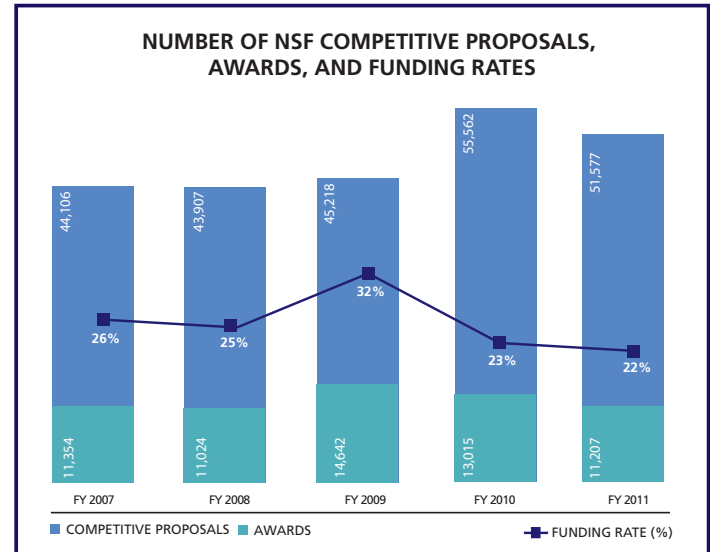


UNITED STATES
National Science Foundation

FY 2011 Performance and Financial Highlights

Who We Are and What We Do

- The National Science Foundation (NSF) is the only federal agency dedicated to advancing research and education in science and engineering across all fields and disciplines and at all educational levels.
- NSF supports research and workforce development programs that help drive future economic growth, global competitiveness, and the creation of high-wage jobs for American workers.
- NSF seeks high-risk, potentially transformative projects that will generate path-breaking discoveries and new technologies.
- NSF integrates research and education to support the development of a world-class scientific and engineering workforce.
- NSF funds advanced instrumentation and facilities that enable state-of-the-art research as well as Arctic and Antarctic research, science operations, and other related activities for the U.S. polar research program.
- NSF supports cooperative research between universities and industry, as well as United States participation in international scientific efforts.
- In many fields, including computer science, mathematics, environmental sciences, and the social sciences, NSF is the principal source of federal support for academic basic research.



From the Director



NSF has long been our nation's engine of innovation. It is the overarching source of federal support for fundamental research across all science and engineering fields. This support becomes even more crucial to innovation as multidisciplinary research becomes increasingly possible, productive, and prevalent. The relationship between technological innovation and fundamental research is well established. In fact, basic research, with its long-term perspective and

strong emphasis on disciplinary excellence and multidisciplinary interactions, is a necessary foundation for a successful innovation ecosystem. In this time of economic uncertainty, there is a national need to support, nurture, and strengthen this ecosystem, which sustains our scientific and economic leadership and helps to ensure our national security.

I am pleased to present the NSF Performance and Financial Highlights report for fiscal year (FY) 2011. This report is the third of three that we prepare each year to demonstrate the agency's accountability to our stakeholders and the American public. This report highlights key information from NSF's FY 2011 *Agency Financial Report* (AFR) and *Annual Performance Report* (APR). I am pleased to report that the performance

NSF BY THE NUMBERS: FY 2011

\$6.9 billion	Appropriations (does not include special or donated funds)
1,875	Colleges, universities, and other institutions receiving NSF funding
51,600	Proposals evaluated through a competitive merit review process
11,200	Competitive awards funded
262,000	Proposal reviews conducted
276,000	Estimated number of people NSF supports directly (researchers, postdoctoral fellows, trainees, teachers, and students)
44,000	Students supported by NSF Graduate Research Fellowships since 1952

