

## INTEGRATIVE ACTIVITIES (IA)

**\$315,740,000**  
**-\$110,820,000 / -26.0%**

### IA Funding (Dollars in Millions)

	FY 2016 Actual	FY 2017 (TBD)	FY 2018 Request	Change Over FY 2016 Actual	
				Amount	Percent
EAC	-	-	\$3.00	\$3.00	N/A
EPSCoR	160.03	-	100.00	-60.03	-37.5%
Graduate Research Fellowship Program	165.96	-	123.27	-42.69	-25.7%
INSPIRE	4.25	-	-	-4.25	-100.0%
Major Research Instrumentation	79.55	-	75.00	-4.55	-5.7%
NSF INCLUDES	1.90	-	2.00	0.10	5.0%
Planning and Policy Support	-	-	4.43	4.43	N/A
Research Investment Communications	3.14	-	3.14	-	-
Science and Technology Centers Class of 2016	5.00	-	-	-5.00	-100.0%
Science and Technology Centers Administration	0.99	-	0.90	-0.09	-9.4%
Science and Technology Policy Institute	4.74	-	4.00	-0.74	-15.6%
STAR METRICS	1.00	-	-	-1.00	-100.0%
<b>Total</b>	<b>\$426.56</b>	<b>-</b>	<b>\$315.74</b>	<b>-\$110.82</b>	<b>-26.0%</b>

The FY 2018 Budget Request for Integrative Activities (IA) is \$315.74 million. This request highlights NSF's continuing emphasis on building capacity across the research and education enterprise, including investments in the Established Program to Stimulate Competitive Research (EPSCoR). These investments are intended to improve the research competitiveness of U.S. states and territories ("jurisdictions") by investing in their academic infrastructure in areas of science and engineering that are supported by NSF and are also critical to that jurisdiction's long-range science and technology strategy. The Major Research Instrumentation Program (MRI) provides organizations with opportunities to acquire and/or develop shared state-of-the-art instrumentation that supports their research and research training goals. Investments in human infrastructure, through programs such as the Graduate Research Fellowship Program (GRFP) and NSF Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science (NSF INCLUDES), continue to be a major emphasis for NSF.

In FY 2018, there will be an agency-wide effort to encourage and support Convergence; this effort will focus on building a consensus on the definition of "convergence," generating calls for proposals that integrate convergence with other NSF Big Ideas, and identifying best mechanisms for reviewing convergent proposals. In addition, NSF will start to ramp up the NSF 2026 program, named in celebration of the Nation's Sestercentennial. NSF 2026 is an NSF Big Idea dedicated to supporting bold, long-term foundational research questions that will lead to major breakthroughs in science and engineering.

### About IA

IA expands the National Science Foundation's capacity for research and innovation through ideation, experimentation, and assessment. IA has five main goals:

- To strengthen alignment of NSF's activities with its mission;
- To enhance NSF's ability to solicit, review, award, and manage an evolving portfolio;
- To develop high-performance analytics and tools that will reveal new insights into the award portfolio and NSF's policies and practices;

## *Integrative Activities*

- To advance research infrastructure that will enable pioneering research across the United States;
- To promulgate an inclusive national education and research enterprise that supports the development of outstanding researchers.

### **FY 2018 Summary**

All funding decreases/increases represent changes over the FY 2016 Actual.

