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Before the
Committee on Science, Space, and Technology
Subcommittee on Research and Technology
United States House of Representatives

"Oversight and Examination of the National Science Foundation's Priorities for 2025 and Beyond"

May 16, 2024

Introduction

Chairman Collins, Ranking Member Stevens, and Members of the Committee, it is a privilege to appear before you to today to discuss the U.S. National Science Foundation's (NSF) Fiscal Year (FY) 2025 Budget Request to Congress. This is an exciting time for science and technology, and we are seeing new breakthroughs every day in industries like artificial intelligence, quantum science, biotechnology, microelectronics, advanced manufacturing, and other emerging industries. For nearly 75 years, investments in the research enterprise have fostered advancements in knowledge and progress in technology that have made the United States a global leader in innovation. The FY 2025 Budget Request builds on that foundation to ensure that the nation will remain at the forefront of science and technology into the future.

In the National Science Foundation Act of 1950 (P.L. 81-507), Congress established the U.S. National Science Foundation and charged it with supporting research "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." Since then, NSF investments have driven economic growth, contributed to technology that enhances national security, strengthened the workforce, enabled breakthroughs in health and medicine, led to countless new technologies and consumer products, improved quality of life across the country, and sustained the nation's role as the international leader in scientific discovery and innovation.

In many cases, NSF investments in fundamental research led to critical outcomes, sometimes decades later, which were not foreseen. Many of today's transformational technologies, including artificial intelligence, quantum information science, and biotechnology, are the result of sustained investments going back several decades. Our future success depends on our ability to continue to expand the foundations of basic research, generate new knowledge and breakthroughs, and translate those discoveries into innovative new technologies.

The President's FY 2025 Budget Request of $10.183 billion is an essential investment in critical areas of research, education, discovery, and innovation that will make it possible to accelerate our progress, prosperity, and competitiveness. It builds on the historic framework laid out in the CHIPS and Science Act of 2022 for how we spur innovation and entrepreneurship, foster educational opportunities and enhance the workforce, and ensure that curiosity-driven exploratory research and use-inspired, solutions-oriented innovation continue to power the nation's growth, success, and leadership.

NSF's Three Pillars

NSF's vision for the future of the science and engineering community is built on three key pillars. The pillars are essential to how we achieve the ambitious goals of the CHIPS and Science Act of 2022 and ensure that investments like the FY 2025 Budget Request can realize their full potential.

The first pillar is to continually strengthen NSF's core mission to accelerate discovery and advance state-of-the-art research through ongoing and sustained investments in every area of fundamental, exploratory research. This is the engine that drives the nation's advancement of knowledge and enables the translation of new ideas, new information, and novel approaches into products, solutions, and benefits for people, consumers, and society. The more we invest in this engine, the more it will power growth, prosperity, success, and leadership for the nation.

The second pillar is that we must inspire more people to join the Science, Technology, Engineering, and Math (STEM) community, and we must especially create opportunities and pathways for the Missing Millions, the millions of people throughout the nation who have the talent and ability to be part of STEM but are not making their way into STEM careers. Only by building a strong, diverse, and broad workforce of the future will we be able to capitalize on new opportunities that are the foundation for our future success, competitiveness, and international leadership.

The third pillar is accelerating the Nation's technology and innovation enterprise by enabling researchers, industry, entrepreneurs, and innovators of all kinds to translate research into solutions, products, and benefits for society. This means fostering partnerships and nurturing talent so that innovation ecosystems can contribute to the economy and our nation's global competitiveness at speed and scale.

Four Strategic Themes

There are four strategic themes in the FY 2025 Budget Request. These themes are areas in which investments today are critical to our success tomorrow, and in which failure to take action now will put America's STEM enterprise and our international competitiveness at a disadvantage in the near future.

1. Advance Emerging Industries for National and Economic Security
2. Build A Resilient Planet
3. Create Opportunities Everywhere
4. Strengthen Research Infrastructure

These themes align with the Administration's priorities of expanding basic research to tackle grand national challenges and empowering new approaches to applied research that spur technology transfer. The themes, expanded upon below, span the broad portfolio of fundamental research that is the heart of NSF's mission. They also stimulate new efforts and connect existing efforts throughout the research portfolio and implement requirements of the CHIPS and Science Act.

