INTEGRATIVE ACTIVITIES (IA) **$491,040,000**
+$19,990,000 / 4.2%

IA Funding
(Dollars in Millions)

	FY 2018 Actual	FY 2019 (TBD)	FY 2020 Request	Change over FY 2018 Actual Amount	Change over FY 2018 Actual Percent
Convergence Accelerator	-	-	$60.00	$60.00	N/A
Evaluation and Assessment Capability	2.99	-	3.00	0.01	0.4%
EPSCoR	170.59	-	151.23	-19.36	-11.3%
Facility Operation Transition	-	-	10.00	10.00	N/A
Graduate Research Fellowship Program	142.27	-	128.45	-13.82	-9.7%
Growing Convergence Research	5.00	-	16.00	11.00	220.0%
HBCU Excellence in Research[1]	20.15	-	10.00	-10.15	-50.4%
Hispanic-Serving Institutions[2]	15.03	-	-	-15.03	-100.0%
Major Research Instrumentation	100.41	-	65.00	-35.41	-35.3%
Mid-scale Research Infrastructure	-	-	30.00	30.00	N/A
NSF 2026	-	-	6.50	6.50	N/A
NSF INCLUDES[3]	1.90	-	-	-1.90	-100.0%
Planning and Policy Support	3.94	-	2.10	-1.84	-46.7%
Research Investment Communications	3.47	-	3.47	-	-
STC Administration	0.56	-	0.55	-0.01	-1.1%
Science & Technology Policy Institute	4.74	-	4.74	-	-
Total	**$471.05**	**-**	**$491.04**	**$19.99**	**4.2%**

[1] In FY 2017, HBCU-EiR was funded at $10.0 million within the Integrative Activities budget. These funds were carried over into FY 2018, and supported awards made in FY 2018 ($20.15 million).

[2] In FY 2017, the HSI Program was funded at $15.0 million within the Integrative Activities budget. These funds were carried over into FY 2018, and supported awards made in FY 2018 ($15.03 million). EHR is responsible for the management of this program.

[3] NSF INCLUDES funding moves to EHR beginning in FY 2019.

The FY 2020 Budget Request for IA is $491.04 million. This request highlights NSF's continuing emphasis on building capacity across the U.S. research and education enterprise.

About IA

The IA budget is managed by the Office of Integrative Activities (OIA), which consists of three sections: Established Program to Stimulate Competitive Research (EPSCoR), Evaluation and Assessment Capability (EAC), and Integrative Activities.

Through its IA investments, NSF incubates new ideas and communities, supports innovation in research and NSF's own processes, and promotes integration across research and education domains. IA enhances the competitiveness of the Nation's research through activities that build capacity for science and engineering (S&E) and broaden participation in research and education. IA expands NSF's capability to gather and use evidence about the progress and impacts of its programs; and as S&E increasingly evolves towards transdisciplinary, convergence-style research and education, IA catalyzes new cross-cutting programs.

IA provides NSF stewardship for several of NSF's 10 Big Ideas: Growing Convergence Research (GCR), Mid-scale Research Infrastructure, and NSF 2026, as well as the NSF Convergence Accelerator activity. These novel programs support, respectively, innovative team science that crosses traditional domain boundaries, cutting-edge instrumentation, the ideation of broad research themes, and use-inspired, translational research.

IA enhances the capacity of jurisdictions, institutions, and individuals to conduct globally-competitive research. IA's jurisdictional and institutional capacity-based programs include EPSCoR, NSF's Historically Black Colleges and Universities Excellence in Research (HBCU-EiR) program, the Major Research Instrumentation (MRI) program, and Mid-scale Research Infrastructure. The Graduate Research Fellowship Program (GRFP) and the prestigious STEM honorary award program, the Alan T. Waterman award, are designed to grow the capacity of the U.S. research enterprise by investing in emerging talent. IA supports the Science and Technology Centers: Integrative Partnerships (STC) program, a center-scale program that promotes discovery and innovation through collaborative research and knowledge transfer.

