NATIONAL SCIENCE FOUNDATION CENTERS

NSF supports a variety of centers programs that contribute to the Foundation's mission and vision. Centers exploit opportunities in science, engineering, and technology in which the complexity of the research program or the resources needed to solve the problem require the advantages of scope, scale, duration, equipment, facilities, and students. Centers are a principle means by which NSF fosters interdisciplinary research.

NSF Centers
(Dollars in Millions)

	Program Initiation	Number of Centers in FY 2012	FY 2012 Actual	FY 2012 Enacted/ Annualized FY 2013 CR	FY 2014 Request	Change Over FY 2012 Enacted Amount	Change Over FY 2012 Enacted Percent
Centers for Analysis & Synthesis	1995	4	$26.29	$26.32	$26.40	$0.08	0.3%
Centers for Chemical Innovation	1998	14	26.03	24.00	33.25	9.25	38.5%
Engineering Research Centers	1985	20	70.36	70.00	70.50	0.50	0.7%
Materials Centers	1994	24	49.56	44.35	56.00	11.65	26.3%
Nanoscale Science & Engineering Centers	2001	13	33.47	31.48	12.87	-18.61	-59.1%
Science & Technology Centers[1]	1987	17	50.02	50.75	71.71	20.96	41.3%
Science of Learning Centers	2003	6	21.94	20.37	19.00	-1.37	-6.7%
Totals		**98**	**$277.66**	**$267.27**	**$289.73**	**$22.46**	**8.4%**

Totals may not add due to rounding.

[1] Six of the 17 Science and Technology Centers supported in FY 2012 are from the FY 2002 cohort. These centers received extensions to their periods of performance in FY 2012 but no additional funding.

Description of Major Changes

Centers for Analysis and Synthesis - BIO

The Socio-Environmental Synthesis Center (SESYNC) uses a variety of approaches to synthesize scientific information, data, and knowledge to advance the understanding of environmental complexity. Emerging environmental challenges are anticipated and managed through the active involvement of environmental and social scientists. Approaches include discussions between scientists and policy makers, working groups from the broad socio-environmental community, and an array of computational and technical service providers. The FY 2014 Request is $6.0 million (no change from FY 2012 Enacted).

The iPlant Collaborative provides a cyberinfrastructure to enable new conceptual advances in plant sciences through integrative, computational thinking. iPlant focuses on grand challenge questions in the plant sciences, including innovative approaches to education, outreach, and the study of social networks. The FY 2014 Request is $12.0 million (no change from FY 2012 Enacted).

The National Evolutionary Synthesis Center (NESCENT) promotes the synthesis of information, concepts, and knowledge to address significant, emerging, or novel questions in evolutionary science and its applications. NESCENT funds graduate students engaged in center synthesis activities; supports activities to expand the conceptual reach of the center; and initiates a formalized, three-tiered assessment of the center that includes milestones for reporting on the impact of center activities. The FY 2014

Request is $4.40 million (-$1.10 million below FY 2012 Enacted) as NSF funding ramps down. FY 2014 is expected to be the final year of funding for NESCENT.

The National Institute for Mathematical and Biological Synthesis (NIMBIOS) supports creative solutions to complex problems at the interface between mathematics and biology. The center is designing education programs aimed at the mathematics/biology interface, thereby building the capacity of mathematically competent, biologically knowledgeable, and computationally adept researchers needed to address the vast array of challenging questions in this century of biology. The FY 2014 Request is $4.0 million (+$1.18 million over FY 2012 Enacted) as the center ramps up cyberinfrastructure capabilities and services.

Centers for Chemical Innovation (CCI) - MPS

The CCI program is designed to address major, long-term fundamental chemical research challenges attracting broad scientific and public interest as well as to provide a rich environment for education, outreach, and innovation. In 2012, managing directors and education/outreach staff from five Phase II CCIs established a Leadership Network as a forum to discuss common challenges and coordinate activities across centers. As a result of this meeting, the CCIs are increasing their engagement with minority-serving organizations. Another meeting is planned for fall 2013 to share scientific progress on Grand Challenges. These activities will continue in FY 2014. In addition, NSF Division of Chemistry staff are developing metrics and collecting data in preparation for the first CCI program evaluation scheduled for FY 2017.