- Evaluation and Assessment Capability (EAC) funding in FY 2018 is \$3.0 million. It will focus on co-funding contracts for program evaluations, improvements in data quality, NSF-wide access to data analytics tools, and activities focused on informing organizational learning and improvement in the performance of NSF programs and day-to-day operations.
- EPSCoR (-\$60.03 million, to a total of \$100.0 million) funding in FY 2018 will focus on Research Infrastructure Improvement Track-1 awards, investments in NSF-supported areas of science and engineering that are aligned with science and technology priority areas as identified by the jurisdictions.
- GRFP invests (-\$42.69 million, to a total of \$123.27 million) in the U.S. in science, technology, engineering, and mathematics (STEM) human capital necessary to ensure the Nation's leadership in advancing innovations in science and engineering. GRFP selects, recognizes, and financially supports graduate students with demonstrated high potential for excellence in STEM and in their chosen careers. Applications are welcome from students in all STEM disciplines supported by NSF and in STEM interdisciplinary areas, including STEM education. Fellows have opportunities for international research through Graduate Opportunities Worldwide (GROW) and federal internships through Graduate Research Internship Program (GRIP). The program will support 1,000 new fellowships with a cost of education allowance of \$12,000 and a stipend of \$34,000. IA provides 50 percent of NSF's funding for GRFP, with the remainder provided by the Directorate for Education and Human Resources (EHR). For additional information on GRFP, see the discussion on Major Investments in STEM Graduate Education narrative in the NSF-Wide Investments chapter.
- In FY 2017, the Integrated NSF Support Promoting Interdisciplinary Research and Education (INSPIRE) pilot ended and a new funding mechanism encompassing elements of INSPIRE was developed; Research Advanced by Interdisciplinary Research and Engineering (RAISE). The RAISE mechanism supports bold, potentially transformative interdisciplinary research that transcends programmatic scope. RAISE guidelines are published in the 2017 NSF Proposal and Award Policy Procedures Guide and the funding mechanism is available to any researcher conducting transformational, interdisciplinary research in fields that NSF supports. Remaining FY 2016 INSPIRE funding will allow co-funding for about 5 RAISE awards at up-to-\$1.0-million each in FY 2017. Starting in FY 2018, IA co-funding will be eliminated and each directorate will support bold, potentially transformative interdisciplinary research through the RAISE mechanism, coordinating with other directorates and divisions, as necessary.
- The MRI program (-\$4.55 million, to a total of \$75.0 million) will continue to catalyze new knowledge and discoveries by empowering the Nation's scientists and engineers with state-of-the-art research instrumentation. The MRI program supports instrument acquisition or development, such as microscopes, spectrometers, cyberinfrastructure, genome sequencers, or telescopes. MRI also supports research-intensive learning environments that promote the development of a diverse workforce as well as facilitates academic and private sector partnerships.

- The goal of NSF INCLUDES (+\$0.10 million, to a total of \$2.0 million) is to develop a talented, innovative, and capable science and engineering workforce that reflects the diversity of our society. If the United States is to remain the world leader with respect to innovations and discoveries in STEM, it must identify and develop talent from all sectors of society to become tomorrow's STEM professionals. Providing opportunities and support for members of all communities and sectors across the Nation is both necessary for the Nation's economic welfare and as part of NSF's commitment to equity. NSF INCLUDES, which began in FY 2015, will be in existence through FY 2025.
- Planning and Policy Support funding in FY 2018 is \$4.43 million. This program supports select NSF-wide policy and planning activities, including support for workshops, conferences, and other long-term planning activities for NSF's Big Ideas. It also aggregates a number of similar activities previously supported elsewhere, including annual agency awards (the Vannevar Bush Award, Public Service Award, Alan T. Waterman Award, and National Medal of Science), and several summer science internship programs that target STEM students from underrepresented groups. The FY 2018 Budget Request will also fund NSF collaborations with the National Academies, including the Government-University-Industry Research Roundtable (GUIRR),<sup>1</sup> and the Committee on Science, Engineering, Medicine, and Public Policy (CoSEMPuP).<sup>2</sup>
- Research Investment Communications (RIC) funding in FY 2018 is \$3.14 million, equal to the FY 2016 Actual. RIC is a leading-edge communications effort that is essential for public awareness and support of science and engineering. RIC creates products and processes through traditional and social media platforms that make NSF's investments in science, technology, engineering, education, and mathematics readily available and easily understandable to everyone. In FY 2018, RIC will continue its focus on informing policy makers, the media, and the general public about the impact of NSF's investments on their daily lives and the Nation's future.
- The Science and Technology Centers: Integrative Partnerships (STC) program (-\$5.09 million, to a total of \$900,000) supports innovative, potentially transformative, complex research and education projects that require large-scale, long-term awards. STCs engage the Nation's intellectual talent through partnerships among academia, industry, national laboratories, and government. These collaborations create synergies that enhance the training of the next generation of scientists, engineers, and educators; and the creation of job opportunities. STCs have impressive records of research achievements as well as fostering strong partnerships with industry. The reduction in budget reflects the transfer of funding for the newest cohort of four STC awards from IA to the relevant managing directorates. The FY 2018 Request will provide support for post award management for the 12 existing centers.
- The Science and Technology Policy Institute (STPI) (-\$740,000, to a total of \$4.0 million) is a Federally Funded Research and Development Center (FFRDC) sponsored by NSF on behalf of the White House Office of Science and Technology Policy (OSTP).
- Science and Technology for America's Reinvestment: Measuring the Effect of Research on Innovation, Competitiveness, and Science (STAR METRICS) (-\$1.0 million, to a total of \$0 million) is an interagency pilot activity that represents a new approach to developing information on how NSF and other federal Research and Development (R&D) investments affect the innovation ecosystem. Funding is being eliminated as this pilot activity has served its purpose.