FY 2020 Activities

NSF Convergence Accelerator

- Through an organizational structure called the NSF Convergence Accelerator (NSF C-Accel), NSF will continue to pilot a novel, phased approach to identifying, nurturing, and funding use-inspired research, moving ideas from discovery into practice. The first two research topics—(1) workforce skilling and reskilling, and (2) open data sharing—are derived from previous research in two of NSF's 10 Big Ideas, FW-HTF and HDR, which are well aligned with Administration priorities. NSF C-Accel will facilitate convergence and translational activities in these areas, especially by creating and leveraging external partnerships. To select the first cohort of PIs for each topic, a dear colleague letter issued in February 2019, will seek proposals for Phase 1 awards to be made in FY 2019. These awards would support six months of idea refinement, team-building, and preliminary research, culminating in a first round of pitches by spring 2020 for the next phase of support focused on building prototypes, developing experimental designs and other deliverables, as appropriate. For more information about NSF C-Accel, see the narrative in the NSF-Wide Investments chapter.

Evaluation and Assessment Capability

- EAC will continue the systematic and rigorous generation of evidence and facilitate its timely use to strengthen NSF's position as a leader in the evaluation and assessment of investments in S&E research, education, and infrastructure. With the support and advice of an agency-wide steering group of assistant directors and office heads, and a working group of program directors, EAC will:
  - harness high-quality evidence to inform organizational learning and support the achievement of organizational objectives;
  - employ timely recommendations from cost-effective, contracted evaluations; and
  - strengthen NSF's use of evidence in decision-making to achieve its mission.
- EAC will also work with programs to facilitate the development of continuous improvement frameworks, which can be used to guide program implementation and evaluation by identifying milestones and metrics to monitor progress.
- EAC will continue its collaboration with the OIRM Division of Information Systems (DIS) to enhance data quality and access. This collaboration is also making available machine learning tools for portfolio analyses and identifying reviewers for use by NSF staff.

Established Program to Stimulate Competitive Research

- EPSCoR investments assist NSF in its statutory function "to strengthen research and education in the sciences and engineering, including independent research by individuals, throughout the United States, and to avoid undue concentration of such research and education."

Facility Operation Transition

- The Facility Operation Transition is a pilot program that reflects NSF's strategic commitment to successful operations and maintenance (O&M) of new major facilities as well as balancing portfolio funding between facilities and investigator research, both of which were emphasized in the NSB's Congressionally requested 2018 report entitled "Study of Operations and Maintenance Costs for NSF Facilities" (NSB-2018-17).[1] NSB envisioned a more flexible MREFC account as one way to achieve these goals; owing to the challenges that would be introduced by maintaining separate construction and operations funding in the MREFC line, the recommended strategic funding is requested in the R&RA account instead. The funds in this activity will be used to (1) partially support initial O&M of new facilities so that the full O&M costs can be gradually absorbed into the managing division or directorate, and (2) partially support divestment of lower-priority facilities, the full cost of which may significantly impact individual division or directorate funding. A total of $10.0 million is requested in FY 2020 for this program. For more information about Facility Operation Transition, see the discussion in the overview of the Facilities chapter.

Graduate Research Fellowship Program

- GRFP supports the training of tomorrow's leaders in the research community. Funding for GRFP is evenly split between IA and EHR. NSF's FY 2020 GRFP funding will support 1,600 new fellows. Information on recent evaluations of GRFP may be found in the Major Graduate STEM Education narrative in the NSF-Wide Investments chapter.

Growing Convergence Research

- The GCR activity, as one of the enabling Big Ideas, supports basic research on novel, challenging, transdisciplinary questions. The unifying characteristics of these undertakings are that: (a) if successfully answered, they are likely to have a large impact, either on fundamental understanding in S&E or on our ability to meet pressing societal challenges, or both; and (b) they require the integration of knowledge, tools, and ways of thinking from multiple disciplines. GCR also aims to grow the next generation of convergence researchers. In FY 2020, GCR investments will support ten to twelve exploratory research collaborations and up to four capacity-building activities. For more information about GCR, see the narrative in the NSF-Wide Investments chapter.

Historically Black Colleges and Universities—Excellence in Research

- The HBCU-EiR program focuses on improving the research capacity and competitiveness of HBCUs by providing dedicated support for research opportunities at these institutions. IA will fund approximately 12 to 20 HBCU-EiR research grants awarded by NSF's S&E directorates.