The CCI program is structured as a two-phase competition. Phase I centers, which are funded for three years, may compete for larger Phase II awards, which are funded for five years with the opportunity to be renewed for an additional five years. The FY 2014 Request is $33.25 million (+$9.25 million above FY 2012 Enacted). This will support the following:

- Up to eight Phase II awards. This includes six ongoing Phase II CCIs and up to two new and/or renewing Phase II CCIs. At $4.0 million per center per year, FY 2014 funding for Phase II centers will range from $24.0 million (ongoing centers only; no new/renewing centers) to $32.0 million (eight ongoing and new/renewing centers).
- Up to six Phase I awards: The three centers initiated in FY 2012 and the one to three centers to be initiated in FY 2013 will be eligible for Phase II status in FY 2014. No new Phase I competition is planned for FY 2014. As all Phase I centers are funded as standard grants up to $1.75 million, FY 2014 funding for Phase I centers will range from zero (no Phase I awardees are selected in FY 2013) to $5.25 million (three Phase I awardees are selected in FY 2013).

Engineering Research Centers (ERC) – ENG

NSF Engineering Research Centers (ERCs) enable innovation through partnerships, bridging the intellectual curiosity of discovery-focused university research and the engineered systems and technology opportunities of industry research. The centers also educate a technology-enabled workforce with hands-on, real-world experience. These characteristics catalyze the development of marketable technologies to generate wealth and address grand challenges. ERCs are investigating intelligent electric power grid systems to provide electricity from renewable sources, devising healthcare innovations through tissue engineering and microelectronics research, creating sensing systems that improve the prediction of tornados, and demonstrating intelligent robotic systems to assist people who are elderly or disabled in daily tasks.

ERCs face two renewal reviews, one in year three to determine if they are structured effectively, and another in year six to determine if they are making an impact, delivering on goals, and positioning themselves for more challenging tasks to warrant further support. The ERC program periodically commissions program-level evaluations by external evaluators such as SRI International; the Science and

Technology Policy Institute (STPI); and ABT Associates to determine the effectiveness of ERC graduates in industry and the benefits of ERC membership to industry and others. A recent update of a past survey of the 35 ERCs that have graduated from NSF support after 10 years finds that 29 (83 percent) are self-sustaining with strong financial support and most ERC features in place.

The FY 2014 Request is $70.50 million (+$500,000 over FY 2012 Enacted). Building on the long-standing ERC program model, NSF will maintain funding for the existing portfolio of 17 ERC's and support three new centers as part of the Class of 2014 for a total of 20 ERCs. The FY 2014 ERC competition will include tracks for both traditional Generation-3 ERC's and for the second class of Nanosystems ERC's (NERCs). The anticipated outcome of the competition is to make a combination of Generation-3 ERC awards and focused NERC awards dependent upon the quality of the proposals and relationship to areas of national need and grand challenges.

Materials Centers – MPS

Materials Research Science and Engineering Centers (MRSECs) advance materials research and provide students with an interdisciplinary education, including global experiences. These centers address fundamental research problems of intellectual and strategic importance that will advance U.S. competitiveness and the development of new technologies.

The MRSEC program will continue to support the Materials Research Facilities Network (MRFN), which links the instrumentation and subject matter expertise of MRSECs to the larger materials-related community as well as encourages MRSEC-to-MRSEC collaborations. The MRFN network will be used to nucleate new Materials Innovation Platforms (MIP). These Platforms will be networked to address instrument and technique development capabilities and capacity for discovery of new materials.

