

INTEGRATED NSF SUPPORT PROMOTING INTERDISCIPLINARY RESEARCH AND EDUCATION (INSPIRE)

Overview

INSPIRE was established to address some of the most complicated and pressing scientific problems that lie at the intersections of traditional disciplines and to advance the NSF's strategic goal of *Transform the Frontiers*¹ and Performance Goal T-1: *Make investments that lead to emerging new fields of science and engineering and shifts in existing fields*. INSPIRE will strengthen NSF's support of interdisciplinary, potentially transformative research by complementing existing efforts with a suite of highly innovative Foundation-wide activities and funding opportunities. It responds to issues raised in a variety of external and internal publications, including a National Academies report² that identified barriers to interdisciplinary research (IDR), documents relating to the America COMPETES Reauthorization Act of 2010, the report of the NSF Facilitating Transformative and Interdisciplinary Research (FactIR) working group,³ and to perceptions in the research community that NSF does not always provide good opportunities for comprehensive review and support of unsolicited IDR proposals that cross traditional boundaries.

FY 2012		
Enacted/		
FY 2012	Annualized	FY 2014
Actual	FY 2013 CR	Request
\$29.10	\$20.35	\$63.00

Goals

Goal 1: NSF program officers will have the necessary tools and management support to empower cross-cutting collaboration and risk-taking in developing and managing their awards portfolio.

Goal 2: Researchers will submit and NSF will support a greater proportion of unusually novel, creative interdisciplinary proposals.

Approach

Approach 1: Toward Goal 1, INSPIRE seeks to empower program officers to overcome a variety of factors that create pressure toward funding of safe, conventional, disciplinary choices. INSPIRE provides financial incentives through co-funding and establishes an expectation that NSF management will promote a bolder interdisciplinary and potentially transformative vision. INSPIRE identifies changes to NSF systems and training practices to enable and facilitate interdisciplinary activities.

Approach 2: Toward Goal 2, while existing NSF programs support potentially transformative IDR through the agency's highly regarded merit review process, INSPIRE seeks to increase NSF's support of bold, high-risk interdisciplinary projects that transcend typical programmatic scope, through novel funding and merit review mechanisms. These mechanisms are intended to increase the community's submissions of such proposals and will provide additional funding for their support. The value of a

¹ *Empowering the Nation Through Discovery and Innovation: NSF Strategic Plan for Fiscal Years (FY) 2011-2016*, www.nsf.gov/news/strategicplan/index.jsp (2011).

² Committee on Facilitating Interdisciplinary Research, Committee on Science, Engineering, and Public Policy (2004). *Facilitating interdisciplinary research*. National Academies. Washington: National Academy Press.

³ Final Report, *Facilitating Transformative and Interdisciplinary Research (FactIR)*, www.inside.nsf.gov/od/factir/FacTIRFinalReport_091221.pdf (2009).

portfolio of merit review mechanisms at agencies has been called out in a recent PCAST report.⁴

The desired outcome will be a portfolio of novel, high-impact IDR projects and a larger community of researchers that develops and submits such proposals to NSF.

- **Lifecycle of activity:** The ramp-up phase of INSPIRE is planned to cover the five-year period of FY 2012-2016. After that, the awards programs are planned to maintain a steady state at that level, subject to a thorough review of INSPIRE as discussed below. Evaluation activities for each INSPIRE goal will be ongoing.
- **Mechanisms to be used:** INSPIRE will address its two goals through two approaches. Goal 1 will be addressed primarily through Approach 1, which focuses on how NSF supports science that may fall outside of the scope of existing NSF programs. In particular, Approach 1 activities will encompass improvements in business practices, funding culture, training, and evaluation. Goal 2 will be addressed primarily through Approach 2, which supports the development of new funding opportunities and mechanisms that encourage the pursuit of novel, creative projects. New INSPIRE funding mechanisms will signal to research communities the priority that NSF places on interdisciplinary and potentially transformative research.
- **Leadership structure and governance:** The NSF Office of International and Integrative Activities (OIIA) serves as the organizational lead for INSPIRE. The INSPIRE Working Group (IWG) was established to guide INSPIRE's activities and is co-chaired by members from OIIA and the research directorates. All research directorates and programmatic offices are represented. The IWG reports to the NSF Director through NSF's Senior Management Roundtable.
- **Scope within NSF:** By design, the scope of INSPIRE is broad. For Approach 1 activities, all research directorates and offices are engaged. In addition, the Office of Information and Resource Management (OIRM) and the Office of Budget, Finance, and Award Management (BFA) are called on to address issues, e.g., business systems, performance plans, and novel forms of evaluation. For Approach 2, each directorate participates by providing co-funding to support research projects. Funding from the Integrative and International Activities (IIA) budget line also provides matching support. Program officers from every research directorate and office are engaged in communicating the goals of INSPIRE to their communities and facilitating cross-Foundational partnering in the review and support of individual proposals. INSPIRE proposals can be in any field of science and engineering supported by NSF.
- **External stakeholders:** For the external research community, INSPIRE will establish a new high-visibility awards program to support pioneering, potentially transformative IDR, to build IDR communities, to foster IDR career pathways, and to provide interdisciplinary training of the scientific workforce.

⁴ President's Council of Advisors on Science and Technology, *Transformation and Opportunity: The Future of the U.S. Research Enterprise*, www.whitehouse.gov/sites/default/files/microsites/ostp/pcast_future_research_enterprise_20121130.pdf (2012).

