



What is the Directorate for Technology, Innovation and Partnerships?

The Directorate for Technology, Innovation and Partnerships deepens the agency's historic mission to advance use-inspired and translational research, powering innovative technologies, addressing the foremost challenges of our time like climate change, and critical and resilient infrastructure, and nurturing an equitable workforce for future, high-wage, quality jobs.

What's the motivation to create the Directorate for Technology, Innovation and Partnerships now?

From addressing the impacts of climate change, to providing equitable access to education, healthcare, and broadband connectivity, to improving U.S. infrastructure, the Nation faces momentous challenges. At the same time, America's research and innovation enterprise is undergoing historic changes – the pace of discovery has accelerated; STEM researchers and students are increasingly passionate about channeling their work to address the problems that we face in our communities; and STEM talent is highly distributed prompting the need for unique new partnerships that blend expertise and resources.

NSF's new TIP directorate constitutes a once-in-a-generation opportunity to focus on these momentous national challenges and transformations in the science and engineering enterprise, and to strengthen and scale the fundamental research that will power future technologies and solutions. Most importantly, to achieve success, TIP must deepen the engagement and tap into the full breadth of the Nation's demography and geography to infuse diverse thinking and perspectives into the design and development of new solutions, and into the interfaces between these advances and society.





How will the Directorate for Technology, Innovation and Partnerships be organized?

TIP comprises three primary focus areas: fostering innovation ecosystems, establishing translation pathways, and partnering across sectors to engage the nation's diverse talent. The directorate will work closely with the entire agency to leverage ongoing research investments and to grow them at speed and scale, leading more rapidly to economic and societal benefits across the nation. See the [TIP webpage](#) to learn more.

FOSTERING INNOVATION ECOSYSTEMS

TIP brings together teams of researchers, practitioners and users to iteratively co-design and co-create game-changing technologies and solutions to address the nation's societal and economic challenges and grow the future workforce. TIP's impact is embodied in its dynamic programs, including the Convergence Accelerator, and anticipated new programs that will foster regional innovation ecosystems and experiential learning opportunities, and prepare students for the wide range of potential future jobs.

- The [Convergence Accelerator](#) builds upon NSF's investments in basic research and discovery to accelerate solutions toward societal impact. Through a two-phased approach, the Convergence Accelerator assembles teams of researchers from multiple disciplines and with differing expertise to form crosscutting partnerships. These teams use convergence research fundamentals and the integration of human-centered design, team science, and communication, storytelling and pitching to stimulate the sharing of innovative ideas. The environment fostered by the Convergence Accelerator accelerates long-lasting, sustainable solutions to a variety of societal challenges.

ESTABLISHING TRANSLATION PATHWAYS

TIP accelerates the translation of research results to the market and society. For example, the directorate's *Lab-to-Market Platform* provides a pathway for researchers, startups and aspiring entrepreneurs to move their ideas from the laboratory to the market, while gaining access to a range of NSF resources.

- The [Partnerships for Innovation program](#) provides NSF-funded researchers the opportunity to increase the impact of their research discoveries. PFI teaches researchers how to develop and implement a technology roadmap, create a business model, and develop their technology into a prototype or proof of concept. Using an approach based on scientific inquiry and industrial discovery, the PFI program accelerates the translation of groundbreaking research into meaningful societal solutions.
- The [NSF Innovation Corps \(I-Corps™\) program](#), an experiential entrepreneurial education program, furthers the nation's innovation ecosystem by equipping researchers with the tools needed to transform discoveries into innovative technologies. I-Corps connects the technological, entrepreneurial and business communities, addressing skill and knowledge gaps to accelerate the transformation of basic research into deep technology ventures.
- [America's Seed Fund powered by NSF](#), also known as the Small Business Innovation Research and Small Business Technology Transfer (SBIR and STTR) programs, funds hundreds of early-stage startups annually, transforming scientific discovery into products and services with commercial and societal impacts. Startups working across almost all areas of science and technology can receive up to \$2 million, in phases, to support research and development for commercial success.

Additionally, TIP supports new pathways for translating research results to society, including open-source ecosystems, and other pathways such as government services, and at-scale educational innovations. For example:

- [Pathways to Enable Open-Source Ecosystems](#), or POSE, is a new program focused on fostering open-source communities and models — from software and data systems to climate modeling and novel biological techniques — to create products that help to solve challenges of national, societal and economic importance. Through NSF funding, the POSE program will facilitate the creation and growth of sustainable, high-impact, open-source ecosystems to ensure secure open-source products, increased coordination of developer contributions, and a focused route to impactful technologies.