The MRSEC program will also continue to support the interaction of MRSEC Education Coordinators with the NSF Directorate for Education and Human Resources' (EHR) Division of Research on Learning in Formal and Informal Settings (ERL) to formulate methodologies for standardizing outreach program assessment and evaluation. In addition, the program will continue to support the interaction of the Georgia Institute of Technology MRSEC with DRL to increase training opportunities for students with disabilities through the Research in Disabilities Education (RDE) program. MRSECs also interact with minority serving institutions (MSIs) through the Partnership for Research and Education in Materials (PREM) program. In FY 2014, there will be 14 active PREM awards, 13 of which are connected to MRSECs.

The FY 2014 Request is $56.0 million (+$11.65 million over the FY 2012 Enacted). This will support 18 MRSECs. The Materials Centers program holds triennial competitions. In the FY 2014 competition, 14 current centers are expected to re-compete, along with about 70 new applicants. Nine awards are expected to be made. This will reduce the number of centers in this class from 14 to 9 in keeping with the advice from the 2007 NRC report, which recommended increasing award size. Nine centers awarded during the last competition in FY 2011 will also continue to be funded. The FY 2014 request is higher than the FY2013 year estimate because there was forward funding in FY 2012 towards the mortgage of continuing awards in FY 2013.

Nanoscale Science and Engineering Centers (NSEC) – ENG

Nanotechnology, which addresses the smallest of scales, is projected to be one of the largest drivers of technological innovation for the next decade and beyond. This potential was recognized in the National Nanotechnology Initiative, particularly in the burgeoning area of nanomanufacturing. Research at the nanoscale through NSF-funded NSECs aims to advance the development of the ultra-small technology that will transform electronics, materials, medicine, environmental science, and many other fields. Each center has an extended vision for research. Together they provide coherence and a long-term outlook to

U.S. nanotechnology research and education and also address the social and ethical implications of such research. NSEC funding supports education and outreach programs from K-12 to the graduate level, which is designed to develop a highly skilled workforce, advance pre-college training, and further public understanding of nanoscale science and engineering. These centers have strong partnerships with industry, national laboratories, and international centers of excellence, which puts in place the necessary elements to bring discoveries in the laboratory to real-world, marketable innovations and technologies.

The FY 2014 Request is $12.87 million (-$18.61 million below the FY 2012 Enacted). This will support five continuing NSECs. The decrease in funding is chiefly due to six centers that will receive their final year of NSF support in FY 2013. Investments in NSECs will continue to decrease as the program no longer needs as much support due to center graduations and a transition to NERCs (see the ERC section above). The five existing centers are expected to be supported through the end of their current award cycles. No new NSEC competitions are planned.

Science and Technology Centers: Integrative Partnerships (STCs) - multi-directorate

The Science and Technology Centers: Integrative Partnerships (STC) program advances interdisciplinary discovery and innovation in science and engineering through the integration of cutting-edge research, excellence in education, targeted knowledge transfer, and the development of a diverse workforce. The STC portfolio reflects NSF-supported disciplines. Examples of investments include: engineering of biological systems; energy-efficient electronics; global and regional environmental systems − sustainability and change; new ways of handling the extraction, manipulation, and exchange of information; cyber security; and new materials for optical and electronic applications. STCs engage the Nation's intellectual talent and collaborate with partners in academia, industry, national laboratories, and government. STCs strengthen the caliber of the Nation's science, technology, engineering, and mathematics (STEM) workforce through intellectually challenging research experiences for students, postdoctoral fellows, researchers, and educators and advance public scientific understanding through partnerships with K-12 and informal education communities.

The FY 2014 Request is $71.71 million (+$20.96 million over FY 2012 Enacted). This will support 16 existing STCs – up to five from the 2013 cohort, five from the 2010 cohort, and six from the 2005/2006 cohort; and the administrative costs ($1.30 million) associated with management and oversight of the program. Awards are usually made for five years, with possible renewal for an additional five years. Support ranges from $4.0 million to $5.0 million per year, except for the class of 2005/2006 centers as they ramp down in preparation for sunset in FY 2014.

