INTEGRATIVE ACTIVITIES (IA)

$545,860,000
+$159,840,000 / 41.4%

IA Funding
(Dollars in Millions)

	FY 2021 Actual	FY 2021 ARP Actual	FY 2022 (TBD)	FY 2023 Request	Change over FY 2021 Actual Amount	Change over FY 2021 Actual Percent
EPSCoR	$200.16	-	-	$247.25	$47.09	23.5%
Equity and Compliance in Research	-	-	-	4.00	4.00	N/A
Evaluation and Assessment Capability	5.67	-	-	7.00	1.33	23.5%
Facility Operations Transition	-	-	-	12.00	12.00	N/A
Growing Convergence Research	15.99	2.28	-	16.00	0.01	0.1%
Growing Research Access for Nationally Transformative Equity and Diversity (GRANTED)	-	-	-	50.00	50.00	N/A
HBCU Excellence in Research	18.81	-	-	37.93	19.12	101.7%
Major Research Instrumentation	75.05	-	-	75.00	-0.05	-0.1%
Mid-scale Research Infrastructure	32.45	-	-	50.00	17.55	54.1%
Modeling and Forecasting	-	-	-	3.00	3.00	N/A
Planning and Policy Support	2.10	-	-	2.50	0.40	19.1%
Research Investment Communications	5.24	-	-	5.40	0.16	3.0%
Research Security Strategy and Policy	-	-	-	2.50	2.50	N/A
STC Class of 2021	25.00	-	-	-	-25.00	-100.0%
STC Class of 2023	-	-	-	27.00	27.00	N/A
STC Admin[1]	0.81	-	-	0.60	-0.21	-25.5%
Science & Technology Policy Institute	4.74	-	-	5.68	0.94	19.8%
Total	**$386.02**	**$2.28**	**-**	**$545.86**	**$159.84**	**41.4%**

[1] FY 2021 Actuals for Science and Technology Center Administration include supplemental funding to STC awards from the 2013 and 2016 cohorts directed to individuals who have been disproportionately impacted by the COVID-19 pandemic. FY 2021 supplemental funding per STC cohort was $535,000 to 2013 Class and $250,000 to 2016 Class.

About IA

IA investments catalyze transformative advances in science and technology by incubating new ideas and communities, supporting innovation in research and in NSF's own processes, and promoting the integration of research and education. They enhance the competitiveness of the Nation's research through activities that build capacity for science and engineering (S&E) and broaden participation in research and research training. They expand NSF's capacity to use evidence for developing strategy and decision making.

IA invests in strategic activities that span the disciplinary spectrum, incubates new cross-cutting activities, and explores emerging ideas. IA provides a flexible mechanism to support emerging program priorities. Sustained strategic investments include instrumentation, infrastructure, and cross-cutting collaborative research.

IA provides funding for programs designed to enhance the ability of jurisdictions, institutions, and individuals to conduct globally competitive research. IA's jurisdictional and institutional capacity-

building programs include EPSCoR, NSF's Historically Black Colleges and Universities Excellence in Research (HBCU-EiR) program, and the Major Research Instrumentation (MRI) program. The Alan T. Waterman honorary award grows the U.S. research enterprise by investing in and recognizing emerging talent. IA also supports Science and Technology Centers: Integrative Partnerships (STC), a program that promotes discovery and innovation through center-scale collaborative research and knowledge transfer.

IA promotes and supports the use of evidence in NSF decision making, leads strategic planning for evidence-building activities, compiles data on key NSF processes, and conducts or oversees studies of NSF activities to guide continuous improvements.

