



# CELEBRATING 2 YEARS

## of the **CHIPS and Science Act**



“For nearly 75 years, the U.S. National Science Foundation has advanced the frontiers of science and engineering research and innovation. On August 9, 2022, President Biden signed into law the “CHIPS and Science Act,” landmark bipartisan legislation that established a bold vision for securing America’s leadership into a future limited only by our capacity to innovate.

NSF has been working at speed and scale to deliver on the tremendous promise that exists across our nation. From the inaugural NSF Engines awards to the launch of the SECURE Center for research security, we have leveraged the CHIPS and Science Act to lay the groundwork for a more resilient, inclusive and productive American STEM enterprise. As we further invest in the immense talent living in every corner of America, we are building the industries of tomorrow and ensuring America leads the world in the innovations of the future.”

- NSF Director Sethuraman Panchanathan

### ACCELERATING TECHNOLOGY DEVELOPMENT AND BUILDING REGIONAL INNOVATION

NSF unleashed critical investments to support use-inspired research and innovation in key technology areas and to support solutions to pressing national, societal and geostrategic challenges, as articulated in the “CHIPS and Science Act of 2022.” The legislation codified NSF’s cross-cutting Directorate for Technology, Innovation and Partnerships (TIP) — NSF’s first new directorate in more than 30 years. In its second year, TIP is already accelerating the translation of agencywide NSF-funded discoveries from the lab to society. It is also developing innovation ecosystems to contribute to economic growth in regions that have been left behind, giving rising to new industries and creating new pathways for all Americans to prepare for the good-quality, well-paying jobs of tomorrow. In short, NSF is creating opportunities for everyone, everywhere, seizing upon the innovation potential that exists anywhere.

To showcase its investments and allow collaboration, TIP is piloting a new award visualization map. Hosted by Elsevier, the [Pure platform](#) lets users quickly search TIP investments by key technology area and view state-level award portfolio data.

NSF supports the full range of critical and emerging technologies, including the key technology focus areas enumerated in the “CHIPS and Science Act of 2022:”

Advanced manufacturing

Artificial materials

Artificial intelligence

Biotechnology

Communication and wireless

Cybersecurity

Cyberinfrastructure and advanced computing

Disaster risk and resilience

Energy technology

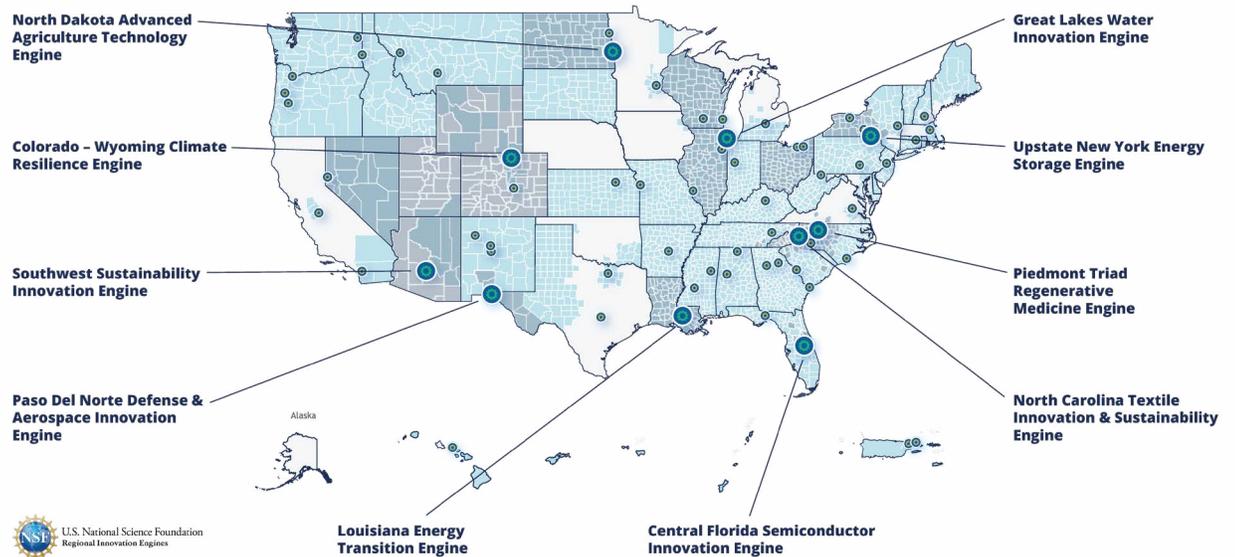
Quantum information science

Semiconductors and microelectronics

Visit <https://new.nsf.gov/chips> for updates on NSF’s “CHIPS and Science Act”-related news and funding opportunities.