Science of Learning Centers (SLC) - multi-directorate

The Science of Learning Centers (SLC) program supports six large-scale, long-term centers that create the intellectual, organizational, and physical infrastructure needed for the advancement of Science of Learning research. It supports research that harnesses and integrates knowledge across multiple disciplines to create a common groundwork of conceptualization, experimentation, and explanation that anchor new lines of thinking and inquiry towards a deeper understanding of learning. The SLC program goal is to advance the frontiers of all the sciences of learning through integrated research; to connect the research to specific scientific, technological, educational, and workforce challenges; to enable research communities to capitalize on new opportunities and discoveries; and to respond to new challenges. The SLC portfolio represents synergistic, exciting research efforts that address many different dimensions of learning.

Each SLC's scientific and other activities are reviewed each year through a site visit review. In 2009, a Committee of Visitors (COV) review of the Science of Learning Centers reported it to be "a major success." In addition, an extensive program level evaluation will be conducted in 2013.

The first cohort of four SLCs was funded in FY 2004. One center was decommissioned in its second year due to its failure to show adequate progress. Support for the three remaining centers in this cohort -- Pittsburgh Science of Learning Center (PSLC), Learning in Formal and Informal Environments (LIFE), and the Center of Excellence for Learning in Education, Science and Technology (CELEST) – will end in FY 2014. The second cohort of three SLCs was funded in FY 2006. Of this cohort, support for the Visual Language and Visual Learning Center (VL2) will end in FY 2014 and support for the Temporal Dynamics of Learning Center (TDLC) and the Spatial Intelligence and Learning Center (SILC) will end in FY 2015.

The Directorate for Social, Behavioral, and Economic Sciences (SBE) initiated external discussion on the future of the SLC program and the science it supports. Following its May 2010 Advisory Committee (A/C) meeting, SBE established a subcommittee under the A/C to explore future directions for the Science of Learning. The subcommittee held one workshop at NSF in October 2012 and held a second workshop in February 2013; a report on findings will be presented at the May 2013 A/C meeting.

The FY 2014 Request is $19.0 million (-$1.37 below FY 2012 Enacted). This will support six SLCs. SBE will continue to oversee management of all six centers, with co-funding from the NSF Directorates for Biological Sciences, Computer and Information Science and Engineering, and Engineering. Since 2012, NSF's funding for the centers has started ramping down as the centers approach the end of their award periods.

Estimates for Centers Participation in 2012

(Dollars in Millions)

	Number Participating Institutions	Number Partners	Total FY 2012 NSF Support	Total Leveraged Support	Number Participants
Centers for Analysis & Synthesis	679	63	$26	$10	1,686
Centers for Chemical Innovation	85	67	$33	$4	591
Engineering Research Centers	621	252	$70	$125	3,964
Materials Centers	382	332	$56	$43	5,813
Nanoscale Science & Engineering Centers	593	544	$13	$47	3,500
Science & Technology Centers	227	581	$72	$56	2,629
Science of Learning Centers	53	220	$19	$33	971

No. of Participating Institutions: All academic institutions participating in activities at the centers.

No. of Partners: The total number of non-academic participants, including industry, states, and other federal agencies at the centers.

Total Leveraged Support: Funding for centers from sources other than NSF.

Number of Participants: The total number of people who use center facilities, not just persons directly support by NSF.

