



**NATIONAL SCIENCE FOUNDATION  
2415 EISENHOWER AVENUE  
ALEXANDRIA, VIRGINIA 22314**

**NSF 23-100**

## **Dear Colleague Letter: Request for Information on Future Topics for Workforce Development in Emerging Technology Career Pathways**

---

May 8, 2023

Dear Colleagues:

The NSF Directorates for Technology, Innovation, and Partnerships (TIP) and STEM Education (EDU) are jointly issuing this Request for Information (RFI) to seek input from non-profit organizations, philanthropies, industry, local, state and tribal government offices/agencies, K-12 schools and districts, institutions of higher education, trade and/or vocational schools, and other communities of practice on opportunities and challenges towards creating a robust collection of flexible and seamless STEM pathways in emerging technological areas.

This Dear Colleague Letter (DCL) does not invite research proposals nor is it a funding opportunity. However, the submission of collective input to this RFI spanning different perspectives from multiple constituent communities may be used to inform, refine, and catalyze future NSF investments and programs.

### **BACKGROUND**

---

The CHIPS and Science Act authorizes significant investments in accelerating critical and emerging technologies (e.g., advanced manufacturing, advanced wireless, artificial intelligence, biotechnology, quantum information science, semiconductors, and microelectronics), as well as in the development of a highly skilled domestic, diverse workforce that can support current and future innovation in these areas. The TIP directorate, home to the NSF Regional Innovation Engines, Convergence Accelerator, Experiential Learning for Emerging and Novel Technologies (ExLENT), and Expanding Partnerships to Increase Innovation Capacity (EPIIC) programs, along with the EDU directorate, home to longstanding programs, such as Advanced Technological Education (ATE), Historically Black Colleges and Universities - Undergraduate Program (HBCU-UP), Innovative Technology

Experiences for Students and Teachers (ITEST), NSF Research Traineeship (NRT), Louis Stokes Alliances for Minority Participation (LSAMP), and Graduate Research Fellowship Program (GRFP), seek to respond to the greatest opportunities and/or challenges to attracting, placing, and retaining diverse domestic talent in emerging technological areas.

The goal of expanding STEM career pathways for U.S. citizens is not a new concept. Aggressive efforts towards this goal have been underway for decades. Yet, current data suggest that there is still much work to do. According to recent [NCES/IPEDS data](#), in 2019-2020, domestic students represented about 50% of the graduate degrees awarded in STEM disciplines. This percentage decreases significantly in fields that lead to emerging technological career pathways, such as computer science and electrical engineering, both at about 20% domestic student representation at the graduate level. Additionally, the rate of growth of domestic students enrolled in STEM degree programs within U.S. based institutions of higher education over a 20-year period (1995-2015) is only 45%, compared to 480% for international students in the same institutions. Importantly, enrollment and degree data for PhDs in STEM fields overall also show persistent, significant disparities, with only 6% for members of racial and ethnic groups underrepresented in STEM, and 34% for women.

New on-ramps into STEM careers have been facilitated by a recent paradigm shift -- from a linear view of the STEM 'pipeline' to the more complex notion of a [braided river](#), described as a collection of paths that change and adapt to the individual. Moreover, increased attention to reskilling, upskilling and cross-skilling through technical training, apprenticeships and other education and training formats has created valuable opportunities for current professionals to advance in their careers or pivot into new pathways or into leadership positions. A 2021 publication by the Women's Forum for the Economy and Society [[DaringCircle Women4STEM](#)] focused on the issue of skill building as a vital path for closing the STEM leadership gender gap. A 2022 AARP study [[Job Reskilling and Upskilling Among the 50+](#)] found that 57% of adults 50+ are willing to learn new skills if requested by their employer, yet a much smaller number actually pursued or participated in any such training.

