

## **AAU response to request for comments posted in Federal Register 12.10.20**

February 9, 2021

### **Introduction**

The Association of American Universities (AAU), an association of America's leading research universities, appreciates the opportunity to submit comments on the development of the National Science Foundation's Strategic Plan for 2022-2026.

In examining the previous Strategic Plan for FY2018-2022, we anticipate many similar goals and strategies will be continued. As a grant-making, fundamental research agency, there should be consistency of high-level goals and strategies. Where possible, we suggest the new plan include measurable outcomes and timelines, which would improve transparency to taxpayers and stakeholders and aid the agency in meeting its goals. The new Strategic Plan should also be forward thinking and include new and innovative ideas to strengthen STEM education; expand greater participation and inclusion in the STEM workforce; and meet the needs for scientific discoveries and advancements that fuel innovations vital to the nation's health, economic competitiveness, and security.

**Below we have provided answers to the questions posed in the Federal Register Request for Information on December 10, 2020.**

### **Question 1: What are the interests, values and emergent science and policy issues that the Strategic Plan should recognize?**

NSF plays a key role in advancing all four priorities identified by President Biden, including: sparking innovation through fundamental research central to long-term **economic recovery**; supporting critical research in the battle against the **COVID-19 pandemic**; addressing **racial equity and justice** through initiatives to broaden participation in STEM fields and strengthen and diversify the STEM Workforce; and funding research and technology development to adapt to and combat **climate change**. The Strategic Plan should consider highlighting how the agency contributes to each priority to better resonate with the science policy landscape for the next several years:

- **Economic Recovery:** This is a key policy issue facing the nation. The Strategic Plan should consider fostering economic recovery across the nation over the next 5 years, including a strategy on how the agency can support scientific infrastructure vital to strengthening regional innovation to help revitalize state and local economies.
- **COVID-19 Pandemic:** The Strategic Plan should articulate NSF's role in the continued response to the pandemic as well as preparation and resilience for future pandemics and other types of disasters. It should include strategies NSF will employ to advance research relating to these topics, such as: research on preparedness; rapid vaccine development platforms; preserving the social safety net; equity and access to medicine;

workforce preparedness; public health messaging and education; rapid deployment vaccine formulations; and accelerated drug discovery and development (using artificial intelligence and high-performance computing).

- **Racial Equity and Diversifying the STEM Workforce:** Achieving NSF’s mission to promote the progress of science will require a globally competitive and diverse scientific and engineering workforce that can tackle large scientific and societal challenges. Therefore, the Strategic Plan should include strategies and goals to increase diversity within and to bolster the STEM workforce. It should also make clear how racial equity is valued or promoted across all NSF programs and personnel.

In the age of COVID-19, and in the years to come as we recover from the pandemic, the definition of a “technically capable workforce” must expand beyond performing rigorous research and producing more scientists. Bridging the gap between training and workforce development requires both a strong educational component, as well as experiential opportunities. Furthermore, driving workforce development into the 21st century will necessitate that all talented individuals in the United States are able to pursue STEM degrees and are taught using research-based teaching approaches proven to be inclusive and to increase learning. The next generation STEM workforce should reflect the diversity of our country. New and innovative partnerships should be promoted by NSF to help to ensure a more diverse STEM workforce. Additionally, NSF must find ways to increase support for early career researchers, especially given the increased pressures being placed on these individuals because of the pandemic.

- **Climate Change:** NSF has a long history of funding climate and environmental-related research. Many scientists indicate that the changing climate is the biggest issue facing the nation and world. According to a 2019 survey, about half of Americans (48%) think new technologies can solve global warming without individuals having to make big changes in their lives<sup>1</sup>. The Strategic Plan should lay out how the agency plans to support climate research throughout the agency, and how the agency will convey to the public the importance of this research. Furthermore, social and behavioral research in support of addressing climate challenges should be a prominent component of the broader NSF plan for addressing climate issues.

**Other key issues and values the Plan should highlight include:**

**Embrace NSF’s role in funding all types of basic research,** including curiosity-driven and use-inspired. The Strategic Plan should indicate the agency’s plans and goals to support the highest quality proposals and indicate what strategies will be used to ensure this.

**Partnerships and collaboration:** The 2018 Strategic Plan included the following Agency priority goal: “Expand public and private partnerships to enhance the impact of NSF’s investments and

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<sup>1</sup> <https://climatecommunication.yale.edu/publications/climate-change-in-the-american-mind-november-2019/>

contribute to American economic competitiveness and security.” AAU supports expanding all types of partnerships and agree with the NSF Director Panchanathan that “Partnerships and innovative mindsets ensure we rapidly seize opportunities and accelerate progress at speed and scale.”<sup>2</sup> The new Strategic Plan provides an opportunity for NSF to articulate clearly its strategy is for expanding partnerships. For example, the new plan should answer questions such as: (1) Looking back on the goal from 2018, what expansion has taken place in NSF’s public/private partnerships, and what lessons have been learned? (2) Are there metrics to determine the success of past and future partnerships?