IA FY 2023 Activities

Established Program to Stimulate Competitive Research (EPSCoR)

- 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."
- EPSCoR provides strategic programs and opportunities that stimulate sustainable improvements to EPSCoR jurisdictions' R&D capacity and capability. EPSCoR aims to stimulate research that enhances jurisdictional competitiveness in NSF disciplinary and multidisciplinary research programs, especially those that drive economic growth.
- At the FY 2023 Request level, increased funding will support activities in response to recommendations from two reports anticipated during FY 2022 (1) Future of NSF EPSCoR and (2) one issued by the Government Accountability Office report. Potential capacity-building activities may include extension of programmatic efforts to broaden participation of groups and institutions traditionally underrepresented in STEM research and education within EPSCoR jurisdictions, as well as the advancement of scalable, interjurisdictional research and development capacity across different institution types.

Equity and Compliance in Research

- In FY 2023, NSF will begin a new Equity and Compliance in Research investment. The requested funding will support NSF's diversity, equity, inclusion, and accessibility (DEIA) activities, which will include strategic planning and implementation, training and curriculum development, stakeholder engagement, complaint processing and investigation, and recruitment and outreach activities. These activities respond to recent executive orders (EO) (e.g., EO 14035 on Diversity, Equity, Inclusion, and Accessibility in the Federal Workforce;[1] EO 13985 on Advancing Racial Equity and Support for Underserved Communities Through the Federal Government;[2] and EO 14020 on Establishment of the White House Gender Policy Council[3]) and are informed by NSF's Racial Equity Task Force Report.

[1] www.whitehouse.gov/briefing-room/presidential-actions/2021/06/25/executive-order-on-diversity-equity-inclusion-and-accessibility-in-the-federal-workforce/

[2] www.whitehouse.gov/briefing-room/presidential-actions/2021/01/20/executive-order-advancing-racial-equity-and-support-for-underserved-communities-through-the-federal-government/

[3] www.whitehouse.gov/briefing-room/presidential-actions/2021/03/08/executive-order-on-establishment-of-the-white-house-gender-policy-council/

Evaluation and Assessment Capability (EAC)

- EAC engages in strategic planning of evidence-building activities in support of the Agency's mission. This includes leading the development of the Agency's learning agenda, annual evaluation plan, inventory and analysis of evidence-building activities, and other activities that support the generation and use of evidence for decision making.
- EAC oversees or conducts evidence-building activities—including evaluations, research, statistics, and other types of studies and analyses—in response to questions prioritized in the Agency's learning agenda, in the annual evaluation plan, or by leadership and staff in response to emerging needs, as experienced this past year in response to COVID-19.
- At the FY 2023 Request level, funding will support studies prioritized in the Agency-wide learning agenda and focused on enabling program improvements that enhance the efficacy of NSF investments. This funding enables EAC to provide needed Agency-wide support that complements the work conducted by NSF directorates and offices.

Facility Operation Transition

- Facility Operation Transition reflects NSF's strategic commitment to a smooth transition from MREFC to O&M funding of new major facilities, as well as achievement of a balanced portfolio between facilities and investigator research, both of which were emphasized in the NSB's Congressionally requested 2019 report entitled "Study of Operations and Maintenance Costs for NSF Facilities" (NSB-2018-17).[4] The Facility Operation Transition funding 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. For more information see the Facilities Overview narrative in the Major Facilities section of the Research Infrastructure chapter.

Growing Convergence Research (GCR)

- GCR supports basic research that uses novel, transdisciplinary approaches to solve complex problems. The unifying characteristics of these activities are that: (1) they have the potential to make a significant impact, either on fundamental understanding in S&E or on the Nation's ability to meet pressing societal challenges, or both; and (2) they require the deep integration of knowledge, tools, and ways of thinking from multiple disciplines. GCR also grows the next generation of convergence researchers. GCR incubates the capacity of research teams to address pressing, emerging research challenges that are large in scope, innovative in character, originate outside of any particular NSF directorate, and may require a long-term commitment. In FY 2023, GCR investments will support three to seven new research collaborations and the continuation of three to six projects begun in FY 2021.

