

**OFFICE OF INTERNATIONAL SCIENCE AND ENGINEERING      \$40,610,000**

The FY 2007 Budget Request for the Office of International Science and Engineering (OISE) is \$40.61 million, an increase of \$6.09 million, or 17.6 percent, over the FY 2006 Current Plan of \$34.52 million.

**Office of International Science and Engineering Funding**

(Dollars in Millions)

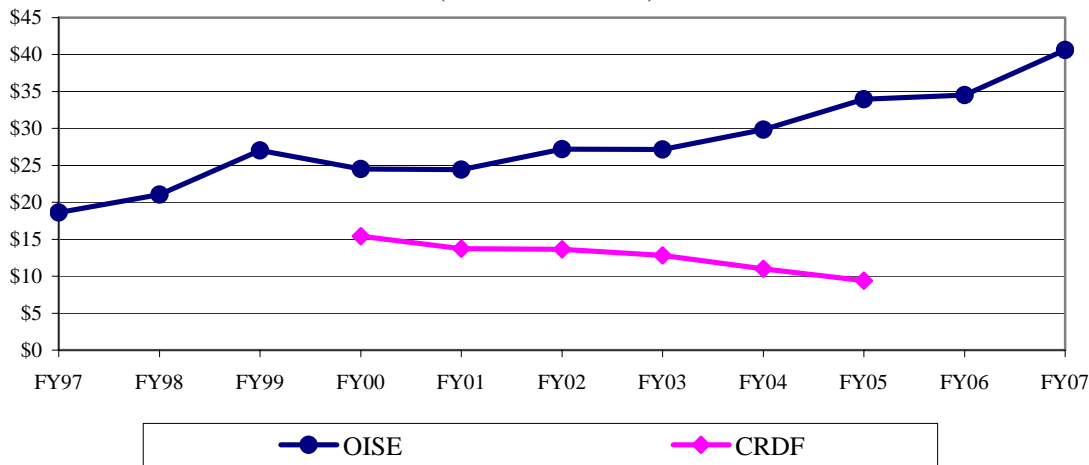
	FY 2005 Actual	FY 2006		Change over FY 2006	
		Current Plan	FY 2007 Request	Amount	Percent
OISE	33.96	34.52	40.61	6.09	17.6%
U.S. Department of State transfer	9.42	-	-	-	N/A
<b>Total, OISE</b>	<b>\$43.38</b>	<b>\$34.52</b>	<b>\$40.61</b>	<b>\$6.09</b>	<b>17.6%</b>

Department of State funds are for an award to the U.S. Civilian Research and Development Foundation.

The Office of International Science and Engineering serves as the focal point, both inside 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 and national interests. Recognizing that scientific discovery is a global enterprise, OISE supports U.S. scientists and engineers engaged in international research and education activities in all NSF-supported disciplines involving any region of the world. In keeping with the National Science Board’s call for NSF to make international science and engineering leadership a high priority and to strengthen the programmatic focus both in the core disciplines and in Foundation-wide activities, OISE was moved in October 2004 from the Directorate for Social, Behavioral and Economic Sciences to the Office of the Director.

**OISE Subactivity Funding**

(Dollars in Millions)



The bottom line shows additional funds provided by the U.S. Department of State for an award to the U.S. Civilian Research and Development Foundation (CRDF) in FY 2000 (\$15.40 million), FY 2001 (\$13.75 million), FY 2002 (\$13.66 million), FY 2003 (\$12.83 million), FY 2004 (\$10.99 million), and FY 2005 (\$9.42 million).

## RELEVANCE

Science and engineering are international enterprises critical to American competitiveness and security. Bold exploration at the frontiers of science and engineering increasingly requires international partnerships. NSF – as the Nation’s principal source of support to U.S. universities for fundamental science, mathematics, and engineering research and education – plays a unique role in leading the worldwide efforts of the U.S. science, engineering, and education communities.

OISE programs and activities are designed to complement and enhance the Foundation’s broad research and education portfolio and to overcome barriers involved in international collaboration. America’s next generation of scientists and engineers must be able to work effectively in the global arena and marketplace. OISE supports programs that enable students and researchers to experience and engage in international research and educational activities across such areas as cyberinfrastructure, complex biological systems, natural hazards prediction and mitigation, nanotechnology, water resources, and math and science education. The Office carries out its functions by working closely with the other NSF directorates and offices as well as through its own programs. Additionally, OISE manages NSF’s offices in Beijing, Paris, and Tokyo that report on and analyze in-country and regional science and technology developments and policies, promote greater collaboration between U.S. and foreign scientists and engineers, liaise with foreign counterpart agencies and research institutes, and facilitate coordination and implementation of NSF research and education programs.