## NSF Engines Awards



In January 2024, NSF announced [10 first-ever NSF Regional Innovation Engines \(NSF Engines\) awards](#), with an initial NSF investment of \$150 million to 10 inaugural awards that has already been matched by more than \$350 million in commitments from state and local governments, the private sector and philanthropy. These 10 NSF Engines have the potential to receive over \$2 billion over the next decade, paving the way toward a new frontier in American innovation. Learn more about each of the 10 NSF Engines and the nearly 60 NSF Engine Development awards preparing for the next NSF Engines cohort on the [interactive NSF Engines Award data page](#).

NSF published nearly 300 [letters of intent](#) which have been submitted under the current NSF Engines funding opportunity, with nearly every U.S. state and territory submitting at least one.

- **Building capacity:** In September 2023, NSF made the first awards through the NSF [Enabling Partnerships to Increase Innovation Capacity \(EPIIC\) program](#) to help emerging research institutions develop capacity and institutional knowledge to build new partnerships, secure future external funding and tap into their regional innovation ecosystems — including potentially into NSF Engines.
- **Translating new technologies:** In December 2023, TIP [announced the first-ever Accelerating Research Translation \(ART\) awards to 18 teams](#) nationwide. These teams will grow their organizations' capacities for translational research, including through mentoring from institutions of higher education with well-established efforts in this space.
- **Bringing innovators together:** The NSF Convergence Accelerator is expanding to 10 [U.S. regions to enhance national and regional research and innovation competitiveness](#). These 10 regional Convergence Accelerators will promote convergent research and innovation by connecting researchers, practitioners and stakeholders from various sectors and domains across each region to expand the innovation ecosystem and address regional societal and economic challenges. Expanding the program will allow NSF to fully harness the geography of innovation by increasing the concentration, proximity and diversity of NSF-funded researchers and practitioners and by scaling the delivery of use-inspired solutions to benefit every part of the country.

NSF's total FY 2023 funding to the NSF Established Program to Stimulate Competitive Research (EPSCoR) program jurisdictions was over \$1.2 billion, exceeding the NSF EPSCoR funding targets for FY 2023 set by the "CHIPS and Science Act of 2022."





## **PREPARING FOR THE FUTURE:**

As it always has, NSF is investing in the technologies of tomorrow.

- **Future manufacturing:** In September 2023, NSF invested \$35 million in the future of manufacturing research and the manufacturing workforce. The 21 new projects are supported through the NSF Future Manufacturing program, which supports the discovery of manufacturing solutions that overcome current scientific, technological, educational, economic and social barriers to provide new manufacturing capabilities for U.S. companies. This is the fourth year of NSF investment in the program, totaling more than \$137 million.
- **Cybersecurity workforce:** The NSF Cybercorps® Scholarship for Service program solicitation was updated to include cybersecurity-related aspects of other emerging technology domains such as AI, quantum computing and aerospace industries. In addition, the NSF NCSES kicked off its Cybersecurity Workforce Data Initiative, which will assess the feasibility of providing nationally representative estimates and statistical information on the cybersecurity workforce, which includes individuals trained and educated in cybersecurity and working in the cybersecurity field in the United States.

## **ENHANCING RESEARCH SECURITY**

Securing the nation's research enterprise is critical to the success of NSF's mission. Led by the NSF [Office of the Chief of Research Security Strategy and Policy](#), NSF continues to dedicate considerable effort and resources to working alongside the research community and its federal and international partners to:

- keep apprised of the latest threats;
- support the research community with the tools and resources to empower them to safeguard their campuses;
- and foster a culture of transparency, thoughtful vigilance and shared responsibility that reflect the values of research integrity.

NSF's internal risk assessment and mitigation capabilities center on its data analytics system, which now forms the core of the recently announced [Trusted Research Using Safeguards and Transparency \(TRUST\)](#) framework. This framework represents a new chapter in risk mitigation at NSF. TRUST will be rolled out in phases, with the first phase launching in FY 2025, focusing on quantum-related projects. Subsequent phases will apply lessons learned from Phase 1 and expand the scope of technologies.

"Research security remains a top priority. Research security is inherently a global challenge, and success will require strong alliances with countries who share our values of openness, reciprocity and fairness. As NSF and our international partners expand our risk mitigation capabilities, coordination and information sharing have been essential. NSF is also closely coordinating with its interagency partners to share information and lessons learned. Collaboration is critical to a vibrant science and engineering community too, one which includes both domestic and international collaboration."

– NSF Director *Sethuraman Panchanathan*

NSF recently [announced](#) the Safeguarding the Entire Community of the U.S. Research Ecosystem (SECURE) Center, led by the University of Washington, 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. research enterprise. The NSF SECURE Center will share information and reports on research security risks, provide training on research security to the science and engineering community and serve as a bridge between the research community and government funding agencies to strengthen cooperation on addressing security concerns. Additionally, Texas A&M University will lead SECURE Analytics, which will support the analytics needs of the SECURE Center and the broader research community while working to protect the privacy of the center's users.