PARTNERING TO ENGAGE THE NATION'S DIVERSE TALENT

To further strengthen NSF investments in research, innovation and education, TIP serves as a resource to foster and expand public and private partnerships across the agency to cultivate regional innovation ecosystems, create technology solutions, support future STEM leaders who reflect the rich cultural and geographic diversity of the country, and ultimately advance the nation's economy and competitiveness. The directorate will coordinate with other NSF units, providing expertise and support to strengthen and scale partnerships that advance and deepen relationships with other government agencies, industry, nonprofits, civic society, communities of practice and international funders across all areas of science, engineering and education. These partnerships advance shared interests and goals among stakeholders, enhance the impact of NSF's and partners' investments, and complement and support national research priorities.



What NSF programs are moving and what new programs will be established?

Certain programs and staff from the Office of Integrative Activities, OIA, and from the Division of Industrial Innovation and Partnerships, IIP, within the Directorate for Engineering have moved into TIP. Specifically, the I-Corps, PFI, SBIR and STTR programs, previously within IIP, have been repositioned within TIP. In addition, the Convergence Accelerator, which was previously housed within OIA, has moved to TIP. These transitions include funding and staff.

IIP's remaining programs — Grant Opportunities for Academic Liaison with Industry (GOALI), Non-Academic Research Internships for Graduate Students (INTERN), and Industry-University Cooperative Research Centers (IUCRC) — are transitioning to the Division of Engineering Education and Centers within ENG.

Continued, bold investments in TIP are critical to propelling research outcomes, growing future STEM leaders and the workforce, and delivering solutions and technologies to Americans faster than ever. In collaboration with other NSF directorates and federal agencies, and subject to the availability of future funding, NSF anticipates launching TIP programs to create and foster innovation ecosystems throughout the U.S. and specifically embedded in communities and regions to address those distinct societal challenges.

Will TIP work with other directorates?

Absolutely. The TIP directorate will function as a “framework” that spans the entire agency, and the directorate will closely collaborate with each of NSF's existing directorates and offices as well as with other stakeholders in the nation's research, innovation and education enterprise. Specifically, TIP will strengthen and scale existing investments in use-inspired and translational research, including co-funding existing programs and portfolios and launching new ones. Working together, TIP and NSF's other directorates will:

- Advance science and engineering research and innovation, leading to breakthrough technologies and solutions to national, societal and economic challenges, sustaining and enhancing U.S. competitiveness on a global stage.
- Accelerate the translation of research results from the lab to the market and society, strengthening the U.S. economy.
- Create new educational pathways for every American to pursue new, high-wage jobs, supporting a diverse workforce of researchers, practitioners, technicians and entrepreneurs.

How will TIP's focus on technology at NSF shape the agency for the future?

Technology, innovation and partnerships are all part of NSF's storied 70-year history.

NSF has consistently supported the full spectrum of fundamental research, from foundational, curiosity-driven, discovery-oriented research to use-inspired, solutions-oriented research. Indeed, this synergy between discovery and innovation constitutes NSF's DNA. It is how transformational leaps forward happen.

NSF's investments in science and technology are also intertwined. The scientific pursuit of knowledge and understanding cannot be separated from the development of new technological capabilities. In turn, new technology capabilities enable the pursuit of new scientific research questions that were previously out of reach.

NSF has long invested in use-inspired research and the translation of research results into practice through a wide range of programs. The TIP directorate constitutes a once-in-a-generation opportunity to double down on this type of work to focus on pivotal challenges and positively transform society, and to do so through public and private partnerships that help to inform, coordinate and grow NSF's research and education investments. Together, TIP and NSF will advance technology; address national, societal and economic challenges, including local and regional difficulties across the nation; and tap into the vast talent base that exists throughout the nation and has for too long been left behind when it comes to the research and innovation enterprise.



How will NSF enhance and optimize the current lab-to-market approach?

Over time, NSF anticipates enhancing and optimizing the agency's current Lab-to-Market Platform by:

- Increasing funding for the **PFI** program, which offers researchers with prior NSF support the opportunity to partner with industry and other entities to accelerate the transition of discoveries from the laboratory to the marketplace through prototyping, technology demonstration and scale-up work, including the licensing of NSF-funded research outputs.
- Increasing funding for the **I-Corps** program to build out I-Corps Hubs and Teams and support partnerships with other NSF programs such as the **Convergence Accelerator**.
- Increasing flexibilities for **America's Seed Fund powered by NSF**, that is, the **SBIR** and **STTR** programs, to provide faster access to seed funding and streamline the transition from Phase I to Phase II.