The Strategic Plan should incorporate goals for various types of collaborations, including:

- **Building and expanding international partnerships** should be a priority articulated in the Strategic Plan and bolstered by specific goals. International partnerships were not included in the last NSF Strategic Plan. The new plan should include specific goals on the international front, and define what benefit to the NSF and the United States may be obtained by mutual partnerships.
- **Collaborating with other agencies should remain a priority.** Building a reputation as the agency that others want to work with is key to the U.S. maintaining leadership in the evolving global research and education landscape. Collaboration goals should be included in the Strategic Plan. For example, NSF should continue work such as the joint AI institutes to leverage the agency’s ability to be nimble and address national needs that overlap with areas supported by other federal research agencies.
- **Partnerships with industry should remain** a continuing priority. Universities and other stakeholders want to know how to support these partnerships. While NSF already has many industry partners, the Strategic Plan could help both the agency and stakeholders understand what kind of strategic partnerships are missing and what the intended goals of additional partnerships would be.

**Demonstrate the importance and value of social sciences across all NSF Directorates:** NSF supported social science plays a critical role in addressing serious scientific and policy challenges facing the nation, but the world, including the COVID-19 pandemic and climate change. The Strategic Plan should reflect the value of social science to solving these and other challenges.

In particular, the Strategic Plan should highlight the examples of social science benefits laid out in the 2017 National Academy of Sciences (NAS) report. As stated by the NAS committee, “Nearly every major challenge the United States faces — from alleviating unemployment to protecting itself from terrorism — requires understanding the causes and consequences of people’s behavior. The diverse disciplines of the social, behavioral, and economic sciences produce fundamental knowledge and tools that provide a greater understanding of why people

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<sup>2</sup> <https://spectrum.ieee.org/the-institute/ieee-member-news/qa-us-science-foundation-director-on-his-vision-for-the-agency>

and societies respond the way they do, what they find important, and what they believe and value — which is critical for the country’s well-being.<sup>3</sup>”

## **Question 2: How can NSF help maintain the US leadership in an evolving global research and education landscape?**

**Diversity, Racial Equity, and Inclusion:** Ensuring inclusivity is one of the three components the Director has included in his vision for the agency. The Strategic Plan should provide more detail on what that means in terms of specific agency actions between now and 2026. We see fostering diverse, equitable, and inclusive university communities as core to maintaining U.S. leadership in research and education. We are an inherently diverse country that welcomes scientific inquiry from within, and from abroad. That is a strength of the U.S. that should be leveraged to bring diverse ideas and perspectives into the academy, thereby enhancing the spirit of creativity and intellectual vitality necessary to achieve national goals for innovation and discovery.

A very broad strategic goal for NSF to consider is advancing the democratization of science and knowledge. It is important to highlight NSF’s work in this space in the Strategic Plan:

- NSF has many programs to broaden participation in STEM. These programs should have a more coherent planning strategy. For example, NSF should identify which programs are critical to achieving specific goals to increase participation from historically marginalized groups in STEM education and research in the plan.
- The Strategic Plan should articulate how the agency fosters diversity at all types of research institutions in both rural and urban locations.
- The Strategic Plan should explicitly show how broader impacts of science can and has been achieved by increasing citizen engagement in science and engineering projects.

**New research modalities:** The Strategic Plan should promote a culture of experimentation with new models of research and funding to advance research. Emerging, converging, and innovative science needs new processes, policies, and structures. Building on programs such as the convergence accelerator, I-Corps, and RAPID grant funding mechanisms, it is important that the new Strategic Plan lay out how NSF will focus innovative strategies over the plan’s timeline.

**Infrastructure planning:** The Strategic Plan should include the agency's vision for future facilities. A compelling way to attract the best talent, support robust collaborations, and maintain the nation’s competitive advantage is to develop research infrastructure. This applies to core facilities across the nation as well as FFRDCs, Major Research Facilities developed through the MREFC process, and mid-scale infrastructure support. Providing strategic goals and

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<sup>3</sup> Committee chair Alan Leshner on a statement accompanying a 2017 consensus report by the National Academies about the importance of social sciences at NSF, <https://www.nap.edu/read/24790/chapter/1#ii>

timing for infrastructure will support the nation's scientific leadership and is an important topic to include in the Strategic Plan.

**Question 3: How can the plan best underscore the importance to the Nation of fundamental research and its broader impact?**

**NSF's Contribution to Urgent Problems:** While we recognize this does not accurately reflect all of NSF's work, we think there is great value in communicating more about what NSF is doing to address urgent problems. The NSF communications and response on how it addressed COVID-19 -through RAPID funding, EAGERs, and other funding are an excellent example. The resources NSF developed not only highlighted immediate outcomes, but they also illustrated how the research areas the agency has funded for decades were critical to supporting that immediate response. This connection is extremely helpful in communicating the broader impacts of the basic research supported by the agency. The Strategic Plan should encourage the agency to emulate this strategy for other pressing issues.

**Improve the PI and scientific community's understanding of Broader Impacts:** The Strategic Plan should include goals to train and equip reviewers and NSF staff. This training should make sure that the Broader Impacts Review Criterion and full range of potential broader impacts available to researchers is fully understood by program officers and review panel members, and that review panels do not give inappropriate favor to or differential preference to proposals that choose to pursue certain broader impact areas over others.