Centers Supported by NSF in FY 2012

Center	Institution	State
Centers for Analysis and Synthesis		
National Evolutionary Synthesis Center	Duke, NC State U, U of N. Carolina	NC
National Institute for Mathematical & Biological Synthesis	U of Tennessee-Knoxville	TN
Plant Science Cyberinfrastructure Collaborative	U of Arizona	AZ
SocioEnvironmental Synthesis Center	U of Maryland	MD
Centers for Chemical Innovation		
Chemistry at the Space-Time Limit (phase II)	U of California-Irvine	CA
Center for Aerosol Impacts on Climate and Environment (phase I)	U of California-San Diego	VA
Center for Chemical Evolution (phase II)	Georgia Institute of Technology	GA
Center for Enabling New Technologies through Catalysis (phase II)	U of Washington	WA
Center for Multiscale Theory and Simulation (phase I)	U Chicago	IL
Center for Nanostructured Electronic Materials (phase I)	U of Florida	FL
Center for Stereoselective C-H Functionalization (phase II)	Emory U	GA
Center for Sustainable Materials Chemistry (phase II)	Oregon State U	OH
Center for Sustainable Nanotechnology (phase I)	U of Wisconsin-Madison	WI
Center for Sustainable Polymers (phase I)	U of Minnesota-Twin Cities	MN
Center for Sustainable Renewable Feedstocks (phase I)	U of California-Santa Barbara	CA
CO2 as a Sustainable Feedstock (phase I)	Brown U	RI
Powering the Planet (phase II)	California Institute of Tech	CA
Quantum Information Center for Quantum Chemistry (phase I)	Purdue U	IN
Engineering Research Centers		
Biomimetic Microelectronic Systems	U of Southern California	CA
Biorenewable Chemicals	Iowa State U	IA
Center for Ultra-wide-area Resilient Electric Energy Transmission Network (CURENT)	U of Tennessee Knoxville	TN
Collaborative Adaptive Sensing of the Atmosphere	U of Mass-Amherst	MA
Compact and Efficient Fluid Power	U of Minnesota	MN
Extreme Ultraviolet Science and Technology	Colorado State	CO
Future Renewable Electric Energy Delivery & Mgmt. Systems	North Carolina State U	NC
Integrated Access Networks	U of Arizona	AZ
Mid-IR Tech for Health and the Environment	Princeton	NJ
Nanosystems ERC for Advanced Self-Powered Systems of Integrated Sensors and Technologies (ASSIST)	North Carolina State U	NC
Nanosystems ERC for Nanomanufacturing Systems for Mobile Computing and Energy Technologies (NASCENT)	U of Texas	TX
Nanosystems ERC for Translational Applications of Nanoscale Multiferroic Systems (TANMS)	U of California-Los Angeles	CA
Quality of Life Technology	Carnegie Mellon/U of Pittsburgh	PA
Quantum Energy and Sustainable Solar Technologies (QESST)	Arizona State U	AZ
Re-inventing the Nation's Urban Water Infrastructure	Stanford University	CA
Revolutionizing Metallic Biomaterials	North Carolina A&T U	NC
Sensorimotor Neural Engineering	U of Washington	WA
Smart Lighting	Rensselaer Polytechnic Institute	NY
Structured Organic Composites	Rutgers	NJ
Synthetic Biology	U of California-Berkeley	CA
Materials Centers		
Brandeis Materials Research Science and Engineering Center	Brandeis U	MA
Princeton Center for Complex Materials	Princeton	NJ
Center for Emergent Materials	Ohio State U	OH
Cornell Center for Materials Research	Cornell	NY
Center for Materials Science and Engineering	Massachusetts Institute of Tech	MA
Center for Multifunctional Nanoscale Materials Structures	Northwestern	IL
Quantum and Spin Phenomena in Nanomagnetic Structures	U of Nebraska	NE