Advance Emerging Industries for National and Economic Security

NSF's **Directorate for Technology, Innovation and Partnerships (TIP)**, the first new directorate at NSF in 30 years, sits at the crossroads of exploratory, curiosity-driven research and use-inspired, solutions-oriented innovation to drive translational research across all fields of science and engineering. This new directorate is a critical new approach in how NSF carries out its mission in today's high-tech economy, and for FY 2025, $900 million is requested for the TIP Directorate to support its work to ensure that the U.S. remains in the vanguard of technology competitiveness for the foreseeable future. TIP advances key technologies; accelerates the translation of research results from the laboratory to the market and society; addresses national, societal, and geostrategic needs; and cultivates new education pathways leading to a diverse and skilled future technical workforce comprising researchers, practitioners, technicians, entrepreneurs, and educators. The TIP Directorate collaborates closely with all of NSF's directorates and offices in its aims to usher in a new era for American innovation, accelerating research to impact and enhance job and economic growth and national security. Serving as a cross-cutting platform that leverages, energizes, and rapidly advances use-inspired research and innovation as well as workforce development across all STEM fields supported by NSF, TIP helps to ensure that the U.S. remains in the vanguard of technology competitiveness for the foreseeable future.

A major achievement for the TIP Directorate is the NSF Regional Innovation Engines (NSF Engines) program. In January of this year, NSF was proud to announce the inaugural NSF Engines awards, which – if fully funded – could represent one of the single largest broad investments in place-based research and development in the nation's history. Spanning more than 15 states, these initial NSF Engines will harness regional talent and partnerships to spur innovation in areas such as semiconductor innovation, energy, climate resilience, environmental sustainability, textiles, agriculture, and regenerative medicine. These innovation ecosystems will catalyze new business and economic growth in those regions of America that have not fully participated in the technology

boom of the past several decades. They will advance equitable and inclusive use-inspired research, entrepreneurship, and workforce development to nurture and accelerate regional industries. Collectively, they will contribute to long-term U.S. competitiveness. $205 million is requested for the NSF Engines for FY 2025.

The NSF Engines program is but one example of the agency's approach to spurring innovation, technological progress, and leadership in innovation across the nation. Additional programs include:

- The **NSF Convergence Accelerator** program will regionalize its approach to accelerate the translation of use-inspired research by investing in regional cohorts of transdisciplinary, multi- sector teams pursuing technology solutions to location-specific challenges in food and agriculture, disaster response and mitigation, and transportation, to name a few. $100 million is requested for Convergence Accelerator for FY 2025.
- The **NSF Accelerating Research Translation** (ART) program, in alignment with the CHIPS and Science Act authorization, will support institutions of higher education that wish to build the necessary infrastructure to boost their overall institutional capacity to accelerate the pace and scale of translational research. Importantly, ART will result in a network of ambassadors who will champion translational research throughout the Nation. $45 million is requested for ART for FY 2025.
- The **NSF Experiential Learning in Emerging Industries** (ExLENT) program will support inclusive experiential learning opportunities designed to provide cohorts of diverse learners with the crucial skills needed to succeed in the key technology focus areas and prepare them to enter the workforce ready to solve the Nation's most pressing societal, economic, national, and geostrategic challenges. $20 million is requested for ExLENT for FY 2025.
- NSF **Entrepreneurial Fellows**, authorized in the CHIPS and Science Act, will provide a diverse cohort of Ph.D.-trained scientists and engineers with the resources they need to bring promising ideas and technologies from the lab to market and society. These NSF Entrepreneurial Fellows will forge connections between academic research and government, industry, and finance, leading the way in technology translation. $10 million is requested for NSF Entrepreneurial Fellows in FY 2025.

Investments in **Emerging Industries** are especially important. These are areas of science and technology that will have enormous impacts on the economy and society and where U.S. leadership is critical to establishing foundations for future development that reflect the nation's values. By investing in our leadership today, we can ensure that each of these areas will continue to serve the interests of our economy, workforce, and communities into the future.