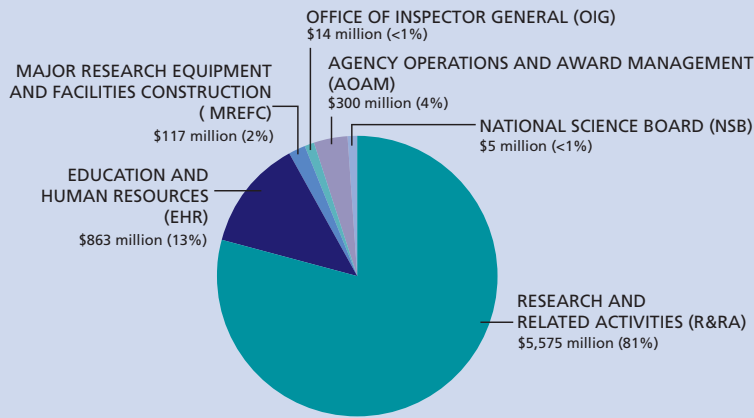
information included in the APR is complete and reliable. As in past years, NSF's performance data has been verified and validated by an independent, external consultant using guidelines from the Government Accountability Office.

Thank you for your interest in NSF.

Subra Suresh
February 15, 2012

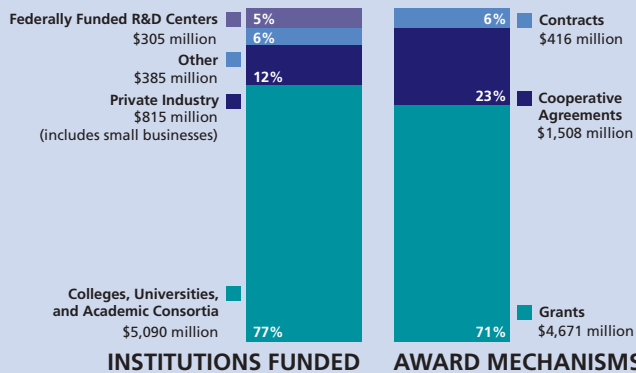
Following the Money

WHERE IT COMES FROM FY 2011 Appropriations by Account (\$6,874 million)



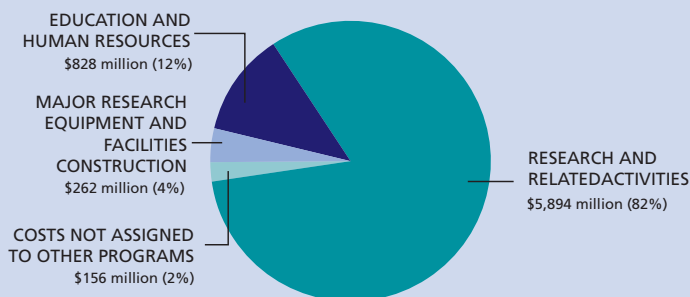
Note: Does not include a 0.2% rescission. Totals may not add due to rounding.

WHERE IT GOES AND HOW IT GETS THERE FY 2011 Obligations for Research and Education Programs (\$6,595 million)



Notes: NSF Research and Education Programs include Research & Related Activities, Education & Human Resources, and Major Research Equipment & Facilities Construction appropriations. Other institutions funded include federal, state, and local governments; nonprofit organizations; and international organizations.

HOW IT'S SPENT FY 2011 Net Cost



- NSF is funded primarily through six congressional appropriations, which totaled \$6,874 million in FY 2011. R&RA, EHR, and MREFC fund the agency's programmatic activities and account for 95 percent of NSF's total appropriations. The AOAM appropriation supports NSF's administrative and management activities. Separate appropriations support the activities of the OIG and NSB.

- In FY 2011, 90 percent of research funding was allocated based on competitive merit review. Awards were made to 1,875 institutions in 50 states, the District of Columbia, and 4 U.S. territories. These institutions employ America's leading scientists, engineers, and educators and train the leading-edge innovators of tomorrow.

- In FY 2011, NSF funded 11,207 awards, mostly to academic institutions. Seventy-seven percent of support for research and education programs (\$5,090 million) was to colleges, universities, and academic consortia. Private industry, including small businesses accounted for 12 percent (\$815 million) and support to Federally Funded R&D Centers accounted for 5 percent (\$305 million). Other recipients include federal, state, and local governments; nonprofit organizations; and international organizations. A small number of awards fund research in collaboration with other countries, which adds value to the U.S. scientific enterprise.

- Most NSF awards (94 percent) were funded through grants or cooperative agreements. Grants can be funded either as standard awards, in which funding for the full duration of the project is provided in a single fiscal year or as continuing awards, in which funding for a multiyear project is provided in increments. Cooperative agreements are used when the project requires substantial agency involvement (e.g., research centers, multi-use facilities). Contracts are used to acquire products, services, and studies (e.g., program evaluations) required primarily for NSF or other government use.

