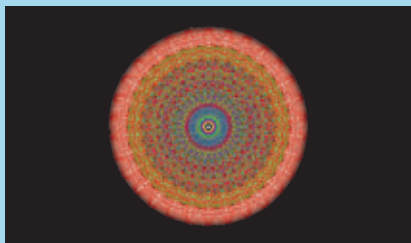
## EARLY CANCER DETECTION

New optical technology developed by an NSF-funded biomedical engineer at Northwestern University has proven effective in the early detection of colon cancer and may also hold promise for detecting pancreatic cancer, the fourth most common cause of cancer deaths in the United States. Known as a silent killer with no method of early detection, pancreatic cancer spreads rapidly and seldom is detected in its early stages.

In a pilot study of 51 patients, the research team found they could detect both early- and advanced-stage pancreatic cancer without touching or imaging the pancreas. The extraordinarily sensitive technique, which is minimally invasive and takes advantage of certain light-scattering effects, can detect abnormal changes in cells lining the duodenum even though the cells appear normal when examined with a conventional microscope.

For more information:  
[www.nsf.gov/news/news\\_summ.jsp?cntn\\_id=109926](http://www.nsf.gov/news/news_summ.jsp?cntn_id=109926)

## MATHEMATICAL SOLUTION FOR ANOTHER DIMENSION



Ever since 1887, when Norwegian mathematician Sophus Lie discovered the mathematical group called E8, researchers have been trying to understand the extraordinarily complex object described by a numerical matrix of more than 400,000 rows and columns. Now, an international team of experts funded by NSF and the American Institute of Mathematics has mapped E8 using powerful computers and programming techniques. This feat is the numerical equivalent of mapping the human genome and will pave the way for breakthroughs in a wide range of problems in geometry, number theory, and the physics of string theory. Because of its size and complexity, the E8 calculation ultimately took about 77 hours on the supercomputer Sage and created a file 60 gigabytes in size. For comparison, the human genome is less than a gigabyte in size. In fact, if written out on paper in a small font, the E8 answer would cover an area the size of Manhattan.

For more information:  
[www.nsf.gov/news/news\\_summ.jsp?cntn\\_id=108482&org=NSF&from=news](http://www.nsf.gov/news/news_summ.jsp?cntn_id=108482&org=NSF&from=news)

Under the *Stewardship* goal, NSF fully achieved seven of the eight annual goals for FY 2007, with partial achievement for the remaining goal (management of large facilities). These results were presented and discussed at the November 2007 meeting of the NSF Advisory Committee for Business and Operations.

### FY 2007 Strategic Outcome Goals and Results

		Result
<b>DISCOVERY</b>	<p>Foster research that will advance the frontiers of knowledge, emphasizing areas of greatest opportunity and potential benefit and establishing the nation as a global leader in fundamental and transformational science and engineering.</p>	<p>Investments in <i>Discovery</i> support cutting-edge research that yields new and important discoveries and promotes the development of new knowledge and techniques within and across traditional boundaries. These investments enable NSF to meet its mission of promoting the progress of science while at the same time helping to maintain the nation's capacity to excel in science and engineering, particularly in academic institutions. The results of NSF-funded research projects provide a rich foundation for broad and useful applications of knowledge and the development of new technologies. Support in this area also promotes the education and training of the next generation of scientists and engineers by providing them with an opportunity to participate in discovery-oriented projects.</p> <p><b>Explanation of result:</b> Assessments by external experts determined that NSF has demonstrated significant achievement of this goal. The assessment process was verified and validated by an external, independent consultant. Results reported in FY 2007 by NSF-funded researchers are featured throughout this report; additional results can be found at <a href="http://www.nsf.gov/discoveries">www.nsf.gov/discoveries</a>.</p>
		<p>Leadership in today's knowledge economy requires world-class scientists and engineers and a national workforce that is scientifically, technically, and mathematically strong. Investments in <i>Learning</i> aim to improve the quality and reach of science, engineering, and mathematics education and enhance student achievement. Each year, NSF supports an estimated 190,000 people—teachers, students, and researchers at every educational level and across all disciplines in science and engineering. Embedded in all NSF programs are efforts to build a more inclusive, knowledgeable, and globally-engaged workforce that fully reflects the strength of the nation's diverse population. Because science and engineering increasingly address global questions of significant societal importance, today's research requires globally-engaged investigators working collaboratively across agencies and international organizations to apply the results of research to long-standing global challenges.</p> <p><b>Explanation of result:</b> Assessments by external experts determined that NSF has demonstrated significant achievement of this goal. The assessment process was verified and validated by an external, independent consultant. Results reported in FY 2007 by NSF-funded researchers are featured throughout this report; additional results can be found at <a href="http://www.nsf.gov/discoveries">www.nsf.gov/discoveries</a>.</p>
<b>DISCOVERY</b>		<p>FY 2004 ●</p> <p>FY 2005 ●</p> <p>FY 2006 ●</p> <p>FY 2007 ●</p>
<b>LEARNING</b>		<p>FY 2004 ●</p> <p>FY 2005 ●</p> <p>FY 2006 ●</p> <p>FY 2007 ●</p>

- Indicates successful achievement.
- Indicates partial achievement.
- ▲ Indicates not achieved.



FY 2007 Strategic Outcome Goals and Results		Result
<p><b>RESEARCH INFRASTRUCTURE</b></p> <p>Build the nation's research capability through critical investments in advanced instrumentation, facilities, cyberinfrastructure, and experimental tools.</p>	<p>NSF investments in <i>Research Infrastructure</i> provide state-of-the-art tools for research and education, such as multi-user research facilities, distributed instrumentation networks and arrays, accelerators, telescopes, research vessels, aircraft, and earthquake simulators. In addition, investments in Internet-based and distributed user facilities are increasing as a result of rapid advances in computer, information, and communication technologies. NSF support for large multi-user facilities helps create state-of-the-art, world-class research platforms vital to new discoveries and the progress of research. NSF support may include construction, upgrades, operations, maintenance, and personnel needed to assist scientists and engineers in the conduct of research at such facilities. NSF consults with other agencies and international partners to avoid duplication and optimize capabilities for U.S. researchers.</p> <p><b>Explanation of result:</b> Assessments by external experts determined that NSF has demonstrated significant achievement of this goal. The assessment process was verified and validated by an external, independent consultant. Results reported in FY 2007 by NSF-funded researchers are featured throughout this report. Additional results can be found at <a href="http://www.nsf.gov/discoveries">www.nsf.gov/discoveries</a>.</p>	<p>FY 2004 ●</p> <p>FY 2005 ●</p> <p>FY 2006 ●</p> <p>FY 2007 ●</p>
<p><b>STEWARDSHIP</b></p> <p>Support excellence in science and engineering research and education through a capable and responsive organization.</p>		<p>●</p>
<p>1. Time-to-Decision</p>	<p>For 70 percent of proposals, inform applicants whether their proposals have been declined or recommended for funding within six months of deadline or target date or of receipt date, whichever is later.</p>	<p>FY 2004 ●</p> <p>FY 2005 ●</p> <p>FY 2006 ●</p> <p>FY 2007 ●</p>
<p>● Indicates successful achievement.            ■ Indicates partial achievement.            ▲ Indicates not achieved.</p>		

### PART ASSESSMENTS

In 2002, OMB developed the Program Assessment Rating Tool (PART) as a systematic methodology for assessing the performance of program activities across the federal government. A PART evaluation focuses on program purpose and design, strategic planning, program management, and program results and accountability. PART is an important component of NSF's performance activities. PART performance measures and action plans have provided valuable tools for program assessment and for improving program performance and management. To date, OMB has completed more than 1,000 PART assessments, representing 98 percent of all federal programs; of those, only 18 percent received the highest rating of "Effective." All NSF programs assessed to date received an effective rating, with one additional assessment slated for completion in FY 2008.

OCEAN HEALTH



With support from NSF, an international group of ecologists and economists has shown that the loss of biodiversity is profoundly reducing the ocean's ability to produce seafood, resist diseases, filter pollutants, and rebound from stresses such as overfishing and climate change. The study reveals that every species lost causes a faster unraveling of the overall ecosystem. Conversely, every species recovered adds significantly to overall productivity and stability of the ecosystem and its ability to withstand stresses. The 4-year analysis is the first to examine all existing data on ocean species and ecosystems, synthesizing historical, experimental, fisheries, and observational data sets to understand the importance of biodiversity at the global scale. Examination of protected areas worldwide shows that restoration of biodiversity increased productivity four-fold in terms of catch per unit effort and made ecosystems 21 percent less susceptible to environmental and human-caused fluctuations on average. The buffering impact of species diversity also generates long-term insurance values that must be incorporated into future economic valuation and management decisions.