- **Artificial Intelligence**, including machine learning, autonomy, and related advances, investments will bring together numerous fields of scientific inquiry—including computer and information science; cognitive science and psychology; economics and game theory; education research; engineering and control theory; ethics; linguistics; mathematics; and philosophy—to advance the frontiers of trustworthy AI, including advancing perception, learning, reasoning, recommendation, and action in the context of specific fields and economic sectors. NSF investments are needed to develop new foundational AI theory and implementation

techniques, advance safety and security of AI systems, and foster novel AI methods that are inspired by use cases in specific application domains and contexts. NSF will play a key part in supporting implementation of the President's *Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence* (AI E.O.). For example, NSF investments in efforts such as the National AI Research Resource pilot will create opportunities for more researchers to access the computational, data, software, model and training resources needed to push the boundaries of AI and apply AI across areas of science and engineering. $729.16 million is requested for Artificial Intelligence for FY 2025.

- **Biotechnology**, including genomics and synthetic biology, investments will support fundamental and translational research, infrastructure, and education to understand and harness biological processes for societal benefit. It will propel advances in genomics, bioinformatics and data analytics, structural and computational biology, biophysics, synthetic and engineering biology, tissue and metabolic engineering, medical technology, the development of new types of biomaterials, bio-inspired data storage and microelectronics, and biomanufacturing, as well as accelerate the ability to harness biological systems to create goods and services that contribute to agriculture, health, security, manufacturing, and resilience to climate change, including natural and anthropogenic disaster prevention and mitigation. As part of the National Engineering Biology Research and Development Initiative codified in the CHIPS and Science Act, NSF investments in research at the intersection of the biological, physical, chemical, data, computational and information sciences and engineering, and social, behavioral and economic sciences will accelerate scientific understanding and technological innovation in engineering biology as well as assure public acceptance of the products of engineering biology. $421.18 million is requested for Biotechnology for FY 2025.
- **Advanced Manufacturing**, including robotics and sensing technologies, investments will accelerate breakthroughs in manufacturing materials, technologies, and systems through fundamental and translational, multidisciplinary research that transforms manufacturing capabilities, methods, and practices. NSF investments will further advance manufacturing through advanced energy and industrial efficiency technologies, resilient manufacturing strategies, novel methods in engineering biology, next-generation materials, and the power of data science, automation, robotics, and machine learning to intelligently design and develop future approaches that are secure, sustainable, and resilient to natural and anthropogenic disasters. $386.67 million is requested for Advanced Manufacturing for FY 2025.
- **Quantum Information Science (QIS)**, including quantum computing and simulation, will advance fundamental understanding of uniquely quantum phenomena that can be harnessed for information processing, transmission, and measurement in ways that classical approaches do less efficiently, or not at all. Current and future applications of QIS differ from prior applications of quantum mechanics by using distinct properties that do not have classical counterparts. The development of new applications for QIS will lay the groundwork for one of the major technological revolutions of the 21st century. NSF investments are a key component of the National Quantum Initiative (NQI), aligning with the Administration's focus on critical and emerging industries. $294.37 million is requested for Quantum Information Science for FY 2025.
- **Microelectronics and Semiconductors**, including advanced computer hardware, investments will address the microelectronics and semiconductor challenges facing our Nation due to

technological and global trends, such as the end of Moore's Law and offshoring of semiconductor fabrication and manufacturing. NSF will advance novel semiconductor design and manufacturing, enabling future advanced computing systems, including quantum computing and networking technologies. Investments will also advance next-generation materials and highly parallel chip designs that will improve the performance of AI algorithms as well as integrate advanced energy efficiencies for low-power and high-performance devices that will drive a mobile and wireless future, and smart sensors that will interface between biosystems and electronics. $174.97 is requested for Microelectronics and Semiconductors for FY 2025. Additionally, the CHIPS and Science Act provides NSF with $200 million over five years for semiconductor workforce development activities.

