



Response to Request for Information on Developing a Roadmap for the Directorate for Technology, Innovation, and Partnerships at the National Science Foundation

July 27, 2023

The Association of Science and Technology Centers (ASTC) is pleased to submit this response to the National Science Foundation’s [Request for Information](#) as part of the development of the roadmap for the Technology, Innovation, and Partnerships (TIP) Directorate. ASTC is a nonprofit membership organization of science and technology centers and museums—and other allied organizations—in all 50 states who share our commitment to engaging the public in science and technology.

ASTC and our network of science engagement organizations appreciates the establishment of the new Technology, Innovation, and Partnerships (TIP) Directorate at the National Science Foundation (NSF), including its many efforts to consider issues at the intersection of science, technology, and society.

As NSF establishes its roadmap for the TIP Directorate, ASTC offers these comments emphasizing the importance of public engagement with science, which the American Association for the Advancement of Science defines as “intentional, meaningful interactions that provide opportunities for mutual learning between scientists and members of the public. Mutual learning refers not just to the acquisition of knowledge, but also to increased familiarity with a breadth of perspectives, frames, and worldviews.”¹

1. Prioritization. What evidence exists that should guide NSF in determining priorities across the technologies listed above in advancing or maintaining U.S. competitiveness? Within each technology area, are there critical use-inspired and translational research topics that should be prioritized for NSF investment in a 1- to 3-year time frame to advance U.S. competitiveness, and if so, why? Which research topics within each of the technology areas can be reasonably expected to be funded by others, making them less critical for TIP funding?

We encourage NSF to focus on technology areas that not only show promise for use-inspired and translational research, but also those that arouse public interest or address public concerns. Because of TIP’s focus on moving discoveries to use and in addressing societal needs, we would expect that nearly all of the research investments made by the Directorate will require a companion investment in public engagement and education, including around ethical, legal, and societal issues. As such, we urge NSF to explicitly call out this commitment

¹ [“Why Public Engagement Matters,”](#) American Association for the Advancement of Science, accessed July 26, 2023.

to public engagement as part of its roadmap and to make this focus an expected element of all funding programs and announcements.

We also encourage NSF to not limit its efforts in public engagement to research areas explicitly addressed by the TIP Directorate. Indeed, there is a need for conversations, discussions, and educational efforts to engage the public around many topics in science and technology, including those beyond the scope of TIP and of NSF. Nearly every challenge that society faces—from climate change to artificial intelligence, pandemic preparedness to inclusive economic growth—benefits from significant taxpayer investment. And the public needs to not only understand how their tax dollars are being spent, but have the opportunity to participate in and help shape discussions of research and technology developments.

There have been numerous calls for the development of a new national strategy for public engagement in science, including dedicated investment in public engagement.² And earlier today, the President’s Council of Advisors on Science and Technology (PCAST), approved a letter to the President recommending action for advancing public engagement with the sciences across the federal government.³

But even as those efforts continue to be developed, NSF—and the TIP Directorate in particular—has a unique opportunity to help advance and promote public engagement. Because NSF’s mandate includes both education and research—unlike many other federal science agencies—the Foundation can serve a critical role in facilitating public engagement and education efforts—and supporting research that helps increase our understanding of what makes for effective public engagement.

2. Suitability. Which technologies, or topics within the technologies listed above, are well-suited for the type of use-inspired and translational research that TIP has the mandate to support? What kind of investment approaches or funding vehicles would have the greatest impact in maturing said technology?

We encourage NSF to use a variety of funding mechanisms to advance progress on public engagement and education. This includes a focus on broad public engagement as an important element in fulfilling NSF’s Broader Impact criterion, especially for TIP-supported activities. In addition, we urge NSF to consider the opportunities for strengthening the Broader Impacts criterion around public engagement as it undertakes its assessment of the review criterion mandated by the CHIPS and Science Act.

We also encourage NSF to develop dedicated funding programs that both directly support efforts in public engagement and add to the research and knowledge base about how these efforts can be most successful. Such targeted funding opportunities might be specific to the

² For example, “[A Federal Strategy for Science Engagement](#),” Day One Project. Accessed July 26, 2023. S.D. Renoe and C. Nelson. “[Creating a Science-Engaged Public](#),” *Issues in Science and Technology*, September 28, 2022.

³ The letter is not yet publicly available, but the PCAST discussion and approval is available at <https://www.youtube.com/live/OHxG0hjmBgl?feature=share>

TIP Directorate and/or launched in partnership with the other directorates at NSF or other federal agencies.

3. Workforce. Which of the technologies listed above will have the greatest workforce needs in the next 1 to 5 years, understanding that investments in workforce initiatives often have longer time horizons to produce results? To meet this growing demand, how could TIP programs be structured to best supply these workforce needs, including pathways to the state and local levels, considering education and training at every level?

