

A Research Infrastructure for Maximizing Public Value of Science

**Oral Testimony before the U.S. House of Representatives
Committee on Science, Space, and Technology
Subcommittee on Research and Technology**

May 6, 2021

Hearing on: National Science Foundation: Advancing Research for the Future of U.S. Innovation
Part II

Mahmud Farooque
Associate Director, Consortium for Science, Policy, and Outcomes
Clinical Associate Professor, School for the Future of Innovation in Society
Arizona State University

Madam Chair, Members of the Committee, it is a privilege to testify today. Thank You.

I come before you to express my personal views about the challenges and opportunities before our nation and the role of the National Science Foundation in meeting them.

First, I find the NSF for Future Act a bold step in the right direction that meets our current technological, economic, social and political moment. Across its history, NSF funded research that addresses societal needs, many of which continue to create beneficial impacts and outcomes. The bill provides these portfolios the same support and infrastructure that it provides to research oriented towards scientific and market outcomes. The bill's provisions are additive and not substitutive and are informed by the most pressing societal challenges from climate change to socio-economic inequity that require a different and dedicated infrastructure.

The crises we face today mirror ones we faced in the late 70s and 80s after two oil shocks, the end of a prolonged foreign conflict, distrust of government, and continuing loss of leadership in industries critical to our economy and national security. Our response was strategic and sustained: The U.S. increased funding for basic research in NSF and DOD, set up NSF engineering research centers, passed the Bayh-Dole Act, created SEMATECH, the Critical Technologies Institute, the Advance Technology Program, and developed technology and industry roadmaps.

Collectively, these measures marked a shift in science policy, from one that prioritized science for science's sake to use-inspired science. They underwrote productivity gains and helped the U.S. recapture leadership in key industries. What this response did not do was change the fundamental distribution of labor among our public R&D institutions, which continue to enjoy robust capacity for orchestrating a similar and effective strategic response.

Despite this economic and scientific success, the U.S. innovation system still lacks the capacity to address stubborn societal challenges. With a few substitutions, a question that Economist Richard Nelson asked over 50 years ago, can still be posed today:

“Why is it that a country that recently landed a fifth Rover on Mars, developed three effective vaccines for a runaway global pandemic in record time, and more generally has led the world in R&D funding for 70 years, seems unable to avert the untimely death of a half a million of its citizens, unable to provide equity, justice and basic standards of living for its citizens living in poverty and facing discrimination, unable to keep the air and water clean and our neighborhoods safe, and struggling to protect our democracy from falling victim to misinformation and manipulation?”

If we are to address these kinds of challenges, first we need to start with the most pressing problems, not the most interesting research questions. Second, we need a broad-based capacity for considering the societal impacts of R&D across the system. And third, we need new evaluation criteria because attributes required to maximize our scientific, market, and societal values are not the same.

This may appear daunting, but NSF can build on its sponsorship of socially relevant research, education, and outreach—like research supported at my own institution. What is required is an infrastructure that allows for scaling and sharing of actionable and socially-relevant research. This can only come from a directorate exclusively organized around addressing our most pressing problems.

But on what challenges should we focus our attention? Science can inform solutions but it is up to society to choose and act. Increased funding and strategic management will ensure competitive leverage of our R&D assets. A solutions directorate must still determine priorities.

This brings me to my last point, the role of the public in our innovation system.

Myself and my colleagues across universities, museums, civic organization, citizen and community science platforms, science advisory bodies, and even some industries, have been grappling with this question for the last decade – how can we make decision-making about science more democratic and reflective of the nation’s shared values?

Here too, NSF has supported many public engagement activities that are bearing fruit and research that informs these activities. The task ahead then should be to take a holistic approach to integrating public engagement in research, education and decision-making.

To close, the NSF for the Future Act has the potential to accelerate societal benefit through R&D as a part of a well-coordinated national strategy. Through the Solutions Directorate, it also has the potential to help organize our R&D efforts in solving society’s most pressing and emergent challenges. What remains an open question is who will help shape how these pressing problems are solved: experts acting alone or experts engaging with the public?