Major Research Instrumentation

- MRI will continue to invest in advanced shared-use instrumentation at academic and other non-profit research organizations. The MRI request will enable support for an estimated 130 new awards for instrument development and acquisition across all of NSF's science and engineering research domains. MRI investments also contribute to research-intensive learning environments that promote the development of a diverse S&E workforce and facilitate partnerships between academia and the private sector.

[1] National Science Board, Study of Operations and Maintenance Costs for NSF Facilities (NSB-2018-17), May 2018, www.nsf.gov/pubs/2018/nsb201817/nsb201817.pdf.

Mid-scale Research Infrastructure – Track 1 (Mid-scale RI-1)

- The Mid-scale RI-1 activity funded through the IA budget within the R&RA account is one component of NSF's Mid-scale Research Infrastructure Big Idea. Mid-scale RI-1 investments support: (1) research infrastructure between approximately $6.0 million and $20.0 million, significantly advancing the Nation's research capabilities and serving to maintain U.S. leadership in global S&E; and (2) the design of future research infrastructure projects. For more information about NSF's Mid-scale Research Infrastructure investments, see the narrative in the NSF-Wide Investments chapter.

NSF 2026

- The NSF 2026 Big Idea, named in recognition and celebration of the Nation's 250th anniversary, supports bold research agendas that are large in scope, innovative in character, originate outside any particular discipline and require a long-term focus. Grand challenge initiatives that require an investment horizon of approximately ten years will be identified through an "Idea Machine," which invites broad community input through crowdsourcing, expert panels, and other mechanisms. In FY 2020, NSF 2026 will support workshops, Research Coordination Networks, and EArly-concept Grants for Exploratory Research (EAGERs) that engage the research community in refining and exploring the high-risk, high-reward research themes identified by the FY 2019 NSF Idea Machine. For more information about NSF 2026, see the narrative in the NSF-Wide Investments chapter.

NSF INCLUDES

Beginning in FY 2019, NSF INCLUDES funding will be provided through EHR, which is the steward for this NSF Big Idea. For more information about FY 2020 NSF INCLUDES activities see the narrative in the NSF-Wide Investments chapter.

Planning and Policy Support (PPS)

- The PPS program supports investments in activities, such as workshops, conferences, and long-term planning exercises, focused on emerging themes and agency innovations. PPS includes funding for Proposal Management Efficiencies, which comprise activities such as the NSF biennial survey and studies of NSF's merit review process. PPS supports the costs associated with the Alan T. Waterman award, the United States' highest honorary award for early career scientists and engineers, the National Science Board's Vannevar Bush Award and Public Service Award, and the National Medal of Science. It also supports summer science internship programs that target STEM students from underrepresented groups. PPS provides funding to the National Academies of Science, Engineering, and Medicine (the National Academies) for the Committee on Science, Engineering, Medicine, and Public Policy (CoSEMPuP),[2] as well as studies, workshops, and letter reports that have a scope that spans multiple research domains.

Research Investment Communications (RIC)

- RIC will continue its investment in 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 STEM readily available and easily understandable to everyone. In FY 2020, 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.

Science and Technology Centers: Integrative Partnerships Program

- STC Administration supports post-award management of STC awards, including site visits by review teams. Additionally, FY 2020 funding will support the management of the proposal competition that will determine the new STC cohort that is expected to start in FY 2021.

[2] CoSEMPuP webpage (http://sites.nationalacademies.org/pga/cosepup/index.htm).

Science and Technology Policy Institutes (STPI)

- STPI is a Federally Funded Research and Development Center sponsored by NSF on behalf of the White House Office of Science and Technology Policy (OSTP). STPI provides analysis of significant domestic and international science and technology policies and developments for OSTP and other federal agencies.