For more information:  
[www.nsf.gov/news/news\\_summ.jsp?cntn\\_id=108149](http://www.nsf.gov/news/news_summ.jsp?cntn_id=108149)

A NEW WINDOW INTO THE EYE









In work that could improve diagnoses of many eye diseases, NSF-funded researchers at the Massachusetts Institute of Technology have developed a new type of laser for taking high-resolution, three-dimensional images of the retina, the part of the eye that converts light to electrical signals that travel to the brain. The new imaging system is based on Optical Coherence Tomography (OCT), which uses light to obtain high-resolution, cross-sectional images of the eye to visualize subtle changes that occur in retinal disease. Future clinical studies, as well as further development, may someday enable ophthalmologists to routinely obtain "OCT snapshots" of the eye, containing comprehensive volumetric information about the microstructure of the retina. Such snapshots could potentially improve diagnoses of retinal diseases such as diabetic retinopathy, glaucoma, and age-related macular degeneration.

For more information:  
<http://web.mit.edu/newsoffice/2007/eye-imaging.html>

FY 2007 Strategic Outcome Goals and Results		Result
<b>STEWARDSHIP</b> <i>(continued)</i>		
2. Merit Review (New in FY 2007)	<p>Improve the transparency of decisions and the quality of the merit review process.</p> <p>NSF's performance is successful when a majority of the following milestones are achieved:</p> <ul style="list-style-type: none"> <li>• Develop methods or metrics to assess the transparency and quality of the merit review process.</li> <li>• Provide a written context statement to the Principal Investigator (PI) that describes the process by which the proposal was reviewed and the context of the decision (such as the number of proposals and awards, information about budget availability, and considerations in portfolio balancing).                      FY 2007 Target: 95 percent                      FY 2007 Result: 95 percent</li> <li>• Develop a website to identify and disseminate effective merit review practices.</li> <li>• Ensure that the Program Management Seminar includes case studies on how to implement an effective merit review process.</li> <li>• Include a section on training and mentoring of program officers in the annual Merit Review Report to the National Science Board.</li> </ul>	●
3. Customer Service (New in FY 2007)	<p>Improve customer service to the science, engineering, and education communities.</p> <p>NSF's performance is successful when the following milestones are achieved:</p> <ul style="list-style-type: none"> <li>• Conduct a survey of investigators on the proposal submission and review processes, targeting those who have submitted proposals to NSF. Gather data on such factors as (1) drivers that increase proposal submissions, (2) PI perceptions regarding success rates, (3) impacts on the PI and reviewer community of increasing proposal submission rates, and (4) trends in customer satisfaction.</li> <li>• Analyze the survey results for directions in improving customer service in order to implement selected recommendations in FY 2008.</li> </ul>	●
4. Broaden Participation (New in FY 2007)	<p>Expand efforts to increase participation by underrepresented groups and diverse institutions throughout the United States in all NSF activities and programs.</p> <p>NSF's performance is successful when the following milestones are achieved:</p> <ul style="list-style-type: none"> <li>• Develop a plan to increase participation in NSF programs by underrepresented groups, which includes defining existing baseline data.</li> <li>• Develop a plan to broaden the pool of reviewers for NSF proposals.</li> </ul>	●
<p>● Indicates successful achievement.                  ■ Indicates partial achievement.                  ▲ Indicates not achieved.</p>		





FY 2007 Strategic Outcome Goals and Results		Result
STEWARDSHIP (continued)		
5. Management of Large Facilities (New in FY 2007)	<p>Ensure the efficient and effective management of the construction and operation of large facilities.</p> <p>NSF's performance is successful when the following milestones are achieved:</p> <ul style="list-style-type: none"> <li>• For construction projects funded by the Major Research Equipment and Facilities Construction appropriation, keep negative cost and schedule variance to less than 10 percent. [Note: The Scientific Ocean Drilling Vessel (SODV) did not achieve its construction schedule; NSF program staff will continue to work with the project managers to monitor the SODV construction schedule.]</li> <li>• For facilities in the operational phase, keep operating time lost to less than 10 percent for 90 percent of those facilities.</li> </ul>	  
6. Post-Award Monitoring (New in FY 2007)	<p>Fully implement NSF's program of post-award financial and administrative monitoring, in order to test the risk-based identification model against the mitigation strategy of increasing methods of oversight.</p> <p>NSF's performance is successful when a majority of the following milestones are achieved:</p> <ul style="list-style-type: none"> <li>• Apply the risk assessment results to develop the FY 2007 monitoring plan (on-site visits, desk reviews, and Financial Cash Transaction Report (FCTR) sampling efforts).</li> <li>• Complete 95 percent of projected FY 2007 on-site monitoring visits by the end of FY 2007.</li> <li>• Complete 95 percent of projected FY 2007 desk reviews by the end of FY 2007.</li> <li>• Complete 95 percent of projected FY 2007 FCTR transaction testing by the end of FY 2007.</li> </ul>	
7. E-Government (New in FY 2007)	<p>Establish an E-Government Implementation Plan.</p> <p>NSF's performance is successful when the following milestones are achieved:</p> <ul style="list-style-type: none"> <li>• Achieve 90 percent of major E-Government Plan implementation milestones.</li> <li>• Post 100 percent of discretionary grants applications on Grants.gov as specified in NSF Ramp-Up Plan.</li> </ul>	
8. Information Technology (IT) Security (New in FY 2007)	<p>Conduct a successful Federal Information Security Management Act IT Program Review.</p> <p>NSF's performance is successful when a majority of the following milestones are achieved:</p> <ul style="list-style-type: none"> <li>• Ensure major applications and general support systems certification and accreditations are current and up to date.</li> <li>• Ensure that 96 percent or more of IT systems are installed in accordance with security configurations.</li> <li>• Ensure that 90 percent or more of applicable systems have Privacy Impact Assessments.</li> </ul>	
 Indicates successful achievement.  Indicates partial achievement.  Indicates not achieved.		

**Right:** NSF-funded researchers at the California Institute of Technology and the University of Iowa are combining insights and methods from brain science with decision science, psychology, and economics to study human judgment and decision-making. Computer-generated visualizations of the brain can help identify the relationship between human behavior and activity in different regions of the brain. In the image shown here, the ellipsoids represent the anatomic variation among the brain regions of 20 subjects based on magnetic resonance imaging (MRI) data. The green, red, and pink ellipsoids represent regions that support language and reasoning. The blue spheres represent areas of the brain that control sensation and motor function.

Research on the relationship between brain function and behavior is stimulating new economic and social theories that incorporate emotion and brain function in formal mathematical models. The goal is to develop integrative theories of social behavior that build upon the bedrock of neural and cognitive functioning, proceed through behavioral analysis, and account for the structure and dynamics of groups and organizations, markets, and societies. For example, high activity in a particular region of the brain, the orbitofrontal cortex, correlates with avoiding choices where people are uncertain about their chances of success and failure (ambiguity aversion). People with damage to portions of the brain associated with the processing of emotion do not exhibit ambiguity aversion. This condition may bestow advantages in circumstances when ambiguity is unavoidable and decisiveness is essential.

For more information:

[www.nsf.gov/od/opp/gpra/cov\\_materials/cov2006/ant\\_nuggets\\_06.pdf](http://www.nsf.gov/od/opp/gpra/cov_materials/cov2006/ant_nuggets_06.pdf)

For more information:

*NSF's FY 2007 Annual Financial Report*  
[www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf0802](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf0802)

*OMB Circular A-123, Management's Responsibility for Internal Control*  
[www.whitehouse.gov/omb/circulars/a123/a123\\_rev.pdf](http://www.whitehouse.gov/omb/circulars/a123/a123_rev.pdf)

NSF's FY 2007 Management Assurance statement can be found in NSF's FY 2007 Annual Financial Report.



## FINANCIAL HIGHLIGHTS

### From the Chief Financial Officer



**Thomas N. Cooley**  
Chief Financial Officer

Fiscal Year (FY) 2007 was a busy and successful one for the National Science Foundation (NSF), with a record number of proposals received and awards made—nearly 45,000 and 11,494, respectively. I am pleased to report the Foundation received an unqualified audit opinion, affirming that NSF's financial statements for the year ended September 30, 2007, were presented fairly in all material respects, in conformity with U.S. generally accepted accounting principles. The audit report noted no material weaknesses but included two significant deficiencies: Contract Monitoring (repeated from the prior year) and Property, Plant, and Equipment Accounting and Reporting. NSF is addressing both deficiencies through a combination of process and system improvements. We believe NSF's efforts in developing and implementing a comprehensive post-award monitoring program that is increasingly being recognized as a model in the federal government has resulted in the removal of last year's post-award monitoring deficiency from the audit report.

