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July 27, 2023

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Comments transmitted electronically via TIPRoadmap-RFI@nsf.gov on July 27, 2023

RE: FABBS Response to 88 FR 26345, Request for Information (RFI) on Developing a Roadmap for the Directorate for Technology, Innovation, and Partnerships at the NSF

Please accept these comments on behalf of the [Federation of Associations in Behavioral and Brain Sciences](https://www.fabbs.org/) (FABBS), a coalition of 29 scientific societies and 60 academic departments that come together to advance the rigor, impact, equity, and accessibility of our disciplines. Our members and our sciences are grateful for critical support from the National Science Foundation (NSF).

FABBS has a keen interest in and strong commitment to bringing insights from our fields to support the mission of the Technology, Innovation, and Partnerships (TIP) Directorate.

FABBS offers two overarching recommendations:

- **Knowledge mobilization** is a tremendous opportunity to translate research to impact. FABBS encourages TIP to invest in the pathways and actors necessary to transform the NSF investment in science into better policy, practice, and outcomes.
- **Consider the user** - including diverse communities - when pursuing use inspired science and innovation.

Knowledge mobilization

TIP has the potential to be the force that translates science and evidence into practice and policy to improve nearly every aspect of our lives. TIP offers a glimpse of how a changing science and engineering enterprise will meet this moment. NSF, as the tagline suggests - 'where discovery begins' - serves a foundational role across all federal agencies. With TIP, NSF can provide the connective tissue to translate discovery into health, education, and economic well-being.



As underscored by the most recent Programme for International Student Assessment (PISA) scores (<https://worldpopulationreview.com/country-rankings/pisa-scores-by-country>) the United States, ranked 22 out of 25, falls well behind our international peers. This low ranking is bewildering for a nation of our wealth, opportunity, and knowledge. To make progress, we need a better understanding of how students and people learn and the hallmarks of good teaching. NSF has invested significant funds in these questions and programs for educating both the STEM workforce and the educators who prepare them. Yet, much of what NSF funded researchers have learned through their work has not been integrated into classrooms across the country.

The ‘reading wars’ is a poignant example of a ‘valley of death’ between rigorous research identifying effective teaching techniques and the implementation and dissemination into diverse classrooms across our nation. In her podcast, *Sold a Story: How Teaching Kids to Read Went So Wrong* (<https://features.apmreports.org/sold-a-story/>), reporter Emily Hanford investigates how certain teaching methods, despite being proven wrong by cognitive scientists, became widely popular, often to the detriment of student learning. NSF funds critical research in the education and cognitive sciences that has the potential to dramatically improve teaching and learning. And yet, without a structure or supported pathways for mobilizing this knowledge into classrooms, the value of this investment is simply theoretical. Prior to TIP, NSF lacked clear mechanisms and processes for this type of knowledge mobilization. FABBS encourages TIP to fund research about the pathways for incorporating research into curriculum and considering the reality of implementation in classrooms as well as teacher training and effectiveness.

The Societal Experts Action Network (SEAN), launched by the National Academies of Sciences, Engineering, and Medicine, with support from the NSF is an inspiring example of knowledge mobilization. FABBS encourages TIP to explore opportunities for this model across societal challenges. SEAN was created to provide actionable guidance on the critical, complex, and urgent questions facing decision makers. Leading experts in the social, behavioral, and economic sciences leveraged their knowledge to provide evidence-based strategies to address COVID-19. Time and again, state and local policy makers turned to SEAN to better understand the numbers and science of the pandemic and to process the evidence to best serve their constituencies. FABBS encourages TIP to fund the synthesis and translation of science into actionable policies, practices, and materials – beyond the traditional peer review journal articles. Examples may include convenings, podcasts, and even [data visualization](#). The term ‘boundary spanners’ describe individuals within an innovation system who work to link knowledge to action. Unfortunately, researchers report that neither



the funding nor the rewards and incentives in academia reward this critical work. TIP could add tremendous value by funding these bridges in the roadmap.

Consider the user in use-inspired

The COVID pandemic offers a crisp example of a missed opportunity for research translation. As Dr. Collins concluded his term as the Director of the National Institutes of Health (NIH), he reflected that it had never occurred to him that once we had an effective vaccine, people would refuse to take it. In retrospect, had NIH leadership considered the ‘users’ and consulted with a group of diverse scientists, health practitioners, and community voices asked the question ‘How do we best protect our population from the virus?’, many of these considerations would have been raised, and possibly accounted for in the planning.

FABBS encourages NSF leadership to learn from this example to maximize the success of TIP by asking ‘What will it take to equitably scale technological inventions across diverse communities?’ rather than a narrower question of ‘how to build a particular technology. and then later turning to the questions of scale and equity – as we saw with the COVID vaccine. As NSF develops a road map to guide investment decisions in use-inspired and translational research, FABBS encourages you to invest time and resources to support the science to understand the user in use-inspired and the systems and implementation processes required for scaling translational research.

The behavioral and brain sciences are foundational for the conceptualization, development, and scaling of technology as well as societal, national, and geostrategic challenge focus areas identified in this RFI.

Key Technology Focuses

Several areas of inquiry from the behavioral and cognitive sciences are relevant to all types of technology.

- **Understanding bias** - Behavioral scientists have long-studied bias - systematic ways in which humans deviate from rational judgment. Behavioral and cognitive expertise are essential to avoid unintentionally passing these biases into large language models. [*Capturing Failures of Large Language Models via Human Cognitive Biases, Oct. 2022.*](#)
- **Cybersecurity** - Traditionally, cybersecurity has depended on technology-based solutions. However, psychology and neuroscience are critical to understanding what makes humans vulnerable to deception as well as ensuring secure practices i.e. developing strong password.



Two examples illustrate the importance of considering the human element to maximize impact.

- **Artificial intelligence, machine learning, and autonomy** - FABBS applauds TIP for funding the NSF AI Institute for Societal Decision Making at Carnegie Mellon University. This institute has the potential to improve the response to societal challenges such as disaster management and public health by creating AI tools to assist human beings faced with critical decisions. The institute will also develop interdisciplinary training to prepare decision makers to quickly execute impactful responses in dynamic situations. The outcome of this center will have exponential value across federal agencies.
- **Natural and anthropogenic disaster prevention or mitigation** - NSF research has the potential to modify the trajectory of our changing climate. New technologies and green energy will only go so far. Translating research into progress will require the knowledge about maximizing individual, community, and societal uptake of new technologies. Adaptation to new processes necessitates behavior change research. Researchers, many of them NSF funded, are examining these very questions. [*Is Behavior the Solution? Setting a Research Agenda for Climate Change Mitigation.*](#) The same is true about mitigating natural disasters. As technology improves accuracy in detection of storms and earthquakes, we must also improve our understanding of risk communication and human decision making. [*Bringing People into Focus - How Social, Behavioral and Economic Research Addresses National Challenge \(nsf13062\)*](#)

FABBS encourages TIP to be aspirational. To borrow a concept from Dr. Panchanathan, TIP should think about both the horizontal and vertical opportunities for the behavioral sciences. If we do these things we will have better outcomes in all societal challenges. Behavioral science questions and researchers have the potential to bolster many translational efforts.

Thank you for the opportunity to provide these comments. FABBS would be delighted for an opportunity to discuss any of these points in more detail.

Many thanks,

Juliane Baron

Executive Director, FABBS



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