## OBJECTIVE

---

NSF is seeking novel approaches that lead to the recruitment of diverse and creative individuals into emerging technologies. The objective is to develop new funding opportunities that will accelerate efforts to increase both the rate and overall composition of domestic students enrolled in traditional academic pathways into STEM disciplines that will lead to emerging technology careers. Of equal priority is the interest in developing new funding opportunities that focus on flexible, non-traditional pathways into emerging technology careers, through support of continuous lifelong learning as a critical strategy to access high-paying jobs in these areas. For example, NSF's new ExLENT Program ([NSF 23-507](#)) recognized the opportunity to engage the broadest range of traditional and nontraditional participants by creating three distinct tracks: Pivots (aimed to attract current professionals

with transferrable soft skills to pivot into emerging tech), Beginnings (aimed at individuals with some STEM competencies to deepen their knowledge and skills in emerging tech), and Explorations (aimed to provide individuals with limited or no specialized STEM education an opportunity to explore emerging tech). Thus, NSF recognizes that there are many constituents with diverse perspectives that will work in partnership to effectively address grand challenges in workforce development.

***NSF seeks, through this Dear Colleague Letter (DCL), input on ways to make educational pathways into emerging technology careers accessible to any American interested in participating in the U.S. research and innovation enterprise.***

## HOW TO RESPOND TO THIS RFI

---

To respond to this RFI, please use the official form available at <https://www.surveymonkey.com/r/NSF-WFD-EMTECH>. NSF recommends that all responses are written in a separate document, using the information provided below, and then pasting them into the response fields on the form. Further, NSF invites individuals, groups, and organizations to provide their input through the online submission form (link above). Respondents should only provide feedback to the questions in the survey of greatest interest to them. The submission form requires the following information:

- Contact person name and affiliation;
- Valid contact email address;
- Additional author name(s) and affiliation(s), if applicable; and
- Area(s) of experience or expertise of the author(s).

Question 1 (maximum 600 words): Describe the greatest opportunities and/or challenges to **creating flexible and affordable training programs** (for technicians, practitioners, researchers, students, etc.) needed to build an inclusive, well-paid, domestic workforce in emerging technology careers.

Question 2 (maximum 600 words): What have been some of the most effective strategies to **removing barriers and providing support** for a diverse, inclusive STEM student population and STEM workforce in emerging technology fields?

Question 3 (maximum 600 words): Describe the opportunities and challenges to **facilitating a learner's ability to transition** from one educational pathway to another (e.g., from a technical training program to an undergraduate program) to support lifelong continuous learning.

Question 4 (maximum 600 words): Describe current gaps or new opportunities to attract **more domestic students at the undergraduate level** (associate and bachelor's) and at the **graduate level** (master's and doctoral) into specific STEM majors that lead to emerging

technology career pathways.

Question 5 (maximum 600 words): Describe strategies to **leverage cross-sector resources**, including those of industry, academia, government, philanthropy, non-profits, and any other sectors interested in the future emerging technology workforce. Name **key partners** with whom NSF could work in this endeavor and provide their expertise and contact information.

Question 6 (maximum 600 words): **Other considerations**. Share other relevant aspects or considerations to facilitate STEM pathways into emerging technology fields.

## TIMELINE

---

Responses to this DCL must be received on or **before 5:00 PM Eastern time on June 21, 2023**.

## WHAT WILL NSF DO WITH THIS INFORMATION?

---

NSF, at its discretion, will use the information submitted in response to this RFI to help inform future program directions, new initiatives, and potential funding opportunities. The information provided will be analyzed, may appear in reports, and may be shared publicly on agency websites. Respondents are advised that the government is under no obligation to acknowledge receipt of the information or provide feedback to respondents with respect to any information submitted. *No proprietary, classified, confidential, or sensitive information should be included in your response submission.* The government reserves the right to use any non-proprietary technical information in any resultant solicitation(s), policies, or procedures.

For questions concerning this RFI and submission of input, please contact any of the NSF Program Directors listed below:

- Rebecca Shearman ([rshearman@nsf.gov](mailto:rshearman@nsf.gov))
- Nina Maung-Gaona ([nmaungga@nsf.gov](mailto:nmaungga@nsf.gov))
- Mary Crowe ([mcrowe@nsf.gov](mailto:mcrowe@nsf.gov))
- Joan Walker ([jowalker@nsf.gov](mailto:jowalker@nsf.gov))
- LeRoy Jones ([ljones@nsf.gov](mailto:ljones@nsf.gov))

Sincerely,

James L. Moore III  
Assistant Director  
Directorate for STEM Education (EDU)

Erwin Gianchandani

Assistant Director  
Directorate for Technology, Innovation and Partnerships (TIP)

National Science Foundation