- Net cost represents the annual cost of operating NSF programs. About 95 percent of all current year net cost of operations incurred was directly related to the support of R&RA, EHR, and MREFC activities. Additional costs were incurred for indirect general operation activities (e.g., salaries, training, and activities related to the advancement of NSF information systems technology) and activities of the NSB and the OIG. These costs were allocated to the R&RA, EHR, and MREFC programs and accounted for 5 percent of the total current year net cost of operations. Costs not assigned to other programs include expenses related to the H-1B Nonimmigrant Petitioner Receipts program and donations.

How We Are Doing: Performance Highlights

- As a federal agency, NSF is subject to the GPRA Modernization Act of 2010 and to related performance reporting guidance issued by the Office of Management and Budget (OMB). In FY 2011, NSF released a new strategic plan for fiscal years 2011–2016, *Empowering the Nation Through Discovery and Innovation*, which describes three strategic goals—Transform the Frontiers, Innovate for Society, and Perform as a Model Organization—that relate directly to NSF’s mission. This goal structure enables NSF to link its investments to longer-term outcomes. To bridge the gap between these strategic goals and measurable outputs, the Strategic Plan establishes a set of performance goals for each strategic goal.
- In FY 2011, NSF set 16 performance goals, which cover all program activities within the agency. Some are new, reflecting either the novel ideas in NSF’s new Strategic Plan or the fact that measurement capabilities can only now be brought to bear in pre-existing areas of interest. Some goals are unchanged from previous years, reflecting deeply ingrained priorities. Other goals are natural follow-ons to activities that began in previous years.
- Thirteen goals were achieved in FY 2011. Achievement of the remaining three was delayed, but all were achieved by the second quarter of FY 2012. The following chart summarizes NSF’s FY 2011 goals. A comprehensive discussion of each goal as it relates to the agency’s overarching strategic plan, goal objectives, and targets, as well as trend data can be found in NSF’s FY 2011 APR.

FY 2011 PERFORMANCE GOALS

STRATEGIC GOAL	PERFORMANCE GOAL	RESULTS
Transform the Frontiers	Goal 1: Potentially Transformative Research. Produce an analysis of NSF’s FY 2010 investments in activities undertaken to foster potentially transformative research.	Achieved
	Goal 2: Science, Technology, Engineering, and Mathematics (STEM) Workforce Priority Goal. Ensure that at least six NSF STEM workforce development programs at the graduate, professional, or early career level participate in evaluation and assessment systems.	Achieved
	Goal 3: International Implications. Identify number of new NSF program solicitations, announcements, and Dear Colleague Letters with international implications.	Achieved
	Goal 4: Construction Project Monitoring. Keep negative cost and schedule variance at or below 10 percent for all MREFC facilities under construction.	Achieved
	Goal 5: Data Management Practices at Large Facilities. Determine current data management practices at NSF-funded facilities.	Achieved
Innovate for Society	Goal 6: Industrial & Innovation Partnerships. Identify the number and types of grantee partnerships.	Achieved
	Goal 7: Public Understanding and Communication. Identify number of programs funding activities that address public understanding and communication of science and engineering.	Achieved
	Goal 8: K–12 Components. Identify number of programs that fund activities with K–12 components.	Achieved
	Goal 9: Innovative Learning Systems. Identify number of programs that fund the development of research-based innovative learning systems.	Achieved
	Goal 10: Partnerships for Learning Technologies. Identify number of programs funding activities that promote partnerships supporting the development of learning technologies.	Achieved
Perform as a Model Organization	Goal 11: Model EEO Agency. Attain essential elements of a model Equal Employment Opportunity (EEO) program, as defined in Equal Employment Opportunity Commission requirements.	Achieved
	Goal 12: IPA Performance Plans. Include temporary staff appointed under the Intergovernmental Personnel Act (IPAs) under NSF’s performance management system.	Achieved
	Goal 13: 360-degree Evaluation Instrument. Pilot use of OPM’s 360-degree evaluation instrument to provide feedback to NSF leaders and managers on skills and abilities.	*
	Goal 14: Staff Developmental Needs. Pilot process for assessing and addressing developmental needs.	*
	Goal 15: Grant-By-Grant Payments. Gather functional requirements for changes in current system processes that will accommodate the transition to a grant-by-grant payment method.	*
	Goal 16: Time-to-Decision. Inform at least 70 percent of applicants whether their proposals have been declined or recommended for funding within 6 months of deadline, target date, or receipt date, whichever is later.	Achieved

*Goals 13, 14, and 15 were achieved by FY 2012–Q1.