Center for Nanoscale Science	Pennsylvania State	PA
Center for Nanostructured Interfaces	U of Wisconsin	WI
Center for Interface Structures and Phenomena	Yale	CT
Center for Photonics and Multiscale Nanomaterials	U. Michigan	MI
Center for Science and Engineering of Materials	California Institute of Tech	CA
Liquid Crystals Materials Research Center	U of Colorado-Boulder	CO
Laboratory for Research on the Structure of Matter	U of Pennsylvania	PA
Materials Research Center	U of Chicago	IL
Materials Research Science and Engineering Center	Harvard	MA
Materials Research Science and Engineering Center	Georgia Institute of Tech	GA
Materials Research Science and Engineering Center	New York U	NY
Materials Research Science and Engineering Center	U of California-Santa Barbara	CA
Materials Research Science and Engineering Center	U of Minnesota	MN
Materials Research Science and Engineering Center	U. Utah	UT
Materials Research Science and Engineering Center on Polymers	U of Massachusetts	MA
Renewable Energy Materials Science and Engineering Center	Colorado School of Mines	CO
Triangle Materials Research Science and Engineering Center	Duke	NC
Nanoscale Science and Engineering Centers		
Affordable Nanoengineering of Polymer Biomedical Devices	Ohio State	OH
Center for Environmental Implications of Nanotechnology (CEIN)	Duke	NC
Center for Integrated and Scalable Nanomanufacturing	U of California-Los Angeles	CA
High Rate Nanomanufacturing	Northeastern, U of New Hampshire, U of Mass-Lowell	MA, NH
Integrated Nanomechanical Systems	U of California-Berkeley, Cal Tech, Stanford, U of California-Merced	CA
Molecular Function at the Nano/Bio Interface	U of Pennsylvania	PA
Nanotechnology in Society Network: Center at ASU	Arizona State U	AZ
Nanotechnology in Society Network: Center at UCSB	U of California-Berkeley	CA
Nanoscale Chemical-Electrical-Mechanical Manufacturing Systems	U of Illinois-Urbana Champaign	IL
National Nanomanufacturing Network: Center for Hierarchical Manufacturing	U of Massachusetts-Amherst	MA
Predictive Toxicology Assessment & Safe Implementation of Nanotechnology in the Environment (CEIN)	U of California-Los Angeles	CA
Probing the Nanoscale	Stanford, IBM	CA
Templated Synthesis and Assembly at the Nanoscale	U of Wisconsin-Madison	WI
Science and Technology Centers		
An NSF Center for the Study of Evolution in Action	Michigan State U	MI
Center of Adv. Materials for the Purification of H2O with Systems[1]	U of Illinois-Urbana Champaign	IL
Center for Biophotonics Science and Technology[1]	U of California-Davis	CA
Center for Coastal Margin Observation and Prediction	Oregon Health and Science U	OR
Center for Dark Energy Biosphere Investigations	U of Southern California	CA
Center for Energy Efficient Electronics Science	U of California-Berkeley	CA
Center for Embedded Networked Sensing[1]	U of California-Los Angeles	CA
Center for Integrated Space Weather Modeling[1]	Boston U	MA
Center for Layered Polymeric Systems	Case Western Reserve U	OH
Center for Microbial Oceanography: Research and Education	U of Hawaii-Manoa	HI
Center for Multi-Scale Modeling of Atmospheric Processes	Colorado State U	CO
Center for Remote Sensing of Ice Sheets	U of Kansas	KS
Emergent Behaviors of Integrated Cellular Systems	MIT	MA
Emerging Frontiers of Science Information	Purdue U	IN
National Center for Earth Surface Dynamics[1]	U of Minnesota-Twin Cities	MN
Center on Materials and Devices for Info. Technology Research[1]	U of Washington	WA
Team for Research in Ubiquitous Secure Technology	U of California-Berkeley	CA
Science of Learning Centers		
Center for Excellence for Learning in Education, Science, & Tech.	Boston U	MA
Pittsburgh Science of Learning Center - Studying Robust Learning	Carnegie Mellon	PA

with Learning Experiments in Real Classrooms		
LIFE Center - Learning in Formal and Informal Environments	U of Washington	WA
Spatial Intelligence and Learning Center	Temple	PA
The Temporal Dynamics of Learning Center	U of California-San Diego	CA
Visual Language and Visual Learning	Gallaudet	DC

[1] These STCs from the FY 2002 cohort received extensions to their periods of performance in FY 2012 but no additional funding.