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<sup>1</sup> <http://sites.nationalacademies.org/pga/guirr/index.htm>

<sup>2</sup> <http://sites.nationalacademies.org/pga/cosepup/index.htm>

## **Program Monitoring and Evaluation**

EAC was established to provide NSF with enhanced capability to operate from a basis of evidence in program and policy decisions; to more consistently assess the influence of its investments; and to establish a culture of evidence-based planning and policy making. EAC has been responsible for establishing mechanisms for NSF-wide leadership and coordination in program and portfolio evaluation, providing expert support and resources for data collection, integration, and management, and improving NSF-wide evaluation capacity.

In FY 2017, EAC staff is evaluating five activities and has negotiated nine evaluation/monitoring contracts in collaboration with lead-directorates of the programs. Each of these projects is summarized below.

### **Internal Program Evaluations and Studies:**

- **Broader Impacts (BI).** This study focuses on the nature of BI evidence in proposals, review panel summaries, and annual reports. Findings from this ongoing project will inform guidance on how principal investigators, reviewers, and COV members consider broader impacts of the research.
- **Intergovernmental Personnel Act (IPA).** The purpose of this project is to assess the effect of the policy change requiring a mandatory 10 percent cost share on NSF's IPA program. Comprehensive results from the pilot, expected before the end of FY 2018, will inform NSF about the effects of that policy.
- **Innovations at the Nexus of Food, Water and Energy Systems (INFEWS).** The purpose of this study is to determine to what extent and how the scientific community has addressed all of the systems in their responses to the FY 2015 and FY 2016 NSF INFEWS solicitations. This will also address what changes this examination of the portfolio suggests for the next solicitation. Final results are anticipated before the end of FY 2017.
- **National Academies (NA).** The purpose of this project is to assess the impact of NSF-funded workshops and conferences convened by NA. Using data provided by NA and information gleaned from public websites, EAC is compiling information on number of report downloads, mention of NA studies in publications and legislation, and influence of such studies on NSF program solicitations. This work is ongoing and will be continually updated as NSF funds new awards to NA.
- **Patents.** This study examines patent data from the US Patent and Trademark Office (USPTO) for links to NSF awards. The results, such as time between the award of the grant and the subsequent patent, provide insights into the potential economic impacts of NSF investments.

### **External Program Evaluations and Studies:**

- **Broadening Participation (BP).** This study examines how BP investments are informing research, through empirical investigations of broadening participation issues or through broadening participation implementation research on what is making a difference. Final results are anticipated before the end of FY 2018.
- **Data Asset Inventory.** This study will develop an inventory and assessment of the data assets currently available to support inquiry of NSF investments in human capital, particularly graduate education (excluding GRFP) and workforce development. The overarching purpose is to determine if data elements can be added to ongoing collections or standardized across collections to reduce the burden of future monitoring and evaluation efforts. Final results are anticipated before the end of FY 2017.
- **GRFP.** This activity encompasses the development of a data collection system that can be used to describe the fellows' graduate school experiences and track career outcomes. This system, with a potential expansion to describe the education and career trajectories of all graduate students funded by NSF, is expected to be in place before the end of FY 2020.
- **NSF Innovation Corps (I-Corps™) Teams Program.** This longitudinal evaluation of the I-Corps™ Teams Program assesses the impact of the program on the team members as well as their academic

institutions. The results will shed light on how I-Corps™ extends the focus of the researchers beyond the research environment. Final results are anticipated before the end of FY 2018.