- **Advanced Wireless**, including communications and immersive technology, investments will bridge knowledge gaps and advance innovations in areas critical to future generations of communications technologies, networks, and services, such as novel wireless devices, circuits, protocols, and systems; mobile edge computing; distributed machine learning and inference on mobile devices; human-machine-network interactions; ultra-low-latency connections; and dynamic spectrum allocation and sharing, all while ensuring security for all users. This investment will serve to advance both new active spectrum applications and spectrum used for non-commercial purposes, such as advanced receiver design and interference mitigation techniques for radio astronomy and atmospheric science. Additionally, NSF co-chaired the formulation of a 2021 *National Strategy to Secure 5G Implementation Plan,* which noted that fifth-generation wireless networks will spur innovation and enable the development of new markets, products, and services, thereby contributing to economic growth and job creation. Of particular importance in the *Secure 5G Implementation Plan* was the need to invest in the security and resiliency of these networks; NSF's Resilient and Intelligent Next-Generation Systems (RINGS) program, in collaboration with two other federal agencies and nine companies, is directly aligned with this emphasis. NSF continues to be a leader in the development of Open Radio Access Networks (O-RANs); the FY 2025 Request will build upon efforts initiated in FY 2024 to augment testing and validation of O-RAN systems via the Platforms for Advanced Wireless Research (PAWR) testbeds, which are jointly funded by NSF and an industry consortium comprising more than 35 companies and associations. Finally, through programs like RINGS and PAWR, NSF will accelerate the lab-to-market translation of innovative research outcomes in academic and government labs to successful products and services for the benefit of society. $167.90 million is requested for Advanced Wireless for FY 2025.

Build A Resilient Planet

- **U.S. Global Change Research Program (USGCRP)** ($897.18 million) supports research that contributes to the USGCRP goals to (1) advance scientific knowledge of interconnected natural and human systems and risks to society from global change; (2) build global capacity to respond to global change through international cooperation and collaboration; (3) enhance the Nation's ability to understand and respond to global change by expanding participation in the Federal research enterprise; and (4) provide accessible, usable information to inform decisions on mitigation, adaptation, and resilience. In FY 2025, NSF will expand its activities related to risk

and resilience, including efforts that will improve climate hazard and disaster resilience in communities, develop technologies needed to advance resilience research, support research on the human health implications of climate change, and grow the human capital to take on the climate challenges of today and tomorrow. NSF will also initiate activities for new approaches related to design in extreme environments.

- **Clean Energy Technology (CET)** ($500.52 million) investments are designed to identify and support transformative research to advance U.S. leadership in the clean energy transition and meet the U.S. Net Zero objectives for 2030 and beyond. NSF's investments in integrated clean energy research and education span longstanding programs as well as focused new solicitations and will support high-risk, high-reward research ideas across the science and engineering spectrum that create broad new understanding and innovations to support energy efficiency, enhance sustainability, support net-zero solutions for decarbonization, adapt to and mitigate climate change, spawn new industries and transform existing industries, and support translation and partnerships for innovation, as well as education and workforce development. NSF also will support multidisciplinary research in areas such as affordable green housing and sustainable systems for clean water, clean transit, and other infrastructure. In FY 2025, investments will focus on fundamental and convergent research, energy research infrastructure, innovation and translation, and education and workforce development.
- NSF will continue investments in **greenhouse gas (GHG) research** ($69.50 million), where NSF-funded projects will develop measuring strategies as well as reporting and verification systems with an emphasis on methane.
- Examples of other programs supported within the Build a Resilient Planet Theme in FY 2025 include further development of the **National Discovery Cloud (NDC) for Climate** ($30.0 million), a resource that will federate advanced computational, data, software and networking resources, democratizing access to a cyberinfrastructure ecosystem that is increasingly necessary to further climate-related S&E, and the **Focus On Recruiting Emerging Climate and Adaptation Scientists and Transformers (FORECAST**) ($15.0 million) program, which centers on individuals from communities that have traditionally been underrepresented in STEM, making resilience research relevant to students and equipping participants with the broader skills necessary to excel in their future endeavors inside and outside academia.

Create Opportunities Everywhere

Today, ideas have been democratized in a significantly new way. Only a few decades ago, cutting-edge information in science and technology was largely confined to universities, research institutions, and industry R&D. But today, even the most advanced research knowledge is often only a click away online and the resources necessary for developing high tech applications and products are more accessible than ever to more people than ever. While ideas have been democratized, opportunities have not. These investments represent NSF's strategic commitment to developing the future-focused STEM workforce that enables Americans from every demographic, in every part of the country, to develop the skills and capabilities necessary to make the most of every new idea.

This is a comprehensive approach for attracting, supporting, and advancing opportunities for groups underrepresented in STEM. It is a whole-of-NSF strategy that incorporates all directorates and

offices and surpasses prior efforts by striving to ensure equity in program delivery. It focuses on expanding access and inclusion in STEM along individual, institutional, and geographic lines.

To accomplish the essential goal of building the large, robust STEM workforce necessary to rapidly capitalize on every new idea, NSF relies on four guiding principles.