Investment Framework

INSPIRE Funding by Directorate

(Dollars in Millions)

	FY 2012 Actual	FY 2012 Enacted/ Annualized FY 2013 CR	FY 2014 Request
Biological Sciences	\$3.06	\$2.00	\$4.00
Computer and Information Science and Engineering	3.84	0.50	5.00
Education and Human Resources	0.64	-	2.00
Engineering	2.99	-	6.00
Geosciences	0.86	2.00	6.00
Mathematical and Physical Sciences	1.97	3.00	7.00
Social, Behavioral and Economic Sciences	3.32	0.50	1.00
International and Integrative Activities	12.43	12.35	32.00
Total	\$29.10	\$20.35	\$63.00

Totals may not add due to rounding.

FY 2010-FY 2013

INSPIRE was announced in February 2011 in the NSF FY 2012 Budget Request to Congress, which included funding on the IIA budget line, to be augmented by co-funding from directorates and offices. The IWG was established in FY 2011, and program planning was initiated.

Under Approach 1, web-based inquiry and letter-of-intent forms were developed to enable principal investigators (PIs) to identify multiple NSF programs of interest and to enable program officers to more easily collaborate on evaluation of INSPIRE funding inquiries shared across programs; this became the pathway to eventual proposals and awards under Approach 2. Tracking of web-based inquiries was implemented, and text-based classification and clustering methods were developed to analyze the scientific content of the inquiries. In FY 2013 a statement of work is in progress for baseline data gathering and a feasibility study (see the Evaluation Framework section below). Review and improvement of internal practices, systems, and evaluation is ongoing.

Under Approach 2, the IWG designed the first INSPIRE award mechanism in FY 2012. It was initially called CREATIV, then simply referred to as INSPIRE, and now evolved into “INSPIRE Track 1” in FY 2013. INSPIRE Track 1 targets individuals and small investigator groups and is open to potentially transformative interdisciplinary ideas on any NSF-supported topic. Forty awards of up to \$1.0 million each, generally internally reviewed, were made for almost \$30.0 million in FY 2012.

In FY 2013, the program includes mid-scale “INSPIRE Track 2” awards of greater scope. These awards are chosen by a combination of internal and external review. Additionally, the program will make prestigious “Director’s INSPIRE Awards” to interdisciplinary individual investigators nominated by program officers from Track 1 submissions and selected by the NSF Director after a rigorous multi-stage process.

FY 2014 Request

In Approach 1, the baseline data and feasibility study will inform an outcome evaluation and impact

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assessment of the first two years of INSPIRE Track 1. The Track 1 outcome evaluation design will be modified as needed for INSPIRE Track 2 and Director's INSPIRE Awards, and an internal report will describe the modified design. In consultation with BFA and OIRM, NSF will begin a review to determine feasible improvements to eBusiness systems to facilitate IDR by allowing for interdisciplinary classification of proposals and awards, and will develop an implementation plan.

In Approach 2, the INSPIRE awards program will continue to ramp up to a total of \$63.0 million (with approximate breakdowns of: INSPIRE Track 1, \$23.0 million; INSPIRE Track 2, \$35.0 million; and Director's INSPIRE Awards, \$5.0 million).

FY 2015 – FY 2016

In Approach 1, the first two years of INSPIRE Track 2 and Director's INSPIRE Awards will be evaluated. In FY 2015, plan recommendations for changes to eBusiness systems will be implemented. These plans will continue in FY 2016.

In Approach 2, funding is planned to increase in FY 2015 and FY 2016, divided (approximately) between INSPIRE Track 1 (about 25% of funds), INSPIRE Track 2 (about 58% of funds), and Director's INSPIRE Awards (about 17% of funds).

Evaluation Framework

In FY 2011-2013, the primary tasks for evaluation were: (1) to develop a logic model for the INSPIRE funding mechanism, identify metrics, develop indices to estimate interdisciplinarity, and determine failure targets for high-risk research, and refresh the baseline of data that was collected in the 2007 proposer survey that was done as part of the IPAMM (Impact of Proposal and Award Management Mechanisms) study;⁵ and (2) to initiate a feasibility study to do (a) a short-term portfolio analysis, (b) a medium-term collection of data on outcomes from awards funded by INSPIRE and non-INSPIRE mechanisms, and (c) a long-term study plan for a possible impact study.

In FY 2014 and beyond, baseline results from previous years' portfolio of awards will make it possible to determine whether the new mechanism is resulting in types of awards that were not being funded with previous mechanisms. Case studies and qualitative assessments of the review process for projects with promising results are expected to provide helpful information. Analyses of the results from program monitoring will determine whether these results suggest that a rigorous impact evaluation is feasible.

Consistent with the goal of providing model business practices at NSF, INSPIRE aims to pilot new streamlined review procedures. NSF has made the mitigation of additional internal and external workload implications a high priority in formulating INSPIRE activities. In FY 2013, Letters of Intent were introduced and will be reviewed to establish the appropriateness of full proposal invitations. In this way, approximately 90 percent of inquiries are expected to be resolved without the internal workload associated with a proposal submission. As was the case for the FY 2012 CREATIV opportunity (now evolved into INSPIRE Track 1), most of the authorized INSPIRE full proposals will be awarded through internal review, placing no burden on the external reviewer community. The larger INSPIRE Track 2 and prestigious individual Director's INSPIRE Awards will involve an element of external review through the use of a Blue Ribbon Panel. The success of these pilot processes will be studied on an ongoing basis, including surveys and topical analyses to determine the extent to which INSPIRE has better positioned NSF to enable interdisciplinary and potentially transformative research.

⁵ www.nsf.gov/od/ipamm/ipamm_2007_survey.jsp