- Technical assistance for NSF INCLUDES. The purpose of this project is to offer evaluation-related technical assistance to support the initial development of design, implementation, and assessment support activities for the NSF INCLUDES Launch Pilots. Technical assistance services may consist of, but are not limited to, coaching and training, experienced consultation/facilitation, tools and resources, technology, and peer learning. This technical assistance will be provided until the end of FY 2019.
- Evaluation of NSF INCLUDES. This comprehensive, developmental program-level evaluation provides formative feedback to support continuous learning and improvement during the inaugural phase of the NSF INCLUDES initiative. It will assess the processes and progress for all Launch Pilot, Alliance, and Backbone efforts for the next few years. Final results are anticipated before the end of FY 2019.
- Research Experience for Undergraduates (REU). The primary purpose of this effort is to design, build, pilot, test, and present findings for a web-based longitudinal data collection system for tracking REU Site participants. Building an evaluation framework around this data collection effort will also facilitate the measurement of participant outcomes. Final results and a proposed evaluation framework are anticipated before the end of FY 2019.
- Secure and Trustworthy Cyberspace (SaTC). This study builds on STPI findings from a review of historical data from investments in cybersecurity from 2008 to 2011. The primary emphasis of the evaluation will be on data from the inception of SaTC in 2012 to the present. An understanding of how and in what ways SaTC makes collective progress toward its goals and objectives will inform the use of these findings to refine existing and future SaTC program level activities. Final results are anticipated before the end of FY 2019.
- Science, Engineering and Education for Sustainability (SEES). This evaluation of the SEES portfolio seeks to measure the success in terms of (1) the development of new knowledge and concepts that advance the overarching goal of a sustainable human future; (2) new and productive connections made among researchers in a range of disciplines; and (3) the development of a workforce capable of meeting sustainability challenges. Final results are anticipated before the end of FY 2018.

In FY 2017, EAC will initiate three new evaluation contracts, each of which is summarized below.

- Centers for Chemical Innovation (CCI). The purpose of this comprehensive assessment is to evaluate the effectiveness of the CCI program in achieving its stated goals. Key concepts of interest are influence of CCIs on the culture of and the nature of collaborative practices in the chemical sciences. The results of this study will be used to communicate the impact of the program and to strengthen the design and operation of the program. Final results are anticipated before the end of FY 2019.
- Established Program to Stimulate Competitive Research. The purpose of this evaluation is two-fold: (1) to develop a flexible framework to explore, define, and measure research competitiveness in relation to the unique jurisdictional contexts of each EPSCoR awardee; and (2) to collect and use evidence of jurisdictional progress toward research competitiveness over time for strategic program improvement. An understanding of how and in what ways progress is made towards increased research competitiveness will inform the use of these findings to refine existing and tailor future EPSCoR program level activities. Final results are anticipated before the end of FY 2020.
- Geoscience Education (GeoEd). This evaluation will inform strategic direction by describing the extent to which the GeoEd portfolio is contributing to and progressing toward the achievement of program goals. The purpose of this evaluation is three-fold, to: (1) develop a flexible framework to define, measure, and explore value and impact; (2) provide evidence of the range, synergies, and variability across factors contributing to impact over time; and (3) strengthen the practice of evaluative inquiry for program improvement among GeoEd decision makers and stakeholders. Final results are anticipated before the end of FY 2018.

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### Committee of Visitors (COV):

- In 2016, a COV reviewed the Major Research Instrumentation (MRI) program and generated a largely positive report, including 10 findings and 11 recommendations. Recommendations included strategies NSF might consider to increase gender diversity in the application pool, increased support for graduate students and novel mechanisms for development of very early stage instrumentation. NSF is preparing a response to the recommendations and will publish annual updates on the COV website. The next MRI COV is anticipated in 2021.
- In 2019, a COV will review the EPSCoR Program.
- In 2020, a COV will review the Science and Technology: Integrative Activities Program.