Sound financial management enables NSF to pursue the critical investments in science and engineering research and education that ultimately help ensure the nation's security, prosperity, and well being. NSF's longstanding commitment to sound financial management practices focuses on providing the highest business services to our customers, stakeholders, and staff, including effective financial control, prompt and streamlined work processes, and reliable and timely financial information to support sound management decisions.

Among NSF achievements during the past year are the following:

- Maintaining "Green" ratings for both the Financial Performance and the Performance Improvement initiatives on the President's Management Agenda scorecard. NSF has successfully sustained a "Green" rating for Financial Performance since inception of the PMA scorecard in 2001.

On March 13, 2007, Thomas N. Cooley (*center*) received the Donald L. Scantlebury Memorial Award at the Federal Financial Management Conference. This award recognizes Cooley's leadership in agency and interagency financial management innovations. Presenting the award are Linda Springer, Director of the Office of Personnel Management, and David Walker, Comptroller General of the United States.



- Consistently receiving +99 percent of quarterly Federal Cash Transaction Reports (FCTR)—a collection rate that significantly exceeds that of other federal agencies. As part of the Federal Grants Streamlining Initiative, NSF has been working with the Office of Management and Budget (OMB) on a Federal Financial Report pilot to consolidate grant recipient financial reporting and replace the FCTR in FY 2008.
- Maintaining an active leadership role in the federal grants management arena including the CFO Council Grants Policy Committee and the Grants Management Line of Business Initiative. NSF is forging the integration of grants and financial management that should result in considerable cost and operations efficiencies. Similarly, NSF's participation in OMB's pilot for performance and accountability reporting, for which we prepared the *Annual Financial Report* and this *Performance Highlights* report, speaks to the Foundation's commitment to innovation—at both the frontier of science and engineering and at the management front.
- Receiving awards from two prestigious communications associations for excellence in annual reporting, for our annual *Performance Highlights* report. The Vision Award from the League of American Communications Professionals and the Blue Pencil Award from the National Association of Government Communicators (NAGC) reinforce our commitment to be accountable to our stakeholders and the public for sound stewardship of the public's resources.

Lastly, I wish to note that this year's unqualified audit opinion marks ten consecutive years of clean audit opinions for the Foundation. As the requirements in financial oversight and accountability have continually increased over the decade, this accomplishment reflects the dedication and diligence of a talented staff that I am proud to lead.

A handwritten signature in black ink that reads "Thomas N. Cooley". The signature is written in a cursive, flowing style.

Thomas N. Cooley  
January 2008



## GAZING DEEPER INTO SPACE



An NSF-funded astronomer helped develop this composite image of the supernova remnant W49B, which reveals a barrel-shaped nebula. One of the final events in the creation of this remnant would have been a gamma-ray burst, which occurs when a young massive star burns through its hydrogen core. When the pressure generated by this reaction diminishes, the pull of gravity forces the star's matter to collapse in on itself. For some extremely massive stars, the force of the collapse is strong enough to create a black hole and the energy is sufficient to power a massive explosion, resulting in an eruption of energy and light.

Occurring on the very edges of our universe, these stunning explosions create a powerful light source that allows astronomers to gaze deeper into space. Long-duration gamma-ray bursts last for just a few seconds, but the light is often strong enough to illuminate details in space previously unseen. Luminescence from gamma-ray bursts expands the possibilities for exploration, enabling researchers to collect information on everything between the burst and the telescope.

● For more information:

[www.nsf.gov/discoveries/disc\\_summ.jsp?cntn\\_id=110634&org=NSF](http://www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=110634&org=NSF)

## USING TRANSISTORS TO SENSE BIOMOLECULES

A unique sensor system could potentially detect the presence of heart disease from a drop of blood or detect the presence of chemicals used for explosives. By placing a molecule on a microcantilever, such as the protein streptavidin, that protein uniquely binds with a molecule in a specific environment. This binding causes surface stress that bends the microcantilever, which was traditionally measured using optics. With funding from NSF, researchers instead embedded transistors into the microcantilever. This alternative measuring technique affords more flexibility, such as the ability to perform high-resolution sensing in liquids or environments in which light scatters. They could also equip a chip with several cantilever-transistor pairs designed to sense different molecules, allowing sensing of the relative amounts of given molecules in an environment.

● For more information:

*NSF's FY 2007 Annual Financial Report*  
[www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf0802](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf0802)

## Financial Highlights

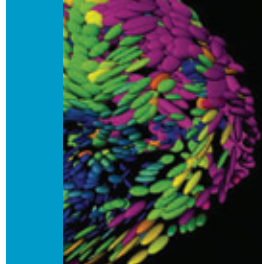
NSF's commitment to excellence, results-oriented management, and stewardship encompasses the agency's financial management arena. In FY 2007, NSF successfully maintained "Green" ratings in both the President's Management Agenda financial performance initiative and the Department of the Treasury's Financial Management scorecards. NSF also achieved top scores in the government-wide Chief Financial Officers Council's financial management metrics. With agency improper payments below the OMB reporting threshold for the past two consecutive years, NSF is now reporting on a three-year cycle, with the next report in FY 2009. However, the Foundation continues to improve operational designs to further minimize improper payments.

NSF has implemented the new Federal Financial Report (FFR) for grant recipients as an important first step to establishing a more streamlined, government-wide grantee financial reporting process. NSF is also participating in OMB's pilot program to improve performance and accountability reporting. Consistent with our leadership role in the CFO Council Grants Policy Committee and the Grants Management Line of Business initiative, NSF is pursuing an innovative integrated approach to the grants and financial management lines of business initiatives.

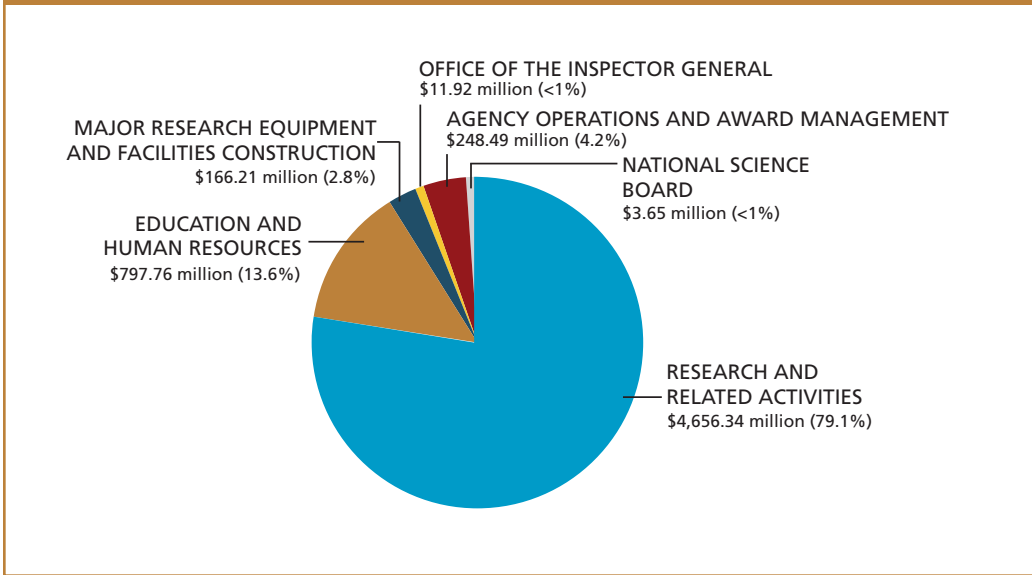
NSF is in its second year of a three-year implementation of a new internal control program developed in response to the recently updated guidelines issued by OMB in *Circular A-123: Management's Responsibility for Internal Control*. NSF's new internal control program identifies all agency business processes and the controls over those processes, assesses their risk, and tests the key controls in those processes. In FY 2007, NSF was in substantial compliance with financial management and systems requirements; however, the agency is reporting a qualified management assurance over internal control because of the planned scope limitation of the internal review of financial reporting. NSF expects to be in full compliance with OMB's financial reporting requirements by the end of FY 2008.