## **STRENGTHENING THE DISCOVERY ECOSYSTEM AND INVESTING IN A DIVERSE STEM WORKFORCE**

NSF's decades of leadership have enabled the agency to quickly strengthen and scale its investments in support of the U.S. research and innovation enterprise. NSF is proud to have supported generations of technicians, engineers, educators, researchers and innovators who make up our nation's diverse STEM workforce. To remain at the vanguard of innovation and competitiveness and to solve the grand challenges of our time, the strength of that demographically and geographically diverse STEM talent must be fully engaged.

- **Connecting STEM workers and STEM jobs:** In July 2024, the [NSF Experiential Learning for Emerging and Novel Technologies \(ExLENT\)](#) program announced more than \$30 million to 39 awardees at U.S. institutions of higher education and nonprofits. ExLENT offers pathways for all Americans, regardless of their past experience in STEM fields, to pursue good-quality, well-paying jobs in key technology areas.



- **Supporting low-income students:** The [NSF Scholarships in Science, Technology, Engineering, and Mathematics](#) program supports institutions of higher education to fund scholarships for academically talented low-income students and to study and implement a program of activities that support their recruitment, retention and graduation in STEM. Leveraging new flexibilities provided under the “CHIPS and Science Act of 2022,” NSF increased the scholarship caps for undergraduate and graduate students to \$15,000 and \$20,000, respectively.
- **Fostering emerging research leaders:** The [NSF Build and Broaden](#) program supports capacity-building projects and partnerships at minority-serving institutions, with an emphasis on emerging research institutions. Meanwhile, the [NSF Growing Research Access for Nationally Transformative Equity and Diversity](#) program addresses systemic barriers within the research enterprise by improving research development and administration capacity at emerging research institutions in both EPSCoR and non-EPSCoR jurisdictions.
- **Making science work for everyone:** The [NSF Ethical and Responsible Research](#) program supports studies on the ethical and societal implications of scientific research, while the [NSF Science of Science: Discovery, Communication and Impact](#) program supports research on the societal benefits of scientific activity and how science advances evidence-based policymaking and the creation of public value.

The NSF National Center for Science and Engineering Statistics (NCSES), housed within the NSF Directorate for Social, Behavioral and Economic Sciences, continues investing in the five-year [National Secure Data Service \(NSDS\) demonstration](#) project. An [NSDS](#) can enhance data usage by improving awareness of its existence, increasing the data’s value and decreasing the burden on the public by linking data sets. This is done while ensuring privacy protection in the rapidly changing world of emerging technologies and complicated privacy and confidentiality laws.



With over 45,000 graduate students supported through its awards in FY 2023, NSF continues to expand its educational and professional development mechanisms. In response to the “CHIPS and Science Act of 2022,” the latest [NSF Proposal & Award Policies & Procedures Guide](#) includes additional requirements for mentoring and individual development plans for graduate students supported by NSF awards. Additionally, the program solicitation for the [NSF Innovations in Graduate Education](#) program has been revised to explicitly call for proposals to conduct research on the graduate education system and the outcomes of various interventions and policies, the impact of different funding mechanisms and innovative approaches to facilitating career exploration.

## KEY TECHNOLOGY HIGHLIGHT: SEMICONDUCTORS

NSF is also partnering with industry to invest in and develop the microelectronics innovations and workforce of the future. The NSF [Future of Semiconductors \(FuSe\)](#) initiative aims to cultivate a broad coalition of researchers and educators from the science and engineering communities utilizing a holistic, codesign approach to enable rapid progress in new semiconductor technologies. Through FuSe, NSF invested more than \$45 million in FY 2023 in [partnership with Ericsson, IBM, Intel, Micron and Samsung](#). Additional examples include:

- a combined \$30 million partnership with Micron Technology to develop bold solutions to address workforce challenges related to semiconductor technologies;
- a combined \$100 million partnership with Intel to support research in semiconductor design and manufacturing as well as innovative approaches to enhancing the education and development of the national technical workforce;
- and a [five-year agreement between the Semiconductor Research Corporation \(SRC\) and the NSF Research Experiences for Undergraduates \(REU\) program](#) to jointly expand undergraduate research opportunities related to semiconductor work through hands-on research opportunities for undergraduates.

NSF and the Department of Commerce are partnering to advance semiconductor workforce development. An NSF-DOC [memorandum of understanding](#) paves the way for the creation of a National Network for Microelectronics Education led by a Network Coordination Hub that will oversee a suite of regional consortia and other efforts that offer consistent, rigorous, engaging curricula, instructional materials, experiential opportunities and more to talent throughout the U.S.