Program Monitoring and Evaluation

Evaluation and Assessment Capability Activities

Ongoing projects include:

- *Intergovernmental Personnel Act (IPA).* In FY 2017, NSF began piloting a requirement that all institutions provide a minimum of ten percent cost share for every IPA agreement. In parallel, EAC has been conducting a study of this pilot. The pilot and the study have continued into a second year with the results of the study expected later in FY 2019. This study is being conducted in collaboration with NSF OIRM.
- *Graduate Research Fellowship Program (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 is expected to be in place in FY 2020. This study is co-funded with EHR.
- *Research Experience for Undergraduates (REU).* The primary purpose of this effort is to design, build, pilot, test, and analyze options for a web-based, longitudinal data collection system for following the career trajectories of REU Site participants. This data collection effort will lay the groundwork for future analyses of participant outcomes. In FY 2018, this study was expanded to include International Research Experiences for Students (IRES) in collaboration with OISE. Results are anticipated in FY 2019. This study is co-funded with EHR and OISE.
- *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 of all Launch Pilots, Alliances, and Coordination Hub projects. Results from this developmental phase of the project are anticipated in FY 2019. This study is co-funded with EHR, CISE, GEO, and MPS.
- *I-Corps™ Teams Program.* This longitudinal evaluation of I-Corps™ teams focuses on how the program affects the participants 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. Data collection completed in FY 2018. The preparation of the project report is underway, and results are anticipated in FY 2019. This study is co-funded with ENG.
- *SaTC.* This study builds on STPI findings from a review of historical data from early investments in cybersecurity core programs from 2008 to 2011. The primary emphasis of this evaluation is on data from the inception in FY 2012 of SaTC, an NSF cross-cutting program, to the present. An understanding of how and in what ways SaTC makes collective progress toward its talent development goals and objectives will inform the use of these findings to refine existing and future SaTC program level activities. Data collection has begun, and initial findings will be presented to NSF in spring 2019. Final results are anticipated before the end of FY 2020. This study is co-funded with CISE.
- *Centers for Chemical Innovation (CCI).* The purpose of this comprehensive assessment is to understand how the CCI program achieves its stated goals. Of particular interest is an understanding of the nature of collaborative practices in the centers. The results of this study will be used to communicate how the program functions and to strengthen its design and operation. Preliminary reporting of findings from analyses of agency administrative data and publication records is underway. Results are anticipated in FY 2019. This study is co-funded with MPS.
- *EPSCoR.* The purpose of this evaluation is two-fold: (1) to develop a flexible framework to explore, describe, and measure research competitiveness in relation to the unique contexts of each EPSCoR jurisdiction; 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 EPSCoR program-level activities. The final project planning activities have been completed and the study team is finalizing the framework and proposed data analyses. Results are anticipated in FY 2020. This study is co-funded with EPSCoR.

In 2018, two evaluations were completed, and their reports were submitted to NSF:

- *Geoscience Education (GeoEd).* This evaluation describes the extent to which the GeoEd portfolio is contributing to and progressing toward the achievement of program goals. The purpose of this evaluation was three-fold: (1) to develop a flexible framework to define, measure, and explore value and outcomes; (2) to provide evidence of the range, synergies, and variability of factors contributing to impact over time; and (3) to strengthen the practice of evaluative inquiry for program improvement among GeoEd decision-makers and stakeholders. The results are being used to develop a strategic plan. The evaluation concluded in August 2018 with a final report and presentation delivered to internal NSF stakeholders. EAC staff facilitated a review of the report and incorporation of findings in a strategic visioning process that concludes in March 2019. This study was co-funded with GEO.
- *Science, Engineering, and Education for Sustainability (SEES).* This evaluation examined the extent to which the SEES portfolio achieved its goals as measured by: (1) the creation of new knowledge and conceptual understanding; (2) the existence and enhancement of productive connections between and among researchers across disciplines; and (3) the creation of a workforce able to handle future sustainability challenges. The study, which compares SEES projects with non-SEES projects, found that the SEES projects were successful in bringing together multiple perspectives and developed more extensive principal investigator (PI) networks. SEES PIs found that dissemination and outreach also yielded new research ideas.