1. Address research equity
2. Build capacity
3. Foster collaboration and partnerships
4. Build in support for future generations

In FY 2025 we are building on existing investments to expand and scale Broadening Participation efforts by incorporating them into NSF's core research portfolio. For *individuals*, NSF will continue to make investments in democratizing STEM education and workforce. For *institutions*, NSF will be more intentional about how it engages Minority-Serving Institutions and Emerging Research Institutions in its formal and informal programs. For *jurisdictions,* NSF will expand support in EPSCoR jurisdictions to ensure geographic diversity.

NSF's commitment to finding talent provides opportunities that build strong STEM pathways that lead to a well-paid workforce and support the U.S. economy. Key investments include these areas:

- **Graduate Research Fellowship Program** ($341.11 million) will support 2,300 new fellows in FY 2025.
- **Established Program to Stimulate Competitive Research (EPSCoR) Office** ($258.37 million) 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 and geographic diversity. Also, pursuant to the CHIPS and Science Act, all NSF research divisions will commit additional support for meritorious proposals from EPSCoR jurisdictions.
- **Hispanic-Serving Institutions (HSI)** ($55.92 million) program seeks to enhance the quality of undergraduate STEM education at HSIs and to increase retention and graduation rates of undergraduate students pursuing degrees in STEM fields at HSIs. The HSI program seeks to build capacity at HSIs that typically do not receive high levels of NSF grant funding.
- The **Louis Stokes Alliances for Minority Participation (LSAMP)** ($55.0 million) is an alliance-based program that works to increase the number of STEM baccalaureate and graduate degrees awarded to populations historically underrepresented in STEM disciplines.
- **Historically Black Colleges and Universities Undergraduate Program (HBCU-UP)** ($44.94 million) is committed to enhancing the quality of undergraduate STEM education and research at HBCUs to broaden participation in the Nation's STEM workforce. HBCU-UP provides awards to develop, implement, and study evidence-based innovative models and approaches for improving the success of HBCU undergraduates so that they may pursue STEM graduate programs and/or careers.
- **Growing Research Access for Nationally Transformative Equity and Diversity (GRANTED)** ($40.0 million) will improve the Nation's research support and service capacity at emerging and

underserved research institutions. GRANTED will use a variety of mechanisms and programs to further NSF's reach in advancing the geography of innovation and engaging the Missing Millions. GRANTED activities will support the enhancement of research administration and post-award management as well as the sharing and implementation of effective practices that lead to competitive proposal development for external funding in STEM research and training.

- **Eddie Bernice Johnson INCLUDES Initiative (NSF INCLUDES)** ($37.35 million) is a comprehensive national initiative to enhance U.S. leadership in STEM discoveries and innovations focused on NSF's commitment to diversity, inclusion, and broadening participation in these fields. The vision of this program is to catalyze the STEM enterprise to work collaboratively for inclusive change, resulting in a STEM workforce that reflects the population of the Nation.
- **Centers of Research Excellence in Science and Technology (CREST)** ($30.31 million) enhance the research capabilities of minority-serving institutions (MSI) through the establishment of centers that effectively integrate education and research. CREST promotes the development of new knowledge, enhancements of the research productivity of individual faculty, and an expanded presence of students historically underrepresented in STEM disciplines.
- **National STEM Teacher Corps** ($30.0 million) aims to bring greater attention and recognition to outstanding STEM teachers in today's classrooms, reward them for their accomplishments, elevate their public profile, and create rewarding career paths in which all STEM teachers can aspire, both to prepare the future STEM workforce and to create a scientifically literate public.
- **Historically Black Colleges and Universities Excellence in Research (HBCU-EiR)** ($26.13 million) program supports projects that enable STEM and STEM education faculty to further develop research capacity at HBCUs and to conduct research.
- The **Tribal Colleges and Universities Program (TCUP)** ($20.90 million) provides awards to Tribal Colleges and Universities, Alaska Native-serving institutions, and Native Hawaiian-serving institutions to promote high quality STEM education, research, and outreach.
- **Alliances for Graduate Education and the Professoriate (AGEP)** ($9.93 million) program aims to increase the number of African American, Hispanic American, Native American Indian, Alaska Native, Native Hawaiian and Native Pacific Islander (or AGEP population) faculty in STEM at all types of institutions of higher education. The program funds projects that increase the understanding of institutional policies and practices to help doctoral candidates, postdoctoral scholars, and faculty improve their academic pathways to tenure and promotion in the STEM professoriate.
- **Build and Broaden (B2)** ($8.36 million) is an innovative program that supports research collaborations and partnerships between scholars at minority-serving institutions (MSIs) and other institutions or organizations. B2 supports projects that build capacity and enhance research productivity in the social and behavioral sciences at MSIs; contributes to more innovative science by diversifying research and widening the STEM pathways; and broadens participation of underrepresented entities in STEM entrepreneurship and innovation.
- **Analytics for Equity Initiative** ($1.25 million) builds on the Evidence-Based Policymaking Act. Led by NSF with four interagency partners, this program will fund researchers to produce rigorous empirical research and actionable recommendations in equity-related topics aligned to agency Learning Agendas. Federal agencies and other organizations can use the resulting recommendations to increase the impact of equity-focused evidence-based strategies.