Growing Research Access for Nationally Transformative Equity and Diversity (GRANTED)

- In FY 2023, NSF will invest in GRANTED, which will improve the Nation's research support and service capacity at emerging and underserved research institutions. In FY 2023, GRANTED activities will support the enhancement of research administration and post-award management, the implementation of effective practices for competitive proposal development, research-coordination networks (RCNs) and institutional partnership grants, and research enterprise hubs in different geographic regions. GRANTED funding in FY 2023 will focus on support for minority-

[4] www.nsf.gov/pubs/2018/nsb201817/nsb201817.pdf

serving institutions and aim to mitigate the barriers to competitiveness at underserved institutions within the Nation's research enterprise as NSF contributes to the Administration's priority on equity. GRANTED will partner with national and regional professional societies to grow the Nation's research capacity within underserved communities and institutions. Additionally, GRANTED will facilitate the development of leadership in research administration as well as enhance institutional research administrative and research support infrastructure.

Historically Black Colleges and Universities – Excellence in Research (HBCU-EiR)

- The HBCU-EiR program focuses on improving the research capacity and competitiveness of HBCUs by supporting new research opportunities at these institutions. In FY 2023, IA will fund 40 to 75 HBCU-EiR research grants managed by NSF's S&E directorates, and supplements to support postdoctoral fellowships, as well as graduate and undergraduate students. Additionally, HBCU-EiR will build capacity for research teams to succeed in center-scale competitions.

Major Research Instrumentation (MRI)

- MRI invests in shared-use S&E research instrumentation. Approximately 140 new awards will support instrument development and acquisition in all of NSF's S&E domains. MRI's investments also contribute to research-intensive learning environments that enhance the training of a diverse S&E workforce and facilitate partnerships between academia and the private sector.

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 program. It aims to significantly advance the Nation's capabilities for conducting potentially transformative research and maintaining U.S. leadership in global S&E. Mid-scale RI-1 investments support: (1) the implementation of research infrastructure projects between $6.0 million and $20.0 million; and (2) the design of future mid-scale research infrastructure projects. In FY 2023, Mid-scale RI-1 will invest $50.0 million in projects emerging from the FY 2023 competition.

Modeling and Forecasting

- NSF will improve its analytical capability in support of advancing research, improving equity in science, and securing global leadership. NSF will expand its capacity to leverage modeling of internal and external data to generate timely and actionable insights to inform Agency strategy, investments, and programmatic decisions. NSF will harness big data (both structured and unstructured) and data science (including AI techniques such as machine learning) to automate analytical modeling in response to Agency priorities. These priorities include monitoring participation in NSF programs, promoting partnerships, and assessing the outcomes of NSF's investments to advance scientific discovery and achieve societal goals. Results of this work will provide valuable information to promote excellence in achieving NSF's mission.

Planning and Policy Support (PPS)

- PPS includes funding for a wide range of activities, many of which are focused on generating evidence and convening stakeholders in support of planning, policy development, and management efficiencies. Examples include conducting NSF's biennial survey of principal investigators and reviewers, supporting studies of NSF's merit review process, engaging in annual agency award activities (such as the Alan T. Waterman Award and National Medal of Science), and supporting summer science internship programs that target STEM students from

underrepresented groups. PPS also provides funding to support collaborations with the National Academies of Science, Engineering, and Medicine (the National Academies) for the Committee on Science, Engineering, Medicine, and Public Policy (CoSEMPuP),[5] the Federal Demonstration Partnership,[6] and studies, workshops, and letter reports spanning multiple research domains. In FY 2023, PPS will continue to invest in catalytic activities—workshops, conferences, and long-term planning exercises, focused on emerging themes and agency innovations—as well as capacity-building activities for national priorities.

Research Investment Communications (RIC)

- RIC invests in leading-edge communication essential to build public and stakeholder awareness and support for S&E. RIC creates products and processes through various digital platforms to make NSF's investments in STEM readily available and easily understandable to everyone. In FY 2023, RIC informs policy makers, stakeholders, the media, and the general public about the impact of NSF's investments on their daily lives and the Nation's future.