The Performance chapter provides details regarding the periodic reviews of programs and portfolios of programs by external Committees of Visitors and directorate Advisory Committees. Please see this chapter for additional information.

**ESTABLISHED PROGRAM TO STIMULATE  
COMPETITIVE RESEARCH**

**\$100,000,000  
-\$60.03 / -37.5%**

**EPSCoR Funding**  
(Dollars in Millions)

	FY 2016 Actual	FY 2017 (TBD)	FY 2018 Request	Change Over FY 2016 Actual	
				Amount	Percent
<b>Total</b>	<b>\$160.03</b>	<b>-</b>	<b>\$100.00</b>	<b>-\$60.03</b>	<b>-37.5%</b>
Research Infrastructure Improvement (RII)	131.00	-	95.00	-36.00	-27.5%
Co-Funding	27.90	-	4.00	-23.90	-85.7%
Outreach and Workshops	1.13	-	1.00	-0.13	-11.7%

EPSCoR funding in FY 2018 is \$100.0 million. EPSCoR assists NSF in its statutory function “to strengthen research and education in science and engineering throughout the United States and to avoid undue concentration of such research and education.” EPSCoR seeks to advance excellence in science and engineering research and education to achieve sustainable increases in research, education, and training capacity and competitiveness that will enable EPSCoR jurisdictions to have increased engagement in the science and engineering supported by NSF.

EPSCoR uses three strategic investment tools: Research Infrastructure Improvement (RII) awards, Co-Funding, and Outreach/Workshops.

**FY 2018 EPSCoR Summary**

In general, approximately 15 percent of the Section’s portfolio is available for new research grants and 85 percent is available for continuing grants.

All funding decreases/increases represent change over the FY 2016 Actual.

**Research Infrastructure Improvement (RII)**

- RII (-\$36.0 million, to a total of \$95.0 million) awards support development of physical, human, and cyber-based research infrastructure in EPSCoR jurisdictions with emphasis on collaborations among academic researchers, the private sector, and state and local governments to affect sustainable improvements in research infrastructure. These awards are designed to improve the research competitiveness of jurisdictions by strengthening their academic research infrastructure in areas of science and engineering supported by NSF and critical to the particular jurisdiction’s science and technology initiatives. RII awards also increase the participation of underrepresented groups in STEM and enable broader regional and topical collaborations among jurisdictions and facilitate the enhancement of discovery, learning, and economic development of EPSCoR jurisdictions.

**Co-Funding**

- Co-Funding (-\$23.90 million, to a total of \$4.0 million): EPSCoR co-invests with NSF directorates and offices on meritorious proposals from individual investigators, groups, and centers in EPSCoR jurisdictions that are submitted to the Foundation’s research and education programs, and to crosscutting initiatives such as clean energy and INFEWS. These proposals are merit reviewed in NSF disciplinary programs and recommended for award, but cannot be funded without the combined, leveraged support of EPSCoR.

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**Outreach and Workshops**

- The Outreach and Workshops (-\$130,000 to a total of \$1.0 million) component of EPSCoR solicits requests for workshops, conferences, and other community-based activities designed to explore opportunities in emerging areas of science and engineering, and to share best practices in strategic planning, diversity, communication, and other capacity-building areas of importance to EPSCoR jurisdictions. EPSCoR also supports outreach travel that enables NSF staff from all directorates and offices to directly engage and inform the EPSCoR research community about NSF opportunities, priorities, programs, and policies.

<b>Number of People Involved in EPSCoR Activities</b>			
	FY 2016	FY 2017	FY 2018
	Actual	(TBD)	Estimate
	Estimate		
Senior Researchers	644	-	400
Other Professionals	187	-	200
Postdoctoral Associates	96	-	40
Graduate Students	578	-	500
Undergraduate Students	624	-	300
K-12 Teachers	7,923	-	3,200
K-12 Students	92,910	-	58,700
<b>Total Number of People</b>	<b>102,962</b>	<b>-</b>	<b>63,340</b>