*Summary of OISE-wide Investments*

*(Dollars in Millions)*

**FY 2006 Current Plan, OISE.....\$34.52**

Partnerships for International Research and Education +\$7.00

In FY 2005 OISE launched a pilot program called *Partnerships for International Research and Education (PIRE)*. This program funds innovative, international collaborative projects that link U.S. institutions and researchers at all career levels with top international collaborators to work at the most promising frontiers of new knowledge. With a limit of one submission per Ph.D.-granting U.S. university, roughly half of the 380 eligible institutions submitted proposals. Given the increasing importance of access to the best researchers and facilities around the world for the U.S. scientific and engineering community, OISE will build on the pilot program by soliciting in FY 2007 a new round of Partnership proposals. OISE will fund approximately 14 new Partnership awards representing an investment of \$7.0 million per year for five years. OISE's total FY 2007 budget for PIRE (including continuing grants from the FY 2005 competition and new FY 2007 awards) will be \$9.20 million.

International Research Experiences for Students +\$1.00

A well-trained technical workforce is vital to maintaining U.S. innovation leadership and economic prosperity. To further enable U.S. undergraduate and graduate students to develop hands-on research skills in a global setting, OISE will invest in FY 2007 a total of \$2.0 million in its program *International Research Experiences for Students* – an increase of \$1.0 million over the FY 2006 Current Plan.

Other Disciplinary and Interdisciplinary Research -\$1.91

This reduction offsets OISE’s enhanced investment in the Partnerships for International Research and Education program. This decrease in funding will result in fewer

workshops, planning visits, and co-funding of activities with other NSF directorates and offices.

Subtotal, Changes +\$6.09

**FY 2007 Request, OISE.....\$40.61**

**OISE Priorities for FY 2007**

During the past several years, OISE has implemented changes to define more clearly its programmatic priorities, to better link OISE to overall NSF goals, and to move toward larger, more innovative, and more competitive awards. OISE’s key programmatic themes for FY 2007 are:

- Promoting research excellence through international collaboration; and
- Providing U.S. students, postdoctoral researchers, and junior faculty with international research and education experiences.

These themes reflect the fact that the process of discovery and the scientific/engineering workforce are increasingly global. The United States needs to engage actively in the global research community through collaborative research and must ensure that its young scientists and engineers are capable of operating in an international research environment and a global market.

The OISE portfolio, which is made up of awards to U.S. researchers and institutions, reflects programs managed by OISE and investments made in partnership with other NSF directorates and offices. In general, 55 percent of OISE’s programmatic budget is available for new awards and activities. The remaining 45 percent funds awards made in previous years.

Specific emphases in FY 2007 are to:

- Continue major investments to promote research excellence through international collaboration. As noted above, OISE will launch a second program solicitation for the **Partnerships for International Research and Education**. In addition, OISE will fund the third year of the five-year pilot Partnerships program. OISE will partner with other NSF research directorates and offices and foreign research organizations to catalyze polar research in support of the **International Polar Year**. OISE will also invest in **cyberinfrastructure** research in order to enable U.S. scientists and engineers to benefit from leading experts, facilities, and data around the world. Other OISE investments to advance research excellence include: supporting workshops and planning visits to explore and develop collaborations; and co-funding and supplemental funding to highly competitive NSF awards that involve international work.
- Support **international research and education experiences** for U.S. early-career researchers, students, and teachers. This includes: the East Asia and Pacific Summer Institutes for U.S. Graduate Students (EAPSI); the International Research Fellowship Program for postdoctoral researchers; funding for undergraduate and graduate students, postdoctoral researchers, and early-career faculty to engage in international collaborative activities; and opportunities for K-12 students and teachers. For EAPSI, New Zealand will be added as a partner, in addition to existing partnerships with Australia, China, Japan, Korea, and Taiwan.

- Promote increasing America’s science and engineering talent pool by **broadening participation** of women and underrepresented groups in NSF-supported international research and education activities, and of K-12 students and teachers participating in science and engineering activities that have an international dimension.
- Provide U.S. Government support to key **multilateral organizations**, thereby enabling U.S. scientists to participate in these global efforts. Multilateral groups expected to be funded include the Human Frontier Science Program, Global Biodiversity Information Facility, International Council of Science, and International Institute for Applied Systems Analysis.
- Continue efforts to develop greater collaboration with **developing countries**.

### NSF-WIDE INVESTMENTS

In FY 2007, OISE will support research and education efforts related to broad, Foundation-wide investments in a number of areas, including NSF’s multidisciplinary priority areas and the Administration’s interagency R&D priorities.