Research Security Strategy and Policy

- In FY 2023, NSF will continue expanding capabilities and competencies to protect the U.S. science and engineering enterprise through its Research Security Strategy and Policy activity. Major components and activities of NSF's Research Security portfolio implemented and available by FY 2023 include: developing a common framework for understanding research security within the U.S. research community and with international colleagues; in partnership with other federal research agencies, establishing uniform mechanisms for research investigators to provide consistent information (i.e., their appointments, activities, and sources of financial support); and creating new analytic capabilities to proactively identify conflicts of commitment and vulnerabilities of pre-publication research. Furthermore, NSF develops and refines staff training resources to ensure a clear understanding of research security issues, NSF disclosure requirements, and the tenets of beneficial international collaboration. Several of these activities are responsive to the January 2022 National Science and Technology Council implementation guidance for National Security Presidential Memorandum 33 (NSPM-33) on National Security Strategy for United States Government-Supported Research and Development.[7] NSF's overall activities respond to the JASON report, "Fundamental Research Security,"[8] which was commissioned by NSF and published in December 2019, as well as subsequent legislation passed by Congress. Additionally, NSF will commission a JASON study in FY 2022 to provide guidance on the establishment of a Research on Research Security funding program that is expected to issue awards beginning in FY 2023.
- FY 2023 funding for NSF's Research Security activity is $2.50 million and will support the Research on Research Security program, which will support partnerships and collaborations of U.S. federal agencies and non-profit organizations. Primary goals of the program will include assessment of the characteristics that distinguish research security from research integrity, improving the quantitative understanding of the scale and scope of research security risks, developing methodologies to assess the potential impact of research security threats, and assessing the additional research security risks in an innovation system that includes more use-inspired

[5] www.nationalacademies.org/cosempup/committee-on-science-engineering-medicine-and-public-policy
[6] www.thefdp.org/default/
[7] www.whitehouse.gov/wp-content/uploads/2022/01/010422-NSPM-33-Implementation-Guidance.pdf
[8] www.nsf.gov/news/special_reports/jasonsecurity/JSR-19-2IFundamentalResearchSecurity_12062019FINAL.pdf

research rater than staying well within the bounds of fundamental research. FY 2023 funding will also continue support for a program partnering with the federal government interagency community to develop training resources for the research community.

- In FY 2021, NSF funded a JASON study on cybersecurity[9] at NSF's major research facilities; in response to the JASON recommendations, NSF is developing new guidance for these research facilities and strengthening its major facility oversight in this area.

Science and Technology Centers: Integrative Partnerships Program (STC)

- The STC program supports exceptionally innovative, complex research and education projects that require large-scale, long-term awards. STCs engage the Nation's intellectual talent in world-class research through partnerships across academia, industry, national laboratories, other public and private entities, and via international collaborations. These partnerships create synergies that enhance the training of the next generation of scientists, engineers, and educators and contributes to NSF's mission to broaden the participation of members of underrepresented groups in STEM. Examples of the foci of current centers include improving agricultural production via programmable plants based on digital biology; new technologies and solutions to limit the need for phosphorus use in agricultural practice, while reducing its harmful environmental impacts; advancing the understanding of Earth's climate; realizing a new generation of optoelectronic materials and devices; creating atomic-scale devices and systems based on quantum materials; and elucidating the mechanisms and architecture of intelligence in the human brain. In FY 2023, $27.0 million supports the first year of five Class of 2023 centers.
- STC Administration supports post-award management of STC awards, including site visits by review teams. FY 2023 funding includes program administration costs for the Class of 2023 competition.

Science and Technology Policy Institute (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.