Strengthen Research Infrastructure

Support for **Major Facilities operations and maintenance (O&M**) ($1,120.33 million) continues to reflect a balance among multiple priorities. NSF divisions carefully allocate resources between research grants and O&M costs for research infrastructure. In addition to regular O&M needs to keep a facility functional, support for upgrades, significant periodic maintenance, and infrastructure renewal must also be addressed within Facilities O&M, which accounts for over 10 percent of NSF's total request in FY 2025. NSF continues to explore ways to invest in research infrastructure, at all scales, to keep pace with changing technologies, increased demand by users, and expanding research opportunities.

The **Mid-scale Research Infrastructure (Mid-scale RI)** ($192.45 million total, comprising $134.42 in agency-wide Track 1 and Track 2 program investments plus $58.03 million in division level programs), program supports research infrastructure with a total project cost above the upper limit for the Major Research Infrastructure program ($4.0 million) and below the Major Research Equipment and Facilities Construction (MREFC) threshold ($100.0 million). This dedicated funding line implements a high-priority, agency-wide mechanism that includes upgrades to major facilities as well as stand-alone projects.

The goals of the Mid-Scale RI program are to:

- Provide access to cutting-edge mid-scale research infrastructure, including instrumentation.
- Enable agile development and implementation of frontier scientific and engineering research infrastructure with a high potential to significantly advance the Nation's research capabilities.
- Train early-career scientists and engineers in the development and use of advanced research infrastructure.

In FY 2025, NSF investments will support Mid-scale RI Track-1 ($4.0 million to $20.0 million awards), funded through the Research & Related Activities account, and Track-2 ($20.0 million to $100.0 million awards), funded through the MREFC account. Both use an approximately biennial funding opportunity; the third solicitation for Mid-scale RI-1 (NSF 22-637) was issued in FY 2022, with awards made in FY 2023 and more anticipated in FY 2024. In addition, proposals have recently been received in response to the Mid-scale RI-2 solicitation (NSF 23-570), with awards anticipated in FY 2025.

The **Major Research Instrumentation (MRI)** ($82.82 million) program is responsible for catalyzing new knowledge and discoveries by helping STEM professionals acquire or develop the instrumentation needed for innovative science and engineering research. MRI grants support instrumentation in all NSF-supported research disciplines. In FY 2025, NSF will continue the implementation of CHIPS and Science Act provisions that began in FY 2023. These include waiving cost-sharing requirements for new MRI projects and supporting projects for equipment and instrumentation to conserve or reduce the consumption of helium.

Major Research Equipment and Facilities Construction (MRFEC). Construction projects that require an investment of more than $100 million are generally supported in NSF's MREFC account. The FY 2025 Request includes funding for two projects: the Antarctic Infrastructure Recapitalization program, an enduring effort that replaces the Antarctic Infrastructure Modernization for Science or AIMS project, and the Leadership-Class Computing Facility (LCCF). The MREFC account also supports the Mid-scale RI Track 2 program, covering projects in the $20 million to $100 million range.