AMERICAN RECOVERY AND REINVESTMENT ACT (ARRA): KEY PERFORMANCE RESULTS

In FY 2011, NSF continued implementation of ARRA-funded programs. NSF's entire ARRA portfolio of more than 5,000 awards and \$3 billion was obligated by the end of FY 2010. The key focus for FY 2011 was monitoring awardee performance, including compliance with requirements for quarterly recipient reporting. As of September 30, 2011, ARRA expenditures were \$1.38 billion.

- In addition to ongoing monitoring of ARRA awards funded in FY 2009 and FY 2010, the Major Research Instrumentation and Academic Research Infrastructure programs funded in FY 2010 began implementation. This entailed early stage monitoring of awardee planning for acquisition of shared scientific instrumentation and, in many cases, planning, design, and construction of laboratory facilities.
- NSF continued its comprehensive, multistage review program resulting in a recipient reporting compliance rate of 99 percent every quarter beginning in December 2009. This effective program established NSF as a leader sought out by the accountability and transparency community for government-wide process improvement recommendations.
- NSF enhanced communication with awardees to ensure the timely expenditure of ARRA funds. Aggressively monitoring ARRA award terms and conditions that require awardees to spend funds by the anniversary date of their award resulted in no award being terminated for this reason. NSF is currently implementing OMB Memorandum M-11-34, requiring acceleration of ARRA expenditures. We are coordinating with the National Institutes of Health, as appropriate, and encouraging NSF awardees to responsibly accelerate remaining ARRA expenditures by September 30, 2013.

FY 2011 FINANCIAL MANAGEMENT PERFORMANCE RESULTS

Financial Statement Audit*	
<ul style="list-style-type: none"> • Unqualified opinion (14th consecutive "clean" opinion) • Material weaknesses 	Yes None
Management Assurances	
<ul style="list-style-type: none"> • Effective internal control over financial reporting (FMFIA §2) • Effective internal control over operations (FMFIA §2) • Conformance with financial management system requirements (FMFIA §4) • Substantial compliance with FFMIA system requirements, accounting standards, and U.S. General Ledger at transaction level 	Yes Yes Yes Yes
Timely financial reporting (Treasury/Financial Management Service Quarterly Scorecard)	Yes
Improper Payments Elimination and Recovery Act of 2010	Compliant
Number of grant payments processed in FY 2011	29,214
<small>*NSF's FY 2011 Independent Auditor's Report can be found in NSF's FY 2011 Agency Financial Report. FMFIA: Federal Managers Financial Integrity Act of 1982 FFMIA: Federal Financial Management Improvement Act of 1996</small>	

Management Challenges

- For FY 2011, the NSF Office of Inspector General (OIG) again cited six major management and performance challenges for the agency. These challenges, which carried over from FY 2010, are: Ensuring proper stewardship of ARRA funds, improving grant administration, strengthening contract administration, becoming a model organization for human capital management, encouraging the ethical conduct of research, and effectively managing large facilities and instruments. Two emerging challenges were also identified: Implementing the Open Government Directive and planning for the next NSF headquarters.
- NSF management focused significant efforts on addressing each of the OIG's management challenges. Among the actions taken during FY 2011 were issuing new operating principles for audit resolution and establishing a Stewardship Collaborative to monitor/improve the process and jointly address outstanding and emerging issues; subjecting all institutions identified as managing higher risk awards to either an Award Monitoring and Business Assistance Program (AMBAP) site visit or desk review; and shifting the emphasis of the AMBAP risk assessment methodology from amount of funds to institutions likely to have challenges such as small, nontraditional institutions with the least experience in managing federal funds. To strengthen contract administration, a Corrective Action Plan for the significant deficiency on contract monitoring of cost reimbursement contracts was implemented. As part of an ongoing effort to effectively manage large facilities, Business Systems Reviews were completed on the Cornell High Energy Synchrotron Source, the Network for Earthquake Engineering Simulation, and the Alaska Research Vessel *Sikuliaq*.
- More information about how NSF management addressed each of the OIG's management and performance challenges is available in the NSF FY 2011 Progress Report on OIG Management Challenges, which can be found in the *FY 2011 AFR*. The Progress Report also outlines the agency's anticipated next steps in addressing each challenge.