NSF prepares annual financial statements in conformity with generally accepted accounting principles of the United States and subjects them to an independent audit to ensure their reliability in assessing performance. In FY 2007, NSF received its tenth consecutive unqualified "clean" audit opinion. An unqualified audit opinion is a measure of the fair presentation of our financial statements. The Foundation prepares a Balance Sheet, Statement of Net Cost, Statement of Changes in Net Position, and Statement of Budgetary Resources. Supplementary information includes Stewardship Investments, Deferred Maintenance, and Budgetary Resources by Major Budget Accounts. The following pages feature highlights of NSF's FY 2007 financial condition. Stewardship Investments are shown on page 19. A detailed discussion of NSF's financial performance and a complete set of financial statements, accompanying notes, and the audit opinion can be found in NSF's *FY 2007 Annual Financial Report*.

NSF is funded primarily through six congressional appropriations. The *Research and Related Activities* (RRA) appropriation is NSF's largest, accounting for nearly 80 percent of the agency's budget. The RRA appropriation funds the best ideas and most promising people working at the frontiers of science and engineering in fundamental basic research, as well as high risk and transformational research to generate important discoveries and new technology that will enhance the nation's quality of life, competitiveness, and national security. The *Education and Human Resources* appropriation accounts for nearly 14 percent of NSF's budget and supports activities that ensure a diverse, competitive, and globally-engaged U.S. science, technology, engineering, and mathematics workforce as well as scientifically literate citizens. The *Major Research Equipment and Facilities Construction* appropriation supports the construction and procurement of unique national research platforms and major research equipment that enable



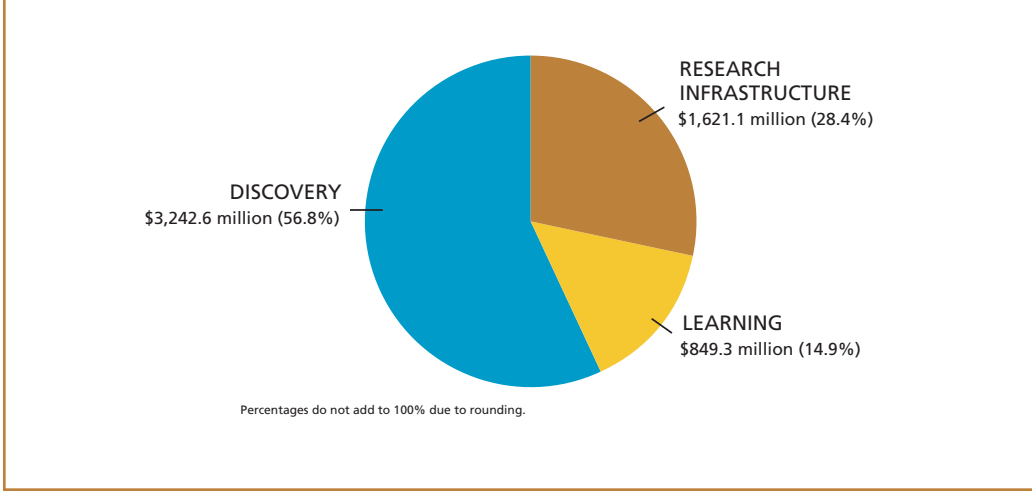
**FY 2007 Budget Obligations by Account (\$5,884.37 million)**



cutting-edge research. The *Agency Operations and Award Management* appropriation accounts for less than 5 percent of NSF’s total budget. Funding for the operation of the Office of Inspector General and for the National Science Board are each provided in a separate appropriation.

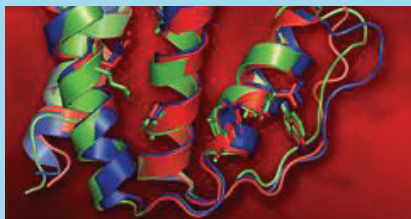
Shown in the chart below are the costs incurred in FY 2007 in support of NSF’s strategic outcome goals of *Discovery*, *Learning*, and *Research Infrastructure*. Costs incurred for indirect general operation activities—salaries, training, activities related to the advancement of NSF information technology, and the activities of the National Science Board and the Office of Inspector General—were allocated to the *Discovery*, *Learning*, and *Research Infrastructure* goals and account for about 5 percent of the total current year Net Cost of Operations. These administrative and management activities are the focus of the *Stewardship* strategic goal.

**FY 2007 Net Cost by Strategic Goal**



Certain financial data referred to on pages 17–19 were derived from NSF’s audited financial statements; however, such limited data have not been specifically audited as stand-alone information.

## DESIGNING NEW DRUGS



Proteins are the building blocks of the body, and biologists have learned that the myriad ways they function—from fighting off infection and building new bones to storing a memory—depend on the precise details of their three-dimensional shapes. But determining the shapes of proteins has been a slow and exacting process. To speed up this important science, researchers at the NSF-funded San Diego Supercomputer Center helped biologists from the University of Washington begin to harness the power of massive supercomputers. After working to adapt the computer code, they used a supercomputer to compute a protein structure in just 3 hours, a process that normally takes weeks. By dramatically accelerating scientific research, modern supercomputers are opening the door to medical advances such as rational drug design.

For more information:  
[www.sdsc.edu/discoveries/discoveries.html](http://www.sdsc.edu/discoveries/discoveries.html)

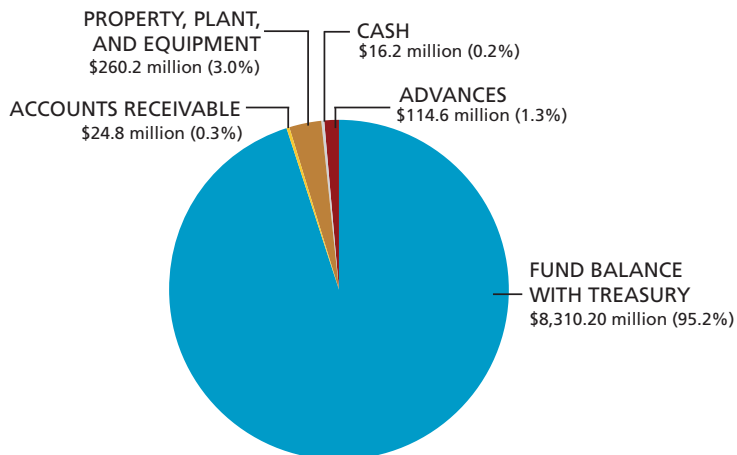
## OVERCOMING BARRIERS TO ACADEMIC ACHIEVEMENT



NSF-supported researchers have found that "stereotype vulnerability" impacts the performance of women and ethnic minorities in science, technology, engineering, and mathematics. It occurs when members of a group believe in negative stereotypes about their abilities, thereby lowering performance. New research identifies situations that give rise to stereotype vulnerability, the factors that moderate it, and its consequences for achievement. When stereotype vulnerability is removed, performance is no longer impaired, and women and ethnic minorities perform at rates comparable to men and majority members. Research on stereotype vulnerability has led to important interventions that have raised the achievement and test scores of low performing women and minority students.

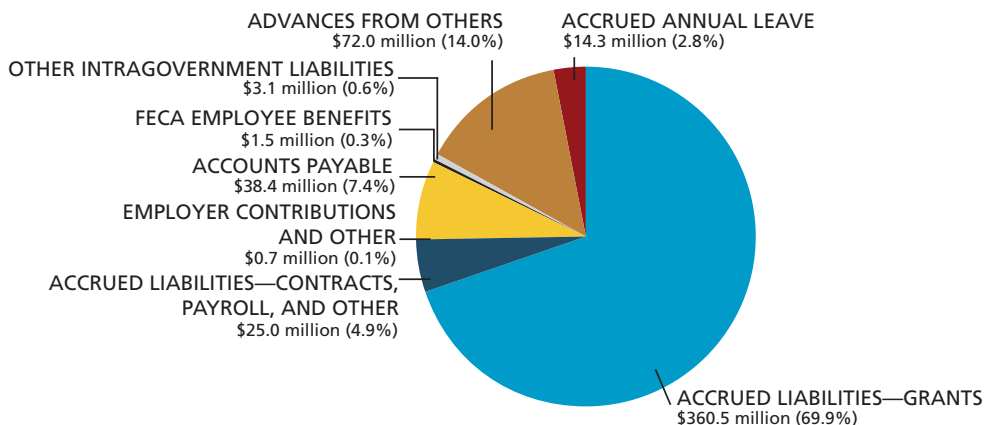
For more information:  
[www.nsf.gov/news/mmg/mmg\\_disp.cfm?med\\_id=59988&from=mmg](http://www.nsf.gov/news/mmg/mmg_disp.cfm?med_id=59988&from=mmg)

### FY 2007 Assets



Three line items—*Fund Balance with Treasury*; *Property, Plant, and Equipment*; and *Advances*—represent 99 percent of NSF's current year assets. *Fund Balance with Treasury* is funding available through the Department of Treasury accounts from which NSF is authorized to make expenditures and pay amounts due. *Property, Plant, and Equipment* comprises capitalized property located at NSF headquarters and NSF-owned property in New Zealand and Antarctica that supports the U.S. Antarctic Program. *Advances* are funds advanced to NSF grantees, contractors, and other government agencies.