- The **Leadership-Class Computing Facility** ($154.0 million) is envisioned as a distributed facility that will provide unique computational and data analytics capabilities, as well as critical software and services, for the Nation's science and engineering research community to enable discoveries that would not be possible otherwise. The project will deploy a comprehensive range of education and outreach activities that will expand and nurture our Nation's future STEM workforce in data and computational science. Construction of the LCCF, funded from the MREFC Account, is planned to begin in FY 2024 now that the development and design phases, funded from the R&RA Account, are complete.
- NSF manages all U.S. Antarctic activities as a single, integrated program, making Antarctic research possible for scientists supported by NSF and other U.S. agencies. Impacts of the COVID-19 pandemic on U.S. Antarctic Program (USAP) operations required construction activities at McMurdo Station to be suspended and caused a significant delay in the completion of AIMS. In the meantime, other investments in facilities and infrastructure on the continent have emerged as priorities that cannot be deferred until after completion of AIMS. As a result, the **Antarctic Infrastructure Recapitalization** (AIR) ($60.0 million) program was conceived as a portfolio of investments in infrastructure across the USAP stations that will replace AIMS. On-ice AIMS construction will continue in FY 2025 with a focus on meeting near-term needs, and unfunded parts of AIMS will be considered for incorporation into the longer-term AIR program.
- In FY 2025, no funding is provided for **HL-LHC Upgrade** ($0.0 million) as the project is being completed. NSF investments are being used to upgrade components of the ATLAS and CMS detectors. These upgrades are approximately 40 percent complete and are anticipated to be finished in FY 2027.
- In FY 2025, no funding is provided for **Vera C. Rubin Observatory** ($0.0 million) as the eleven-year construction project is completed. Rubin will be an 8-meter class wide field optical telescope capable of carrying out surveys of the entire southern sky.
- **Mid-scale Research Infrastructure, Track 2 (Mid-scale RI)**. See discussion of Mid-scale RI above.

Design of Potential New Major Facility Construction Projects. The FY 2025 Request supports the continued design of a single telescope within the U.S. Extremely Large Telescope (U.S. ELT) program. Consistent with a recent statement by the National Science Board to fund one telescope in the ELT program, NSF will initiate an external expert panel to conduct a review of the two U.S. ELT projects that will inform NSF's decision of which project will remain in the Major Facility Design Stage. A future decision remains about whether to advance that project to Construction, pending completion of the Final Design Phase.

Research Security

NSF is expanding capabilities and competencies to protect the U.S. science and engineering enterprise through its Research Security Strategy and Policy activity. In January 2022, the National Science and Technology Council's Research Security Subcommittee, co-chaired by NSF, issued implementation guidance for National Security Presidential Memorandum 33 (NSPM-33) on National Security Strategy for United States Government-Supported Research and Development. The August 2022 CHIPS and Science Act contained several research security provisions that NSF is implementing. NSF participation in discussions with the U.S. research community and with international colleagues and development of common frameworks for understanding research security are major components of the NSF Research Security activity, which is expected to continue to grow in FY 2025. Specific activities include:

- As required by Section 10338 of the CHIPS and Science Act, NSF will establish the Research Security and Integrity Information Sharing Analysis Organization, to be known as the SECURE center, which will serve as a clearinghouse for information to empower the research community to identify and mitigate foreign interference that poses risks to the U.S.-funded research enterprise. The SECURE Center will share information and reports on research security risks and provide training to the research community. NSF aims to grant a SECURE Center award through cooperative agreement(s) by the end of FY 2024, officially standing up this Center in FY 2025.
- NSF will fund a Research on Research Security (RoRS) workshop on May 23-24, followed up with a RoRS funding program in FY 2025. The 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 research rather than staying well within the bounds of fundamental research.
- NSF will continue to scale up its analytic capabilities to proactively identify conflicts of commitment, vulnerabilities of pre-publication research, and risks to the merit review system in NSF proposals and the Small Business Innovation Research due diligence process in FY 2025.
- Through a partnership with the federal government interagency community, NSF published research security training modules for the research community in FY 2024. NSF will continue to fund the delivery of these modules and assess if more are required in FY 2025.
- As required by Section 10339B of the CHIPS and Science Act, NSF will develop and implement a new framework and IT system to begin to collect Foreign Financial Disclosure Requirements (FFDR) from NSF recipient institutions of higher education in FY 2024. NSF will refine the collection and analysis of these reports to enable OCRSSP to identify potential threats in FY 2025.
- NSF will develop and implement a new policy to review NSF proposals for national security concerns in FY 2024. As part of the new policy, NSF will develop TRUST, Trusted Research Using Safeguards and Transparency, comprised of risk-based indicators to inform the basis of this decision-making process. NSF intends to pursue and implement mitigation measures to address and minimize risk. NSF will begin a pilot program in summer FY 2024 and will continue the pilot program through FY 2025.