These investments are based on a highly-focused and strategic framework that simultaneously strengthens core research, enhances interdisciplinary collaborations, promotes the integration of research and education, and collectively benefits the U.S. economy and citizenry. Within OISE, funding will support/contribute to ensuring that U.S. research and education objectives in these important areas benefit from international collaboration. OISE investments focus on innovative, catalytic initiatives, with the understanding that U.S. researchers with established international collaborations will seek funding directly from other NSF directorates/offices. Seeking to be responsive to broad NSF interests, recent OISE investments have supported all NSF-wide investment areas. For all of these, OISE investments support planning visits, workshops, principal-investigator-led collaborative research, international research experiences for U.S. students and postdoctoral researchers, and other catalytic activities.

### Office of International Science and Engineering NSF-wide Investments

(Dollars in Millions)

	FY 2005 Actual	FY 2006		Change over FY 2006	
		Current Plan	FY 2007 Request	Amount	Percent
Biocomplexity in the Environment	\$0.71	\$0.25	\$0.13	-\$0.12	-48.0%
Cyberinfrastructure	0.22	1.00	1.05	0.05	5.0%
Human and Social Dynamics	0.06	0.50	0.50	-	-
International Polar Year	-	-	0.30	0.30	N/A
Mathematical Sciences	0.32	-	-	-	N/A
National Nanotechnology Initiative	0.72	-	-	-	N/A
Networking and Information Technology R&D	0.38	-	-	-	N/A

- Support to Biocomplexity in the Environment will be reduced from \$250,000 to \$130,000.
- OISE will coordinate with directorates and offices across the Foundation to ensure that the international dimensions of **Cyberinfrastructure** are highlighted and developed, and invest \$1.05 million for international collaboration in cyberinfrastructure research and education activities.
- OISE will maintain its funding level of \$500,000 for **Human and Social Dynamics** research where the potential for international collaboration is rapidly expanding.
- OISE will work closely with the Office of Polar Programs and participating directorates to ensure effective international partnering for research and education activities related to the **International Polar Year** (IPY) and will invest \$300,000 for IPY-related programs.
- For **Mathematical Sciences**, OISE will support the initiation/development phases of international collaborations in this priority area if meritorious proposals are received.
- The opportunities and benefits of international collaboration in the areas of **National Nanotechnology** and **Networking and Information Technology Research and Development** have been targeted in the past. OISE support to catalyze new international collaborations in these areas will be considered on the basis of proposals received.

## QUALITY

OISE maximizes the quality of research and education activities it supports through the use of a competitive, merit-based review process. Within the existing portfolio, the percentage of funds allocated to projects that undergo merit review was 50 percent in FY 2005 and is estimated at 50 percent in FY 2006 and 60 percent in FY 2007. The majority of projects that did not undergo external review were supplements that added an international dimension to projects already reviewed and funded in NSF disciplinary programs.

To ensure the highest quality in processing and recommending proposals for awards, a Committee of Visitors composed of external experts reviewed OISE in FY 2005 and affirmed the high quality of funded projects, of OISE's program portfolio management, and of OISE's unique enabling role within NSF regarding international activities and issues. These experts assess the integrity and efficiency of proposal review processes and provide a retrospective assessment of the quality of results of OISE's investments.

Additionally, the Advisory Committee for International Science and Engineering, composed of members representing the U.S. research and education community across disciplines, was established in June 2005. The Committee meets twice a year and advises the Office on its programs and the integration of international activities across the Foundation. The Committee includes a balanced representation of women, members of under-represented minorities, and geographic regions.

**PERFORMANCE**

NSF's FY 2007 budget is aligned to reflect funding associated with the Foundation's four strategic goals and ten investment categories highlighted in the FY 2003-2008 Strategic Plan. These were designed as a mechanism to better enable assessment of programs and to facilitate budget and performance integration.

**Office of International Science and Engineering  
By Strategic Outcome Goal and Investment Category**

(Dollars in Millions)