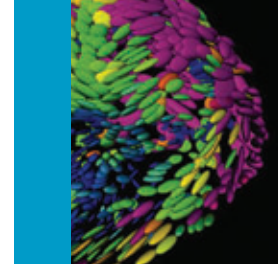
### FY 2007 Liabilities



Three line items—*Accounts Payable*, *Accrued Liabilities—Grants*, and *Advances from Others*—represent 91 percent of NSF's current year liabilities. *Accounts Payable* includes liabilities to NSF vendors for unpaid goods and services received. *Accrued Liabilities—Grants* are amounts recorded for NSF's grants for which grantees have incurred costs but have not submitted their Federal Cash Transaction Reports (FCTR). *Advances from Others* represents payments received in advance from other federal agencies through interagency agreements for services that have not been performed.

### Changes in Financial Position in FY 2007 (amounts in thousands)

Net Financial Condition	FY 2007	FY 2006	Increase/ (Decrease)	% Change
Assets	\$8,726,006	\$8,247,611	\$478,395	6%
Liabilities	\$515,430	\$441,720	\$73,710	17%
Net Position	\$8,210,576	\$7,805,891	\$404,685	5%
Net Cost	\$5,636,129	\$5,595,761	\$40,368	1%



## Stewardship Investments: Research and Human Capital (amounts in thousands) (unaudited)

	FY 2007	FY 2006	FY 2005	FY 2004	FY 2003
<b>RESEARCH AND HUMAN CAPITAL ACTIVITIES</b>					
Basic Research	4,195,444	3,682,266	3,564,093	3,494,302	3,519,159
Applied Research	432,820	339,757	291,169	209,225	218,152
Education and Training	808,642	1,378,472	1,386,952	1,224,058	867,489
Non-Investing Activities	275,993	321,085	292,426	268,298	196,363
<b>Total Research and Human Capital Activities</b>	<b>\$ 5,712,899</b>	<b>\$ 5,721,580</b>	<b>\$ 5,534,640</b>	<b>\$ 5,195,883</b>	<b>\$ 4,801,163</b>
<b>INPUTS AND OUTPUTS</b>					
<b>Research and Human Capital Activities</b>					
<u>Investments in:</u>					
Universities	4,016,101	3,994,682	3,970,851	3,705,751	3,310,365
Industry	208,696	199,523	223,563	196,260	178,000
Federal Agencies	203,759	221,002	143,316	107,212	144,792
Small Business	220,602	218,334	193,199	200,995	186,400
Federally Funded R&D Centers	335,731	299,802	278,542	269,968	285,329
Non-Profit Organizations	421,775	428,648	418,209	374,838	360,654
Other	306,235	359,589	306,960	340,859	335,623
	<b>\$ 5,712,899</b>	<b>\$ 5,721,580</b>	<b>\$ 5,534,640</b>	<b>\$ 5,195,883</b>	<b>\$ 4,801,163</b>
<u>Support to:</u>					
Scientists	496,431	473,457	454,053	477,970	427,304
Postdoctoral Programs	163,896	158,528	162,132	175,680	163,239
Graduate Students	585,308	544,513	538,233	546,084	475,315
	<b>\$ 1,245,635</b>	<b>\$ 1,176,498</b>	<b>\$ 1,154,418</b>	<b>\$ 1,199,734</b>	<b>\$ 1,065,858</b>
<b>Outputs</b>					
<u>Number of:</u>					
Award Actions	23,000	22,000	22,000	23,000	23,000
Senior Researchers	41,000	32,000	32,000	31,000	30,000
Other Professionals	13,000	11,000	12,000	15,000	12,000
Postdoctoral Associates	6,000	5,000	6,000	6,000	6,000
Graduate Students	35,000	26,000	27,000	29,000	27,000
Undergraduate Students	23,000	27,000	33,000	35,000	32,000
K-12 Students	11,000	8,000	11,000	14,000	14,000
K-12 Teachers	61,000	59,000	74,000	86,000	85,000

NSF's mission is to support basic scientific research and research fundamental to the engineering process as well as science and engineering education programs. NSF's Stewardship Investments fall principally into the categories of Research and Human Capital. For expenses incurred under the Research category, the majority of NSF funding is devoted to basic research, with a relatively small share going to applied research. This funding supports both the conduct of research and the necessary supporting infrastructure, including state-of-the-art instrumentation, equipment, computing resources, and multi-user facilities such as digital libraries, observatories, and research vessels and aircraft. Basic and applied research expenses are determined by prorating the program costs of NSF's strategic goals Research Infrastructure and Discovery reported on the Statement of Net Cost. The proration uses the basic and applied research percentages of total estimated research and development obligations reported in the current year Budget Request to OMB. The actual numbers are not available until later in the following fiscal year. Education and training costs equate to NSF's third strategic goal, Learning, and the costs related to non-investing activities reflect the fourth strategic goal, Stewardship.

The data provided for Scientists, Postdoctoral Associates, and Graduate Students are obtained from NSF's proposal system and information reported by each Principal Investigator. The number of award actions are actual values from NSF's Enterprise Information System (EIS). The remaining outputs and outcomes are estimates obtained annually from the NSF Directorates. They are reported in the annual Budget Request to OMB.

NSF's Human Capital investments focus principally on education and training, toward a goal of creating a diverse, internationally competitive, and globally engaged workforce of scientists and engineers and well-informed citizens. NSF supports activities to improve formal and informal science, mathematics, engineering, and technology education at all levels, as well as public science literacy projects that engage people of all ages in life-long learning. The incremental decrease in the net costs of Research and Human Capital activities reflects a decrease in education and training activities. The increase in support to scientists, postdoctoral programs, and graduate students and the increase in the number of people directly involved in NSF-supported activities reflect primarily increased funding for basic and applied research.

### STEWARDSHIP INVESTMENTS

Information about stewardship investments is from NSF's FY 2007 Stewardship Investments statement. It can be found in the Required Supplementary Stewardship Information section of NSF's *FY 2007 Annual Financial Report*.

Certain financial data referred to on pages 17-19 were derived from NSF's audited financial statements; however, such limited data have not been specifically audited as stand-alone information.



**Right:** Recent climate warming and land use changes may be altering atmospheric dustiness over the Antarctic Peninsula and nearby oceans. While past studies of antarctic ice cores have linked high levels of atmospheric dust with large decreases in global air temperature at the end of the last ice age, there are few reliable records from recent decades and centuries, when natural processes and human activities have altered climate and the landscape. In a landmark study funded in part by NSF, scientists at the Desert Research Institute measured total aluminum in a 120 meter long ice core obtained from James Ross Island at the northern tip of the Antarctic Peninsula. The highly detailed record of soil dust spans the period 1832 to 1991 and shows that dust deposited from the air more than doubled during the 20th century. This increase closely paralleled measured air temperature increases of approximately 1°C in the Southern Hemisphere and southern South America over the same period, with high dust levels in the Antarctic Peninsula corresponding to warm and dry conditions during spring and summer in Patagonia and southern South America.

For more information:

[www.nsf.gov/news/news\\_summ.jsp?cntn\\_id=110330&org=NSF&from=newsField](http://www.nsf.gov/news/news_summ.jsp?cntn_id=110330&org=NSF&from=newsField)

For more information:

Office of the Director  
[www.nsf.gov/od/index.jsp](http://www.nsf.gov/od/index.jsp)  
National Science Board  
[www.nsf.gov/nsb/](http://www.nsf.gov/nsb/)

## APPENDIXES

### Appendix 1: DESCRIPTION OF NSF DIRECTORATES AND MANAGEMENT OFFICES

The **Directorate for Biological Sciences (BIO)** provides support for research to advance understanding of the underlying principles and mechanisms governing life. Research studies range across progressively more complex systems and scales encompassing the structure and dynamics of biological molecules, cells, tissues, organs, organisms, populations, communities, and ecosystems up to and including the global biosphere. Comprehensive concepts that span and unify the diverse areas of biology include complexity, robustness, communication, resilience, adaptability, and cooperation. Achieving a coherent understanding of the complex biological web of interactions that is life is a major challenge of the future. Meeting this challenge will require that knowledge about individual biological units, networks, sub-systems, and systems be compiled and connected from the molecular to the global level and across scales of time and space. Integral to all BIO activities is support for a broad range of research resources and a commitment to integrate research and education, to broaden participation, and to promote international partnerships. For more information, go to [www.nsf.gov/dir/index.jsp?dir=BIO](http://www.nsf.gov/dir/index.jsp?dir=BIO).