[9] www.nsf.gov/news/special_reports/jasonreportcybersecurity/index.jsp

ESTABLISHED PROGRAM TO STIMULATE COMPETITIVE RESEARCH (EPSCOR)

$247,250,000
+$47,090,000 / 23.5%

EPSCoR Funding
(Dollars in Millions)

	FY 2021 Actual	FY 2022 (TBD)	FY 2023 Request	Change over FY 2021 Actual Amount	Percent
Total	**$200.16**	**-**	**$247.25**	**$47.09**	**23.5%**
Research Infrastructure Improvement	135.55	-	197.69	62.14	45.8%
Co-Funding	64.02	-	48.21	-15.81	-24.7%
Outreach and Workshops	0.60	-	1.35	0.75	126.4%

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 17 percent of the EPSCoR portfolio is available to support new research grants. The remaining 83 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 investments support development of physical, human, and cyber-based research infrastructure in EPSCoR jurisdictions, with an emphasis on collaborations among academic researchers, the private sector, and state and local governments, to affect sustainable improvements in research infrastructure. RII projects are designed to improve the research competitiveness of jurisdictions by strengthening their academic research infrastructure in areas of S&E supported by NSF that are critical to the jurisdiction's science and technology initiatives. In FY 2023, EPSCoR continues the RII Track-2: Focused EPSCoR Collaborations (RII Track-2 FEC), which builds inter-jurisdictional collaborative teams of EPSCoR investigators in scientific focus areas consistent with NSF priorities. These awards have a particular focus on the development of early career/junior faculty. In FY 2023, awards will support the Administration's R&D priority areas.
- In FY 2020, NSF EPSCoR established a memorandum of understanding with NASA EPSCoR with the goal of providing a new NSF/NASA activity within the existing RII Track-4: EPSCoR Research Fellows. This new opportunity, RII Track-4 Fellows Advancing in Science and Technology (RII Track-4 FAST), is intended to allow non-tenured principal investigators to further develop their individual research potential through extended collaborative visits to NASA Centers' research facilities located throughout the U.S. This activity targets faculty at minority-serving institutions, women's colleges, and primarily undergraduate institutions in EPSCoR jurisdictions. In FY 2023, this activity will be in its second cycle, and more NASA research centers may be added as research sites.

Co-Funding

- EPSCoR co-funding enables awards in response to meritorious proposals from individual investigators, collaborative groups, and center-scale teams based in EPSCoR-eligible jurisdictions. These proposals are submitted across all of the Foundation's research and education programs, including crosscutting initiatives, where they undergo merit review and are selected for award based on NSF's intellectual merit and broader impact criteria. EPSCoR prioritizes co-funding for awards that advance its programmatic goals, including those supporting new investigators. In FY 2020, the program began placing increased emphasis on providing co-funding support for center-scale projects and those that make major, potentially transformational impacts toward physical and cyberinfrastructure and the development of a diverse STEM workforce within EPSCoR-eligible jurisdictions. This emphasis will continue in FY 2023; however, at a reduced level. EPSCoR co-funding ensures support for projects that might not be funded without the combined, leveraged resources of EPSCoR and the managing programs.

Outreach and Workshops

- The Outreach component of EPSCoR solicits requests for workshops, conferences, and other community-based activities. These are designed to explore opportunities in emerging areas of S&E and to share best practices in strategic planning, diversity, communication, and other capacity-building areas of importance in 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.

Strategic Partnership and Evaluation Activities

- In FY 2023, NSF EPSCoR continues to implement a cohesive evaluation framework to study processes and outcomes that contribute to academic research competitiveness. EPSCoR will continue to identify and collect high-quality data from jurisdictions and will work with jurisdictions to use the framework to identify opportunities for increasing their competitiveness in NSF research programs and for other federal and private S&E funding.

People Involved in EPSCoR Activities

Number of People Involved in EPSCoR Activities

	FY 2021 Actual Estimate	FY 2021 ARP Actual Estimate	FY 2022 (TBD)	FY 2023 Estimate
Senior Researchers	815	-	-	1,000
Other Professionals	203	-	-	300
Postdoctoral Associates	133	-	-	200
Graduate Students	564	-	-	700
Undergraduate Students	684	-	-	800
K-12 Teachers	1,072	-	-	1,300
K-12 Students	24,336	-	-	30,100
Total Number of People	**27,807**	**-**	**-**	**34,400**