	FY 2006			Change over	
	FY 2005	Current	FY 2007	FY 2006	
	Actual	Plan	Request	Amount	Percent
<b><i>Ideas</i></b>					
Fundamental Science and Engineering	\$33.22	\$24.17	\$29.26	\$5.09	21.1%
Centers Programs	0.20	-	-	-	N/A
Capability Enhancement	-	-	-	-	N/A
	<u>33.42</u>	<u>24.17</u>	<u>29.26</u>	<u>5.09</u>	<u>21.1%</u>
<b><i>Tools</i></b>					
Facilities	-	-	-	-	N/A
Infrastructure and Instrumentation	-	-	-	-	N/A
Polar Tools, Facilities, and Logistics	-	-	-	-	N/A
Federally-Funded R&D Centers	-	-	-	-	N/A
	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>N/A</u>
<b><i>People</i></b>					
Individuals	8.66	7.00	8.00	1.00	14.3%
Institutions	-	-	-	-	N/A
Collaborations	-	1.00	1.00	-	-
	<u>8.66</u>	<u>8.00</u>	<u>9.00</u>	<u>1.00</u>	<u>12.5%</u>
<b><i>Organizational Excellence</i></b>					
	1.31	2.35	2.35	-	-
<b>Total, OISE</b>	<u>\$43.38</u>	<u>\$34.52</u>	<u>\$40.61</u>	<u>\$6.09</u>	<u>17.6%</u>

The FY 2005 total for Fundamental Science and Engineering includes \$9.42 million provided to NSF by the U.S. Department of State for an award to the U.S. Civilian Research and Development Foundation.

**Recent Research Highlights**

► **Wild Capuchin Monkeys Use Tools:** Working in northeastern Brazil, a team of researchers led by University of Georgia psychologist Dorothy Fragaszy has observed the first direct scientific evidence of tool use among a population of wild capuchin monkeys. Such tool use has long been known among chimpanzees in the wild. But this was the first such study of monkeys, and is thus of great importance for a comparative understanding of the cognitive, motor, and social underpinnings of routine tool use.

Co-investigators in the international study are from the Consiglio Nazionale delle Ricerche in Rome, Italy, the University of São Paulo, Brazil, and the Fundação BioBrasil in Bahia, Brazil. Their work got underway when they heard new reports



Brazilian Capuchin Monkey. Credit: Dorothy Fragaszy Univ. of Georgia

of wild capuchin monkey bands in Brazil that routinely use stones to pound open palm nuts. One of the Brazilian researchers had access to two of the sites where these bands lived. The result was the first opportunity to study the spontaneous development of tool use by a whole population of monkeys over a long period of time, in a completely natural setting.

Still, a number of puzzles remain. For example, some of the cracking stones are large, water-smoothed rocks, which are not found in the immediate area. Where do they come from? Have the monkeys transported them over very long distances?



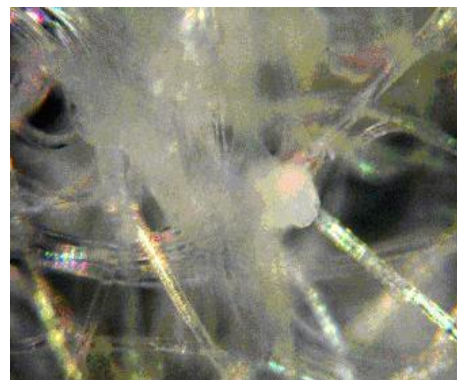
PASI on Materials for Energy Conversion and Environmental Protection. Credit: R. P. H. Chang, Northwestern University

► **PASI Program Backs Bright Ideas in Energy Research:** In October 2003, more than 60 graduate students and researchers from academia, government and industry met in Rio de Janeiro to make a cutting-edge plan for research on fuel cells and emissions control technologies. The Energy Conversion and Environmental Protection meeting was sponsored by the Pan-American Advanced Study Institutes (PASI), a program designed to stimulate training and cooperation between students and researchers in North, South, and Central America.

Jointly sponsored by NSF and the Department of Energy, PASI projects encourage an international and interdisciplinary approach to the most pressing research questions across the sciences. A PASI course generally lasts from two to four weeks and can consist of lectures, demonstrations, research seminars or discussions. In Rio, lecturers served as mentors and made presentations to graduate students representing more than ten countries. Unlike a traditional conference, the PASI courses provided students with a range of opportunities for interactive learning and hands-on experience. In turn, the students identified research questions, drew up collaborative research plans, and prepared joint proposals to seek funding for their projects. This project also contributed to broadening the participation of U.S. students from underrepresented groups as well as giving all U.S. participants a valuable international experience that would make them competitive in the global workforce.

► **Hi-Tech Textiles Repel Germs, Bugs, and Static Electricity!** In a triple whammy against germs, insect pests, and static electricity, scientists from North Carolina State University at Raleigh and the National Research Center in Cairo, Egypt have developed new fabrics that have antistatic, antimicrobial, and insecticidal properties.