Why is NSF the right agency to help advance the national innovation ecosystem?

NSF has been investing in fundamental research in all fields of science and engineering, delivering foundational and use-inspired outcomes, for seven decades. NSF is the largest non-defense funder of artificial intelligence research, has funded over 30 Nobel Prize winners in quantum information science, and has directly contributed to seminal advances in advanced manufacturing, such as 3D printing. In the fight against COVID-19, the results of NSF investments have proven critical: the nation's capacity to test rapidly and at large scale is directly attributable to polymerase chain reaction, or PCR, testing capabilities, which were made possible by NSF-funded research.

Within the federal research and development enterprise, NSF's investments complement those of other agencies. Specifically, many other agencies invest in R&D focused on their mission needs. NSF investments in fundamental research often involve partnerships with other agencies to leverage that research and help meet those agencies' needs. For example, NSF has collaborated with the U.S. Department of Agriculture on its National Artificial Intelligence Research Institutes program, with USDA's National Institute of Food and Agriculture fully funding four food and agricultural institutes to date. Beyond these partnerships, NSF stands ready to rapidly scale use-inspired and translational research, complementing and enhancing R&D investments across the federal government.

The TIP directorate does not aim to replicate the DARPA model, nor the approach employed by NSF's existing directorates. Rather, the directorate will pursue a model that builds vibrant public and private partnerships in alignment with NSF's longstanding mission and allows for transformative advances across all areas of STEM.

How will the Directorate of Technology, Innovation and Partnerships be funded?

Funding for TIP is contingent upon Congressional appropriations, and NSF greatly appreciates the continued strong and bipartisan support for the agency. In general, NSF strives to take a balanced approach between its existing directorates and TIP. For example, the "Fiscal Year 2022 President's Budget" request to Congress proposed balanced growth across the agency. In the request, the agency's overall budget grows by \$1.6 billion, with TIP receiving \$500 million for new programs, in addition to \$364 million in realigned investments, and the rest going toward existing directorates and offices.

How will TIP scale/co-fund/strengthen existing programs and projects to accelerate development of technology?

TIP will closely collaborate with NSF's existing directorates and offices at all levels. For example, TIP anticipates providing co-funding to certain programs led by other directorates that focus on use-inspired, solution-oriented research in key technology areas, such as the National Artificial Intelligence Research Institutes and Quantum Leap Challenge Institutes.



Will the number of research or grant opportunities for certain types of research be affected?

Not at all. On the contrary, TIP's emphasis on use-inspired, solution-oriented research and on translational research will serve to benefit all of NSF's existing directorates and offices, rounding out the full breadth of work, from foundational to use-inspired to translational research, that NSF has long supported. Not only will TIP have a symbiotic relationship with all of NSF's existing directorates, but TIP's success is contingent upon continued, sustained investments across all of science and engineering.

PARTNERSHIPS

What are some of the types of partnerships are you looking to catalyze?

Today, STEM talent is increasingly distributed across academia, industry, nonprofits, state and local governments, civil society and communities of practice. To fully harness that talent, NSF seeks to grow partnerships across these constituencies, fostering blended teams to work together to inspire research questions, pursue co-design and co-creation of new technologies and solutions, and accelerate the translation of research results to society.

BROADENING PARTICIPATION

How will TIP contribute to broadening participation?

While NSF welcomes global talent, it cannot be a substitute for the domestic talent base. Growing U.S. competitiveness and security requires developing domestic talent to unleash the nation's full potential. Today, too many brilliant minds across the country are not engaged in STEM. The nation's success depends on a workforce capable of innovating and tackling emerging challenges. It depends on a workforce that offers a diverse set of perspectives to the design and development of new technologies and solutions, and the interfaces between those technologies and solutions and broader society. Each year, NSF investments touch approximately 300,000 people through roughly 2,000 institutions in every state and territory — yet there are still far too many individuals unable to enter or stay in STEM fields. Furthermore, those who do enter STEM fields often find resources hard to come by. NSF is best positioned and has the programs and experience to rapidly capitalize on this unfulfilled potential. The TIP directorate and its programs are being designed from the outset to focus on diversity, equity, inclusion and accessibility across demographics, organization and sector types, and geographies.