The **Directorate for Computer and Information Science and Engineering (CISE)** supports research in all areas of computer and information science and engineering, helps develop and maintain cutting-edge national computing and information infrastructure for research and education, and contributes to the education and training of the next generation of computer scientists and

engineers. CISE supports projects designed to establish the scientific foundations of computing and communication devices and to explore their usage. For example, CISE funds advances in computing and communication theory, algorithms for computer and computational sciences, architecture and design of computers and software, and revolutionary computing paradigms based on emerging scientific ideas. At the systems level, CISE supports projects to better understand the fundamental properties of computer and network systems and to create better abstractions and tools for designing, building, analyzing, and measuring future systems. CISE programs also support advances in our understanding of the effective integration and co-evolution of social and computing systems; the capabilities of human beings and computing machines to create, discover, and reason with knowledge; the application of information technology to science and engineering problems; and the potential of computational systems to perform tasks autonomously, robustly, and flexibly. For more information, go to [www.nsf.gov/dir/index.jsp?dir=CISE](http://www.nsf.gov/dir/index.jsp?dir=CISE).

The **Directorate for Education and Human Resources (EHR)** supports activities that promote excellence in U.S. science, technology, engineering, and mathematics (STEM) education at all levels and in all settings, both formal and informal. The goal of these activities is to develop a diverse and well-prepared workforce of scientists, technicians, engineers, mathematicians, and educators, as well as a well-informed citizenry

with access to the ideas and tools of science and engineering. EHR supports education research and infrastructure development in all science and engineering disciplines. Support is provided for individuals to pursue advanced study, for institutions to build their capacity to provide excellent STEM education, and for collaborations to strengthen STEM education at all levels by fostering alliances and partnerships among colleges, universities, school districts, and other institutions in the public and private sectors. For more information, go to [www.nsf.gov/dir/index.jsp?dir=EHR](http://www.nsf.gov/dir/index.jsp?dir=EHR).

The **Directorate for Engineering (ENG)** supports research and education activities that provide a foundation for our nation's global leadership in technology and innovation. This leadership is the key to our continued economic growth and national security. ENG investments include such emerging technologies as sensors and sensor systems, molecular electronics, photonics, cyberinfrastructure, metabolic engineering, bioengineering, manufacturing innovation, and nanotechnology. Fundamental engineering research has a profound impact on areas such as protecting the environment, improving human health, enabling science to better understand the natural world, and enhancing our standard of living. For more information, go to [www.nsf.gov/dir/index.jsp?dir=ENG](http://www.nsf.gov/dir/index.jsp?dir=ENG).

The **Directorate for Geosciences (GEO)** supports research in the atmospheric, earth, and ocean sciences. Basic research in the geosciences advances our scientific knowledge of the Earth and advances our ability to predict natural phenomena of economic and human significance, such as climate change, weather, earthquakes, fish-stock fluctuations, and disruptive events in the solar-terrestrial environment. GEO also supports the operation of national user facilities. For more information, go to [www.nsf.gov/dir/index.jsp?dir=GEO](http://www.nsf.gov/dir/index.jsp?dir=GEO).

The **Directorate for Mathematical and Physical Sciences (MPS)** supports research and education in astronomical sciences, chemistry, materials research, mathematical sciences, and physics. Major equipment and instrumentation such as telescopes and particle accelerators are provided to support the needs of individual investigators. MPS also supports state-of-the-art facilities that enable research at the cutting edge of science and research opportunities in totally new directions. For more information, go to [www.nsf.gov/dir/index.jsp?dir=MPS](http://www.nsf.gov/dir/index.jsp?dir=MPS).

The **Directorate for Social, Behavioral, and Economic Sciences (SBE)** supports research and education to build fundamental scientific knowledge about human cognition, language, social behavior, and culture and on economic, legal, political, and social systems, organizations,

and institutions. To improve understanding of the science and engineering enterprise, SBE also supports science resources studies that are the nation's primary source of data on the science and engineering enterprise. For more information, go to [www.nsf.gov/dir/index.jsp?dir=SBE](http://www.nsf.gov/dir/index.jsp?dir=SBE).

The **Office of Cyberinfrastructure (OCI)** coordinates and supports the acquisition, development, and provision of state-of-the-art cyberinfrastructure resources, tools, and services essential to the conduct of 21st century science and engineering research and education. OCI supports cyberinfrastructure, such as supercomputers, high-capacity mass-storage systems, system software suites and programming environments, scalable interactive visualization tools, productivity software libraries and tools, large-scale data repositories and digitized scientific data management systems, networks of various reach and granularity, and an array of software tools and services that hide the complexities and heterogeneity of contemporary cyberinfrastructure while providing broad access and enhanced usability. OCI supports the preparation and training of current and future generations of researchers and educators to use cyberinfrastructure to further their research and education goals, while also supporting the scientific and engineering professionals who create and maintain these IT-based resources and systems and who provide essential customer services to the national science and engineering user community. For more information, go to [www.nsf.gov/dir/index.jsp?org=OCI](http://www.nsf.gov/dir/index.jsp?org=OCI).

The **Office of Polar Programs (OPP)**, which includes the U.S. Polar Research Programs and U.S. Antarctic Logistical Support Activities, supports multidisciplinary research in the Arctic and Antarctic regions. These geographic frontiers—premier natural laboratories—are the areas predicted to be the first affected by global change. They are vital to understanding past, present, and future responses of Earth systems to natural and man-made changes. OPP support provides unique research opportunities ranging from studies of Earth's ice and oceans to research in atmospheric sciences and astronomy. For more information, go to [www.nsf.gov/dir/index.jsp?org=OPP](http://www.nsf.gov/dir/index.jsp?org=OPP).

The **Office of International Science and Engineering (OISE)** serves as the focal point, both within and outside NSF, for international science and engineering activities. OISE promotes the development of an integrated, Foundation-wide international strategy and manages international programs that are innovative, catalytic, and responsive to a broad range of NSF interests. OISE also supports programs that provide international research experiences to students and young investigators, preparing them for full participation in the global research enterprise. In

## BRAIN SURGERY



NSF-funded computer scientists at the College of William and Mary have developed a dynamic computer model of the brain to guide neurosurgeons during surgery. The three-dimensional model takes into account multiple factors, such as gravity and atmospheric pressure, that cause the brain to change shape and position.

NSF grantee and Guggenheim Fellow Nikos Chrisochoides approximates the geometry of the patient's brain by tessellating it into triangles in three dimensions, in other words, generating a mesh representing the brain. The model will help surgeons to make informed decisions about what to cut, where the critical paths are, and what areas to avoid.

For more information:

[www.nsf.gov/discoveries/disc\\_summ.jsp?cntn\\_id=110646&org=NSF](http://www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=110646&org=NSF)

## REAL-TIME WEATHER FORECASTING

Tornados, floods, and other severe regional storms cause hundreds of deaths annually across the United States, disrupting transportation and commerce and causing economic loss exceeding \$13 billion. These losses may be reduced through the deployment of software infrastructure that can trigger weather forecast models in response to developing weather. By mining streams of weather data, the software can "see" a storm while it is still in its early development stages and automatically launch a weather forecast. The data from the forecast are then available for visualization and further analysis from the Linked Environments for Atmospheric Discovery (LEAD) portal. LEAD makes meteorological data, forecast models, and analysis and visualization tools widely available and also provides the first searchable index of all national research weather data. This project, which demonstrates how the power of computing can help address problems of critical national importance, represents a paradigm shift for severe weather prediction and analysis, involving a multidisciplinary team of world class atmospheric and computer scientists.

For more information:

<https://portal.leadproject.org/gridsphere/gridsphere>

addition, OISE manages cooperative relationships with partner countries around the world and with international scientific organizations on behalf of NSF. For more information, go to [www.nsf.gov/div/index.jsp?div=OISE](http://www.nsf.gov/div/index.jsp?div=OISE).

The **Office of Budget, Finance, and Award Management (BFA)** is headed by the Chief Financial Officer, who has responsibility for budget, financial management, grants administration and procurement operations, and related policy. Budget responsibilities include the development of the Foundation's annual budget, long-range planning, and budget operations and control. BFA's financial, grants, and other administrative management systems ensure that the Foundation's resources are well managed and that efficient, streamlined business and management practices are in place. For more information, go to [www.nsf.gov/bfa/](http://www.nsf.gov/bfa/).