The researchers treated the polypropylene-based fabrics with a special plasma that allowed them to attach synthetic antimicrobial compounds and natural insecticidal agents such as citronella, jasmine and sweet basil. Compared to ordinary fabrics, the new textile showed a 99.9 percent reduction in two common microorganisms, including *E. coli*, as well as ticks and other larger pests. In the future, the researchers hope to use similar technology in commonly used commercial fabrics made of cotton and wool. Potential applications for the fabrics include athletic apparel, clothing for people working in medical facilities, and protective garments for armed forces personnel.



Antimicrobial and insecticidal fabric. Credit: Mohamed Bourham, North Carolina State University.

► **Thinking Globally for the Cyberinfrastructure Workforce:** In an effort to prepare young researchers for a meaningful place in the modern world of globalization and technological change, the Pacific Rim Undergraduate Experience Program (PRIME) at University of California/San Diego is giving qualified students a chance to participate in international research and cultural experiences.

PRIME is funded by NSF in cooperation with the Pacific Rim Applications and the Grid Middleware Assembly, a consortium involved in the advancement and use of very high-speed computation. During the program's first year, nine American computer science students received support to work with research teams at some of the world's leading institutions in that field – among them, Osaka University's Cybermedia Center in Japan, Taiwan's National Center for High-Performance Computing, and Monash University of Australia. They participated in projects ranging from computer-aided visualization to the remote control of experimental equipment, to distributed computing. In future years, the program will expand in scope even further, branching into research areas such as cardiac physiology and earthquake-prepared engineering.



Nine U.S. students participated in PRIME 2004.  
Credit: Peter Arzberger, Univ. of Calif./San Diego



Aldovandra vesiculosa, an Australian aquatic plant. Credit: GBIF

► **Information on Global Biodiversity at Your Fingertips:** February 2004 marked the online debut of the NSF-supported Global Biodiversity Information Facility (GBIF), a digital database of scientific information on worldwide biodiversity. The portal gives access to more than 130 sources of information about the world's natural history collections, herbaria and other databases at the click of a mouse button.

Users can search the database by location, type of organism by scientific or common name, or other observational data and retrieve lists sorted by country. One important goal of the project is to digitize and make available data on organisms – often collected by researchers from developed countries – originating in developing countries, where such databases are generally scarce. In all, the GBIF provides access to more than 77 million records.

► **Alaska and Russia: Training Grounds for Tomorrow's Volcanologists:** As the role of volcanoes in climate change becomes clearer, and as the growing global population becomes ever more vulnerable to natural catastrophe, NSF is supporting efforts to understand and predict volcanic activity. To that end, John Eichelberger from the University of Alaska and Elena Vesna from Kamchatka State University have led an NSF-sponsored research and training project that brings American and Russian students to sites in Alaska and Russia – including the Kamchatka peninsula, home to the greatest density of volcanoes in the world.



U.S. and Russian collaborators on location. Credit: John Eichelberger, University of Alaska/Fairbanks



With students and faculty living together in remote camps and conducting day-long excursions on foot to study volcanic phenomena, the researchers are holding field courses in the region during three separate summers. These courses take advantage of the unparalleled teaching opportunities provided by active volcanism – especially when it comes to dramatizing the fundamentals of physics and chemistry.

### Other Performance Indicators

OISE funding supports a significant number of individuals with a focus on early-career researchers. In FY 2005, awards managed by OISE supported estimated totals of 428 postdoctoral researchers, 601 graduate students, and 116 undergraduates. OISE’s East Asia and Pacific Summer Institutes program alone placed 152 U.S. graduate students in research projects in Australia, China, Japan, Korea and Taiwan, while the Office’s International Research Fellowship Program supported the research activities of 30 postdoctoral fellows from 15 states in 14 countries around the world. The table below shows the number of individuals supported through research awards where stipend and salaries are provided.

**Number of People Involved in OISE Activities<sup>1/</sup>**

	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate
Senior Researchers	110	115	110
Other Professionals	25	25	35
Postdoctorates	35	35	55
Graduate Students	120	125	185
Undergraduate Students	50	56	90
<b>Total Number of People</b>	<b>340</b>	<b>356</b>	<b>475</b>

<sup>1/</sup> This table shows salary and stipend support awards only.

The funding rate for competitive awards in FY 2007 is estimated to decrease, chiefly due to plans to increase award size.

### OISE Funding Profile

	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate
<b>Statistics for Competitive Awards:</b>			
Number	335	330	320
Funding Rate	41%	45%	40%
<b>Statistics for Research Grants:</b>			
Number of Research Grants	71	70	85
Funding Rate	13%	20%	20%
Median Annualized Award Size	\$14,996	\$25,000	\$30,000
Average Annualized Award Size	\$90,980	\$50,000	\$100,000
Average Award Duration, in years	2.4	2.4	2.6