Looking Ahead: OneNSF

NSF is an agency that works seamlessly across disciplinary organizational, institutional and national boundaries to promote global leadership in advancing research, education and innovation.

In Spring 2011, Director Subra Suresh introduced OneNSF, a comprehensive vision for NSF as it operates in partnership with the science and engineering community for the benefit of society. The OneNSF approach builds on the agency's mission to support fundamental research and education. It seeks to empower NSF to respond to new challenges in a changing global environment, leverage resources and opportunities for maximum impact, and provide leadership to establish innovative practices, programs, and paradigms that advance scientific knowledge and STEM education. These capabilities—responsiveness, leverage and leadership—are the core characteristics of OneNSF.

Within the Foundation, OneNSF identifies policies, strategies and practices to foster and sustain a culture and workplace environment based on cooperation and communication across organizational divisions and disciplinary boundaries. Externally, OneNSF will encourage a heightened level of cooperation and consensus between NSF and its partners and among NSF grantees and their collaborators in the science and engineering community around the globe.

OneNSF facilitates the creation of new knowledge, stimulates discovery, addresses complex societal problems, and promotes national prosperity by encompassing both focused investments and broader areas of emphasis. Under the OneNSF framework, NSF is supporting an array of programs that foster linkages across the organization including Cyberinfrastructure Framework for 21st Century Science and Engineering (CIF21); Science, Engineering, and Education for Sustainability (SEES); Advanced Manufacturing; and research and development that strengthens the development of K–12 teachers and undergraduate faculty in science, technology, engineering, and math. More information about these programs can be found in NSF's *FY 2013 Budget Request to Congress*.

FY 2011 NSF Executive Staff and Officers

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Office of the Deputy Director

Cora B. Marrett, Deputy Director¹

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Cora Marrett, Director (Acting)⁷

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Martha A. Rubenstein, Director

Office of Information and Resource Management

Amy Northcutt, Office Head (Acting)⁸

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Chief Human Capital Officer

Judith Sunley⁹ (Office of Information and Resource Management)

Chief Technology Officer

José Muñoz

Chief Information Officer

Amy Northcutt, Acting⁹ (Office of Information and Resource Management)

NSF Affirmative Action Officer

Claudia J. Postell (Office of Diversity and Inclusion)

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University of Chicago

Subra Suresh
Member, *ex officio*
Director, National Science Foundation

Michael L. Van Woert
Executive Officer and Director,
National Science Board Office

¹Dr. Marrett was confirmed by the U.S. Senate on May 26, 2011.

²Effective September 2011.

³Effective February 2011.

⁴Effective March 2011.

⁵Effective January 2011.

⁶Effective April 2011.

⁷Effective May 2011. Dr. Marrett was replaced by Judith B. Gan in January 2012.

⁸Replaced by Eugene Hubbard in January 2012.

⁹Effective September 2011. Appointed Chief Information Officer in December 2011.

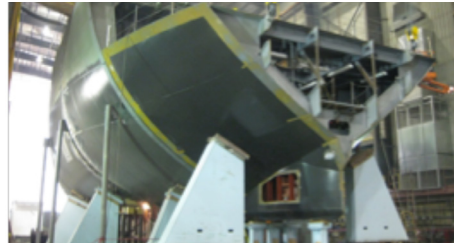
¹⁰Effective May 2011.