The **Office of Information and Resource Management (OIRM)** provides human capital management, information technology solutions, continuous learning opportunities, and general administrative services to the NSF community of scientists, engineers, and educators. OIRM also provides logistical support functions for NSF staff as well as the general public. It is responsible for recruiting, staffing, and other human resource service requirements for all NSF staff and visiting personnel. OIRM is responsible for the management of NSF's physical infrastructure and conference facilities, the administration of its sophisticated technology infrastructure, and the dissemination of information about NSF programs to the external community through the agency's website. It is also responsible for delivery of the hardware, software, and support systems necessary to manage the Foundation's grant-making process and to maintain advanced financial and accounting systems. For more information, go to [www.nsf.gov/oirm/](http://www.nsf.gov/oirm/).

## Appendix 2: EXECUTIVE STAFF AND OFFICERS

### NSF Executive Staff

#### Office of the Director

Arden L. Bement, Jr., Director

#### Office of the Deputy Director

Kathie L. Olsen, Deputy Director

#### National Science Board

Steven C. Beering, Chair

Kathryn D. Sullivan, Vice Chair

#### Directorate for Biological Sciences

James Collins, Assistant Director

#### Directorate for Computer and Information Science and Engineering

Jeannette M. Wing, Assistant Director

#### Directorate for Education and Human Resources

Cora Marrett, Assistant Director

#### Directorate for Engineering

Richard Buckius, Assistant Director

#### Directorate for Geosciences

Jarvis Moyers, Assistant Director

#### Directorate for Mathematical and Physical Sciences

Tony F. Chan, Assistant Director

#### Directorate for Social, Behavioral, and Economic Sciences

David W. Lightfoot, Assistant Director

#### Office of Cyberinfrastructure

Daniel E. Atkins, Director

#### Office of International Science and Engineering

Thomas Weber, Director

#### Office of Polar Programs

Karl A. Erb, Director

#### Office of Equal Opportunity Programs

Ronald D. Branch, Director

#### Office of the General Counsel

Lawrence Rudolph, General Counsel

#### Office of Inspector General

Christine C. Boesz, Inspector General

#### Office of Integrative Activities

Nathaniel G. Pitts, Director

#### Office of Legislative and Public Affairs

Jeff Nesbit, Director

#### Office of Budget, Finance, and Award Management

Thomas N. Cooley, Director

#### Office of Information and Resource Management

Anthony A. Arnolie, Director

### NSF Officers

#### Chief Financial Officer

Thomas N. Cooley (Office of Budget, Finance, and Award Management)

#### Chief Human Capital Officer

Anthony A. Arnolie (Office of Information and Resource Management)

#### Chief Information Officer/Chief Privacy Officer

George O. Strawn (Office of Information and Resource Management)

#### NSF Affirmative Action Officer

Consuelo Roberts (Office of Equal Opportunity Programs)

### Appendix 3: NATIONAL SCIENCE BOARD MEMBERS DURING FY 2007

**Steven C. Beering (Chair)**  
President Emeritus  
Purdue University

**Kathryn D. Sullivan (Vice Chair)**  
Director, Battelle Center for Mathematics and  
Science Education Policy  
John Glenn School of Public Affairs  
Ohio State University

**Mark R. Abbott**  
Dean and Professor  
College of Oceanic and Atmospheric Sciences  
Oregon State University

**Dan E. Arvizu**  
Director and Chief Executive  
National Renewable Energy Laboratory

**Barry C. Barish**  
Maxine and Ronald Linde Professor of  
Physics Emeritus and Director, LIGO Laboratory  
California Institute of Technology

**Camilla P. Benbow**  
Patricia and Rodes Hart Dean of Education and  
Human Development  
Peabody College of Education and Human  
Development  
Vanderbilt University

**Ray M. Bowen**  
President Emeritus  
Texas A&M University

**John T. Bruer**  
President  
The James S. McDonnell Foundation

**G. Wayne Clough**  
President  
Georgia Institute of Technology

**Kelvin K. Droegemeier**  
Associate Vice President for Research and  
Regents' Professor of Meteorology and  
Weathernews Chair  
University of Oklahoma

**Kenneth M. Ford**  
Director and Chief Executive Officer  
Institute for Human and Machine Cognition

**Patricia D. Galloway**  
Chief Executive Officer  
The Nielsen-Wurster Group, Inc.

**José-Marie Griffiths**  
Dean, School of Information and Library Science  
University of North Carolina

**Daniel E. Hastings**  
Dean for Undergraduate Education and  
Professor, Aeronautics & Astronautics and  
Engineering Systems  
Massachusetts Institute of Technology

**Karl Hess**  
Professor of Advanced Study Emeritus and  
Swanlund Chair  
University of Illinois

**Elizabeth Hoffman**  
Executive Vice President and Provost  
Iowa State University

**Louis J. Lanzerotti**  
Distinguished Research Professor of Physics  
Center for Solar-Terrestrial Research  
New Jersey Institute of Technology

**Alan I. Leshner**  
Chief Executive Officer and Executive Publisher,  
*Science*  
American Association for the Advancement of  
Science

**Douglas D. Randall**  
Professor and Thomas Jefferson Fellow and  
Director, Interdisciplinary Plant Group  
University of Missouri-Columbia

**Arthur K. Reilly**  
Senior Director, Strategic Technology Policy  
Cisco Systems, Inc.

**Jon C. Strauss**  
President Emeritus  
Harvey Mudd College

**Thomas N. Taylor**  
Roy A. Roberts Distinguished Professor  
Department of Ecology and Evolutionary  
Biology and Curator of Paleobotany in the  
Natural History Museum and Biodiversity  
Research Center  
University of Kansas

**Richard F. Thompson**  
Keck Professor of Psychology and  
Biological Sciences  
University of Southern California

**Jo Anne Vasquez**  
Director of Professional Development,  
Policy, and Outreach  
Center for Research on Education in Science,  
Mathematics, Engineering, and Technology  
Arizona State University

**Arden L. Bement, Jr., (Member *ex officio*)**  
Director  
National Science Foundation

**Michael P. Crosby**  
Executive Officer and Office Director  
National Science Board





**Right:** A multinational team of researchers has detected low-energy solar neutrinos—subatomic particles produced in the core of the sun—and measured in real-time the rate the particles hit our planet. The researchers also obtained fresh evidence that neutrinos oscillate (transform from one state to another) before arriving at Earth, adding weight to present theories about the nature of neutrinos and the inner workings of the sun and other stars. These are the first results from the Borexino detector, shown here, an international collaboration comprised of more than 100 researchers, including NSF-supported investigators at Princeton University and Virginia Polytechnic Institute and State University. These scientists have operated the Borexino experiment in one of the deepest laboratories in the world, the Gran Sasso Laboratory of the Italian National Institute of Nuclear Physics (INFN). The 18-meter (59-foot) diameter Borexino detector lies more than a kilometer (almost a mile) underground. The depth blocks out cosmic rays and other radiation sources that could create additional background signals.

For more information:

[www.nsf.gov/news/news\\_summ.jsp?cntn\\_id=109893&org=NSF&from=news](http://www.nsf.gov/news/news_summ.jsp?cntn_id=109893&org=NSF&from=news)