Sexual Assault and Harassment Prevention and Response

The success of the science and engineering enterprise depends on a safe research environment free from sexual assault and harassment, and NSF is dedicated to doing everything within the agency's power to achieve that. NSF has taken several steps to ensure that the United States Antarctic Program (USAP) is an environment that is free from sexual assault and harassment, and this continues to be a priority for the agency going forward. In 2022, NSF established a Sexual Assault and Harassment Prevention and Response (SAHPR) office to serve as a single focal point for this issue. We issued the Action Plan for Antarctica and established the SAHPR Task Force who were tasked with carrying out that Action Plan, which was implemented through a series of activities over the next year; all Action Plan items were completed by the end of that season. An on-ice victim advocate was deployed to Antarctica in October 2022 and listening sessions with USAP participants were held from December 2022 through February 2023. NSF established saferscience@nsf.gov in January 2023 as a single resource line for the NSF community who experienced sexual assault or harassment and all physical safety upgrades were completed by the end of February 2023. In April 2023, the NSF Antarctic 24/7 Helpline was added as an additional resource for the community and a supplement to the advocate, counselor, chaplain, and marshal stationed on the continent. These are only the initial steps NSF is taking in Antarctica, and changes to address the community's needs will continue to be made on an ongoing basis.

In parallel to these and other actions, NSF has used, and continues to use, other levers available in the Antarctic Support Contract to address this issue. NSF ensured that contractors understood the expectation that they and their sub-contractors must adhere to the codes of business ethics and integrity that are part of the Federal Acquisition Regulation. NSF also made necessary contract modifications clarifying the scope of required reporting of sexual assault and harassment, increasing reporting requirements to a quarterly basis, and expanding the level of detail to be reported. In September 2023, we added a SAHPR Office contact for streamlining reporting, and more recently, a Special Assistant for SAHPR Program Implementation was appointed within the Office of the Director. NSF is continuing to work to ensure that a range of support and reporting mechanisms exist so that everyone in the USAP community knows how to reach the type of support they need.

Many of these changes come directly from engagement with, and suggestions from, the USAP community. NSF is grateful to the community and hopes that they will continue to share their thoughts and ideas. The agency knows that there is more to do and that this must be a sustained effort, not just in Antarctica but throughout the research enterprise. While the SAHPR Action Plan was designed for Antarctica, and that continues to be its primary focus, NSF is also moving into a broader implementation phase that goes beyond specific responsibilities for the US Antarctic Program to ensure a unified agency approach. Ensuring a safe, harassment-free environment for researchers will continue to be a priority for NSF.

Improve Access to America's Statistical Data

Consistent with recent executive orders that highlight the importance of objective and trustworthy data and in alignment with the intentions of recent legislation, NSF is supporting efforts to streamline secure access to federal data and build capacity for all individuals to use these data to inform critical policy and research discussions. Key investments include continued leadership of government-wide evidence-building activities and initiatives such as continued management of the Standard Application Process portal for applying to access confidential data from statistical agencies and units. FY 2025 funding will support expansion of this portal in features, usability, agency participation, and datasets. In addition, this funding will support the National Secure Data Service demonstration project. This demonstration project was authorized in the CHIPS and Science Act of 2022. FY 2025 work will continue to support the testing of a secure computing space as well as data concierge services and privacy-preserving technologies to expand the utility and use of federal statistical data for evidence building.

Conclusion

This is a critical moment for the Nation's leadership in science and technology. Our ability to compete internationally, to power our economy, to foster a dynamic workforce, and to enhance our national security relies on sustained investments in the STEM enterprise and the American people who make it successful. The President's Fiscal Year 2025 Budget Request affirms the Administration's commitment to investing in the science and engineering research that makes that possible. It is an investment in our nation's leadership, in the future of our workforce and economy, and in the role our nation plays as an international leader in discovery and innovation.

Thank you for the opportunity to testify before you today. With the continued support of this Committee and Congress, NSF stands ready to build on the CHIPS and Science Act and more than seven decades of investments to continue to strengthen our nation's progress, support our economic and national security, and foster opportunities everywhere so that innovation can happen everywhere, at speed and scale.