Research and Education Highlights



Credit: A Royer, A Doud, M Rose, and Bin He; University of Minnesota

Controlling Machines With Our Minds. NSF-funded researchers at the University of Minnesota have developed a unique brain-computer interface (BCI) that allows humans to use thoughts to control the flight of a virtual helicopter in real time. The experience takes place in three dimensions and uses electrical signals from the scalp to control the helicopter's movements. A brain wave-based system offers individuals with nervous system diseases and spinal cord injuries the potential to improve their quality of life and to participate in society. A BCI system may also extend the performance of healthy individuals by harnessing thoughts to control multiple activities. Nervous system diseases and injuries cost the U.S. over \$500 billion annually in health care expenses and lost productivity. A noninvasive BCI system to rehabilitate these individuals could have a significant impact. The Minnesota team's investigations also address a significant problem in science: decoding brain waves to control devices. They use functional magnetic resonance imaging and brain wave recordings to map the "thought" signals formed when the brain processes information. The map helps the researchers decode the signals associated with different imagined motor tasks. This research may make a significant contribution to neuroscience, rehabilitation engineering, control theory, signal processing, and imaging science.



Credit: Benjamin Massey, R/V Sikuliaq Project Shipyard Inspector.

Research Vessel. Funded in part by the American Recovery and Reinvestment Act of 2009, construction of the NSF R/V *Sikuliaq* (for the Inuit word meaning "young sea ice") is well underway at Marinette Marine Corporation in Marinette, Wisconsin. Construction of the research vessel will create more than 150 jobs locally, while building a long-term national asset for the U.S. oceanographic research community. The *Sikuliaq* will be a 261-foot oceanographic research ship capable of bringing scientists to the ice-choked waters of Alaska and the polar regions. When complete, it will be one of the most advanced university research vessels in the world, with the capability to break ice up to 2.5-foot thick. The *Sikuliaq* will allow researchers to collect sediment samples directly from the seafloor, host remotely operated vehicles, use a flexible suite of winches to raise and lower scientific equipment, and conduct surveys throughout the water column and sea bottom using an extensive set of research instrumentation. The ship will also be able to transmit real-time information directly to classrooms all over the world. The vessel design strives to have the lowest possible environmental impact, including a low underwater radiated noise signature for marine mammal and fisheries work.



Credit: Grace Chui

Scratch. While working with their Computer Clubhouses—community centers that help inner-city youth gain access and experience with new technologies—Mitchel Resnick and his colleagues at the MIT Media Lab saw an opportunity to create a new computer programming language that would be appropriate and fun for children, help students have an enjoyable educational experience in learning math, computation and problem-solving skills, while helping them create animations and games. With NSF support, they developed Scratch, a new computer programming language where coding is done with graphical blocks, allowing a student to write codes by snapping together blocks, much like LEGO bricks or pieces of a puzzle. The results have been dramatic. Researchers have been most excited about the diversity of projects and the level of sharing and collaboration that exists in the Scratch community. Scratch has made it easy for more than 1 million children to create and share their own interactive stories, animations, games, music, and art. As young people create and share Scratch projects, they learn important mathematical and computational ideas, while also learning to think creatively, reason systematically, and work collaboratively. NSF is currently supporting the development of Scratch Jr, a new version designed specifically for early childhood education.

For more information:

NSF FY 2011 Agency Financial Report
www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf12001

NSF FY 2011 Annual Performance Report
See Performance chapter in *NSF FY 2013 Budget Request to Congress* at www.nsf.gov/about/performance.

FY 2013 NSF Budget Request to Congress
See NSF's Budget and Performance website at www.nsf.gov/about/performance

Empowering the Nation Through Discovery and Innovation: NSF Strategic Plan for Fiscal Years 2011-2016
www.nsf.gov/news/strategicplan/index.jsp

NSF FY 2011 Progress Report on OIG Management Challenges
www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf12001
(see Appendix 3B)

Report to the National Science Board on the National Science Foundation's Merit Review Process, FY 2010
www.nsf.gov/nsb/publications/2011/nsb1141.pdf

NSF Research and Education Highlights and Discoveries
www.nsf.gov/discoveries
Driving Federal Performance
www.Performance.gov

Controlling Machines With Our Minds
www.Research.gov (see Science, Engineering and Education (SEE) Innovation, "Flying High With Brain Waves") and www.nsf.gov/news/letter/mar_10/index.jsp

Research Vessel Sikuliaq
www.nsf.gov/pubs/2011/nsf11067/nsf11067.pdf?WT.mc_id=USNSF_179

Scratch
http://info.scratch.mit.edu/About_Scratch