There is a need for additional training in public engagement and education to both increase the number of well-prepared science engagement practitioners and to better equip researchers in science and technology with the tools they need to effectively engage the public. We know that true public engagement is more than just a lecture or a website, but really depends on a deep commitment to two-way communication and implementation of a deliberate and effective plan. Fortunately, as noted below, there are many public- and private-sector models of how to do this well, which underscores the need for NSF to support efforts to bring these to a wider audience.

a. How could TIP collaborate with other government and private organizations to ensure workforce development activities address industry priorities across the key technology focus areas and societal, national, and geostrategic challenges while broadening the talent base through diversity, equity, inclusion, and accessibility?

We encourage NSF to engage colleagues at other government agencies and private organizations that have a track record of advancing public engagement with science. Within the federal government, we would flag several activities as models, including the Community-Based Participatory Research Program at the National Institute on Minority Health and Health Disparities⁴ and the Environmental Literacy Program at the National Oceanic and Atmospheric Administration.⁵ Beyond the government, we would point to Advancing Research Impact in Society (ARIS)⁶ and the Expert and Citizen Assessment of Science and Technology (ECAST) network.⁷ And there are many examples within the science center and museum community; ASTC would be happy to engage with NSF on identifying additional models and potential partners.

In general, TIP should partner with and/or provide support to these and other organizations with expertise in public engagement with science to develop and implement training programs for science engagement professionals and researchers in science and technology.

⁴ <https://www.nimhd.nih.gov/programs/extramural/community-based-participatory.html>

⁵ <https://www.noaa.gov/office-education/elp>

⁶ <https://researchinsociety.org/>

⁷ <https://ecastonline.org/>

b. How could the directorate inform state, local, and tribal government of the knowledge, skills, and abilities needed to build pathways to prepare future workers and reskill current workers for entry into the key technology focus areas?

TIP should join with other federal agencies to provide resources and guidance to state, local, and tribal governments on how they can complement national efforts supported by NSF and others. For example, we encourage NSF to explore partnership with the Economic Development Administration, which has launched the Good Jobs Challenge,⁸ with grantees serving 32 states and territories in 15 targeted industries, and the STEM Talent Initiative,⁹ which is focused around regional workforce needs. TIP can also engage with the Department of Labor to align its efforts with federal workforce initiatives, including promotion of encouraging practices and efforts to modernize data systems at the national, state, and local levels.

4. Addressing societal challenges. Considering the ways each of the key technology focus areas will impact each of the societal, national, and geostrategic challenges, which of the technology areas should receive investment priority and why? This includes investments in use-inspired and translational research, education, training, as well as general literacy on a given topic. On what specific challenge problems related to the societal, national, and geostrategic challenges could TIP focus that would, in turn, drive technological development in the key technology areas?

ASTC and our member science centers and museums share a commitment to engaging the public on science and technology, so we are particularly interested in the intersection of science, technology, and society. Because of TIP's focus on moving discoveries to use and to addressing societal needs, our priority is to ensure that public engagement is a strong part of any areas of investment. As such, we encourage and would expect TIP to prioritize areas that arouse public interest or address public concerns—in addition to those areas where there is a compelling need to make progress, including on urgent societal challenges.

5. Additions. Are there technology areas that should be prioritized for TIP investment in the near term that are not included in the above list, such as those included on the National Science and Technology Council's Critical and Emerging Technologies List, and if so, why?

Other than the comments above about the importance of public engagement around issues of science and technology broadly, ASTC does not have any feedback about the specific technology areas.

6. Crosscutting investments. What translational research investments can be made to drive innovation by addressing critical needs common to multiple technology focus areas? What are these shared needs, and among which technology areas?

⁸ <https://www.eda.gov/arpa/good-job-challenge>

⁹ <https://www.eda.gov/funding/programs/stem-challenge>

ASTC emphasizes the need to invest in research that helps advance our understanding of the most effective approaches to public engagement with science—and in disseminating this research to a wide audience of science engagement professionals and to the science and technology community. Adding to our collective knowledge base and toolset will be essential as the need for public engagement becomes even more important as society increasingly tackles issues that have a base in science and technology. These investments are needed to effectively communicate with and engage the public around use-inspired technology, including—but not limited to—those supported by NSF.

Founded in 1973, the [Association of Science and Technology Centers](#) (ASTC) is a network of more than 600 science and technology centers and museums, and allied organizations, engaging more than 110 million people annually across North America and in almost 50 countries. With its members and partners, ASTC works towards a vision of increasing understanding of and engagement with science and technology among all people.



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