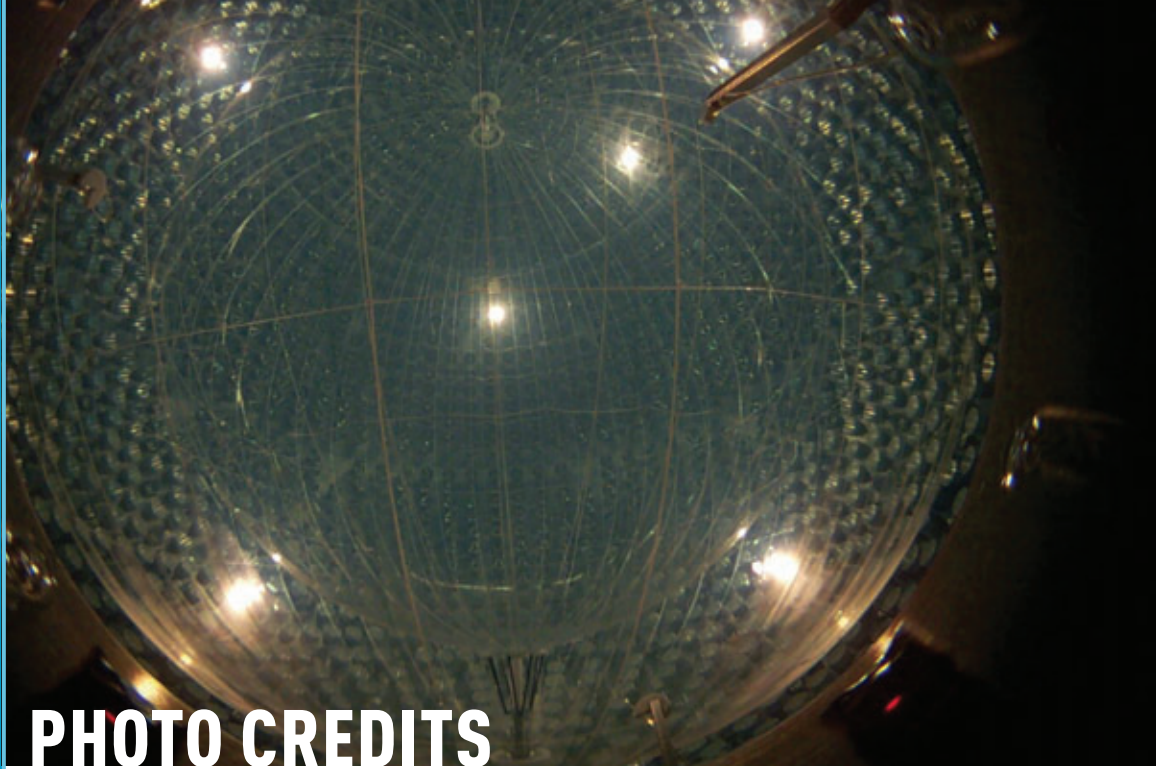
Page 1

Sierra Negra, an active volcano in the Galápagos Archipelago, displays remarkable behavior that discloses how magma fills up and is stored in shallow reservoirs in Earth's crust. A team of NSF-funded researchers used a network of Global Positioning System (GPS) monitors to measure the deflection of Earth's surface when magma becomes pressurized as it rises from great depths. Between 2002 and 2005, the top of the volcano—one of five volcanoes on Isabela Island—bulged almost a meter. When the volcano erupted in 2005, the GPS readings revealed that pressure beneath the surface began to build up again within 20 seconds of an eruption. The GPS measurements provide scientists with a greater understanding of volcanic activity and can help researchers better predict new eruptions, which, in turn, will lead to improved early warning systems. This project also demonstrates how international and national scientific partnerships add to the understanding of fundamental natural processes, while promoting the broader education of students in the United States and around the world.

Credit: Dennis Geist, University of Idaho

For more information:

[www.webpages.uidaho.edu/~dgeist/](http://www.webpages.uidaho.edu/~dgeist/)



## PHOTO CREDITS



Page 2

Credit: Cathy Morrison, Missouri Department of Transportation



Page 4

Credit: Cedar Creek Long-term Ecological Research Site



Page 6

Credit: Ginger Withers, Whitman College



Page 6

Credit: Victor Pushparaj, Rensselaer Polytechnic Institute



Page 8

Credit: Andrew Hanson, Indiana University



Page 10

Credit: John Stembridge, University of Michigan



Page 12

Credit: ARC COE for Coral Reef Studies



Page 14

Credit: Dr. Paul Thompson, University of California, Los Angeles, National Institute of Biomedical Imaging and Bioengineering



Page 16

Credit: X-ray: NASA/CXC/SSC/J. Keohane et al.; Infrared: Caltech/SSC/J. Rho and T. Jarrett



Page 18

Credit: R.C. Walker, San Diego Supercomputer Center, University of California, San Diego, and S. Raman, University of Washington



Page 18

Credit: Richard F. Voss and Heinz-Otto Peitgen



Page 20

Credit: NSF, Steven Profaizer



Page 22

Credit: Joseph McClain, College of William and Mary



Page 24

Credit: Italian National Institute of Nuclear Physics (INFN)

**For more information:**

NSF Web Site  
www.nsf.gov

NSF Research Highlights and Discoveries  
www.nsf.gov/discoveries/

NSF Investing in America's Future: Strategic Plan FY 2006-2011  
www.nsf.gov/publications/pub\_summ.jsp?ods\_key=nsf0648

NSF's FY 2009 Budget Request to Congress  
www.nsf.gov/about/budget/

NSF's FY 2007 Annual Financial Report  
www.nsf.gov/publications/pub\_summ.jsp?ods\_key=nsf0802

NSF Performance Assessment  
www.nsf.gov/about/performance/

Report of the FY 2007 Advisory Committee on GPRA Performance Assessment  
www.nsf.gov/publications/pub\_summ.jsp?ods\_key=nsf07207

Report to National Science Board on NSF's Merit Review Process, FY 2006  
www.nsf.gov/nsb/documents/2007/2006\_merit\_review.pdf

American Competitiveness Initiative  
www.whitehouse.gov/stateoftheunion/2006/acil/

America COMPETES Act  
www.whitehouse.gov/news/releases/2007/08/20070809-6.html

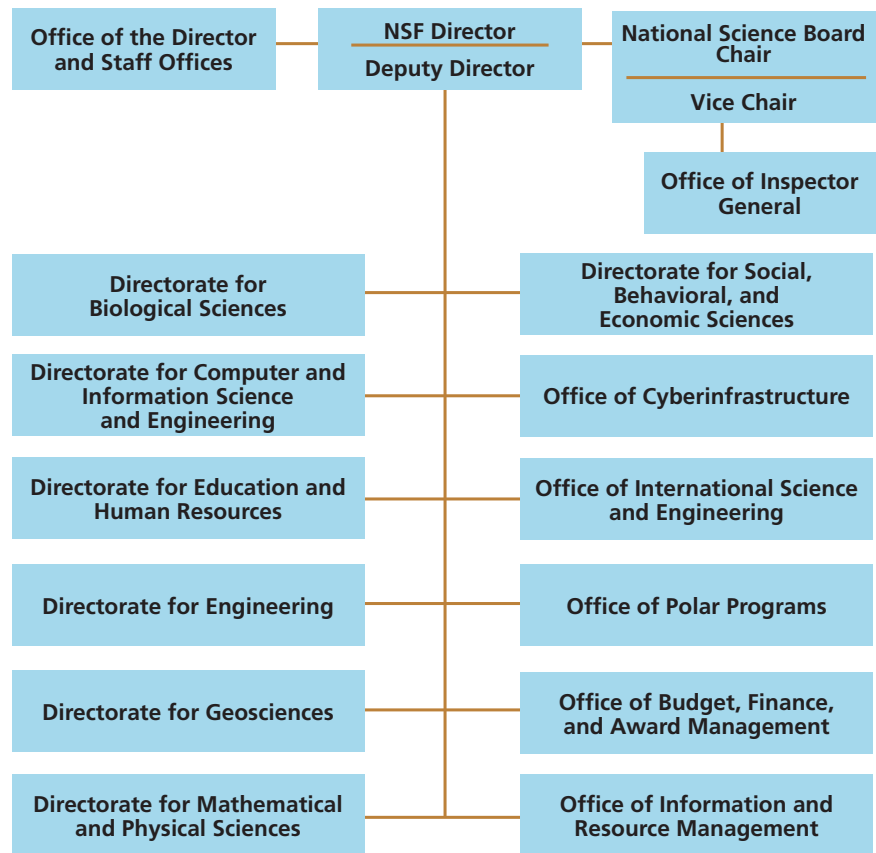
President's Management Agenda  
www.Results.gov

Performance Assessment Rating Tool (PART)  
www.ExpectMore.gov

OMB Circular A-123, Management's Responsibility for Internal Control  
www.whitehouse.gov/omb/circulars/a123/a123\_rev.pdf

e-Gov and the Grants Management Line of Business Initiative  
www.whitehouse.gov/omb/egov/c-6-3-grants.html

## FY 2007 Organization Chart



NSF is headed by a Director who is appointed by the President and confirmed by the Senate. A 24-member National Science Board, also appointed by the President with the consent of the Senate, meets about six times a year to establish the overall policies of the Foundation. The NSF workforce includes approximately 1,300 full-time staff. NSF regularly recruits visiting scientists, engineers, and educators who are leaders in their fields. Recruiting active researchers and educators to fill rotating assignments infuses new talent and expertise into NSF and is integral to the NSF's mission of supporting the entire spectrum of science and engineering research and education, particularly research at the frontier. In addition, NSF employs contractors who are engaged in commercial administrative activities.

To comment on or to request copies of this report, please send an e-mail to [Accountability@nsf.gov](mailto:Accountability@nsf.gov). This report is available at [www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf0803](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf0803).



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