<u>Evaluation and Assessment Capability Related Activities</u>

- In the spring and early summer of 2018, EAC participated in NSF's Strategic Review (SR) process, in which federal agencies assess their progress towards on their strategic objectives.
  - EAC staff co-lead one SR, on developing a Learning agenda for NSF INCLUDES. Learning agendas are a systematic approach to engaging stakeholders in asking questions with answers that yield evidence to inform decision-making and policy action to enhance performance of programs and other organizational units, including the agency as a whole. The NSF INCLUDES Learning Agenda Strategic Review laid the groundwork for the development of a learning agenda on which EAC began working at the start of FY 2019, in collaboration with EHR.
  - The other four SRs covered the four pillars of Renewing NSF and were facilitated by EAC. In FY 2019, EAC will continue to support the implementation of Renewing NSF by leading the monitoring and assessment of progress.
- FY 2019 EAC related activities include the ongoing projects described above. In addition:
  - EAC will focus on gathering evidence to describe the implementation of two of NSF's 10 Big Ideas, NSF INCLUDES and GCR, as well as NSF C-Accel. The evidence thus generated will be used to inform day-to-day operations and performance improvement as these activities mature. EAC will also continue to monitor the progress of Renewing NSF.
  - EAC, in collaboration with NSF's Office of Diversity and Inclusion, has begun to investigate the requirements for a potential monitoring system to understand the effects of NSF's policy on sexual harassment, announced in September 2018.
- In FY 2020, the GRFP, SaTC, and EPSCoR projects will continue, as will the work focused on NSF's 10 Big Ideas and NSF C-Accel. EAC will also lead NSF's response to the forthcoming OMB guidance and enable implementation of the requirements of the Foundations for Evidence-Based Policymaking Act of 2018 (FEBP, P.L. 115-435). In FY 2020, EAC will engage in new collaborative evaluation projects in accordance with NSF's priorities.

Workshops and Reports:

- In FY 2018, with the National Institutes of Health and other agencies, NSF co-funded studies by the National Academies on:
  - The role of inducement prizes in spurring innovation. A public workshop on the role of inducement prizes is anticipated in spring 2019, with release of a final report in early 2020;
  - The sexual harassment of women in academic sciences, engineering and medicine. A report entitled "Sexual Harassment of Women: Climate, Culture, and Consequences in Academic Sciences, Engineering, and Medicine" was released by the National Academies in June 2018; and
  - How to address the under-representation of women in science, engineering and medicine. A symposium highlighting evidence-based interventions for addressing the underrepresentation of women in science, engineering, and medicine will be held in March 2019.
- In FY 2017 and FY 2018, NSF funded a National Academies study of reproducibility and replicability in science. The release of that study report is anticipated in April 2019. NSF also funded a workshop on environmental and security science, held in October 2018, with a report anticipated by summer 2019.

Committees of Visitors (COV):

- In 2018, none of the IA programs held a COV.
- In 2019, none of the IA programs will hold a COV.
- In 2020, COVs will review the EPSCoR and MRI programs.

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 (EPSCOR) **$151,230,000**
-$19,360,000 / -11.3%

EPSCoR Funding
(Dollars in Millions)

	FY 2018 Actual	FY 2019 (TBD)	FY 2020 Request	Change over FY 2018 Actual Amount	Percent
Total	**$170.59**	**-**	**$151.23**	**-$19.36**	**-11.3%**
Research Infrastructure Improvement (RII)	142.20	-	125.94	-16.26	-11.4%
Co-Funding	27.59	-	24.50	-3.09	-11.2%
Outreach and Workshops	0.79	-	0.79	-	-

About EPSCoR

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, enhancing the competitiveness of EPSCoR jurisdictions in the science and engineering domains supported by NSF.

In general, about 12 percent of the EPSCoR portfolio is available to support new research grants. The remaining 88 percent supports grants made in prior years.

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

Research Infrastructure Improvement (RII)

- RII awards will continue to 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 effect 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 invest in workforce development, increase the participation of underrepresented groups in STEM, enable broader regional and topical collaborations among jurisdictions, and facilitate the enhancement of discovery, learning, and economic development of EPSCoR jurisdictions.

Co-Funding

- 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, including crosscutting initiatives.

Outreach and Workshops

- The Outreach and Workshops 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.

People Involved in EPSCoR Activities

Number of People Involved in EPSCoR Activities

	FY 2018 Actual Estimate	FY 2019 (TBD)	FY 2020 Estimate
Senior Researchers	573	-	600
Other Professionals	184	-	200
Postdoctoral Associates	103	-	100
Graduate Students	496	-	500
Undergraduate Students	462	-	600
K-12 Teachers	4,545	-	4,100
K-12 Students	115,331	-	102,200
Total Number of People	**121,694**	**-**	**108,300**