Summary of URA-Hosted Discussion of

National Science Foundation Request for Information on the Technology, Innovation, and Partnership (TIP) Directorate's Roadmap Development

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Speakers:

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Introduction and Overview

On April 28, 2023, the National Science Foundation released a Request for Information ([RFI](#)) to gather "…input from the full range of institutions and organizations across all sectors—industry, academia, non-profits, government, venture capital, and others—to inform the development of a roadmap for its newly-established Technology, Innovation, and Partnerships (TIP) Directorate…". Responses to the RFI are due to NSF on July 27, 2023. Over 45 individuals representing 39 URA member universities attended the meeting.

Acknowledging the importance of this new activity, the complexities inherent in establishing TIP and developing its inaugural technology roadmap, and the critical nature of university inputs to the process, Universities Research Association hosted an on-line meeting on July 10, 2023 between representatives from URA member universities and NSF officials. The purpose of the meeting was to provide a forum where NSF officials could provide background information and context for the RFI that will enable university officials to better construct their responses to be most useful to NSF as they develop the roadmap. A Question-and-Answer-session followed the presentations from the NSF officials.

Background

The legislation that established TIP requires the development of a roadmap to guide investments in use-inspired and translational research to increase U.S. competitiveness in the 10 technology areas and 5 societal challenge areas identified in figure (1) below.

Figure 1: Key Technology Areas and Challenges Identified for TIP Investments
Credit: from NSF briefing, July10, 2023

In introducing the session, NSF officials pointed out that inputs to the roadmap development process are being gathered from a variety of sources including feedback from the RFI; interactions with NSF directorates and SMEs; existing national strategies and R&D plans, priorities/investment areas of other Federal agencies and the private sector; and through other data-driven research sources.

To elicit constructive inputs to inform the development of the roadmap the RFI focuses on the following six key questions:

Prioritization. What evidence exists that should guide NSF in determining priorities across the technologies for 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?

Suitability. Which technology areas/topics are well-suited for the type of use-inspired and translational research that TIP has the mandate to support?

Workforce. Which of the technologies will have the greatest workforce needs in the next 1 to 5 years?

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?

Additions. Are there technology areas that should be prioritized for TIP investment in the near term that are not included in the list from Congress?

Crosscutting investments. What translational research investments can be made to drive innovation by addressing critical needs common to multiple technology focus areas?

Summary of Key Points Made by the NSF TIP Leadership

The authorization for TIP is very broad but the appropriation is not yet sufficient to cover the TIP mandate. The TIP appropriation for fiscal year 2023 is $800M which, if divided equally between the ten technology areas, would be a relatively small amount in a particular area, for example, artificial intelligence. To credibly carry out its mission TIP must take the long-term view of the critical technology focus areas and the societal, national and geostrategic challenges. Input from the Nation's universities is a critical step.

The TIP mission is less about prioritizing one topic today over another but rather creating a process of developing and updating a roadmap to identify those areas where TIP can move the needle appreciably on a particular topic today but also to nimbly shift to other topics in the future as circumstances dictate.

To do this TIP is taking a circular approach in four stages: forecasting, road mapping, investing, and assessing. The first phase is about forecasting what the opportunity spaces are. Phase two is developing the roadmap that will guide investment, closely followed by phase 3 which is the process of making the actual investments. The final phase is to assess the effectiveness of the investments and the delivery of impact.

Accordingly, technology forecasting is a critical input area. With robust technology forecasting TIP should be able, together with inputs from universities and others, to develop the roadmap that speaks to how to stage and drive investments over the coming years. That roadmap is followed by a process of assessing the progress of delivering impact on those investments.

One of the areas where university and community input is especially critical is related to sequencing of investments. That is, identifying which technologies are particularly critical to advance in the near future and which should be made at a later date. Part of this process involves input from the community but also input from NSF's other directorates—and from other Federal agencies and industry—to identify opportunities for investments in areas where there are gaps in coverage. In some cases, this might mean investing in translational research efforts that complement basic research being done by other parts of NSF or by other organizations.

One primary task of TIP is to focus on the domestic workforce in key technology areas and expand participation of students and researchers in areas of the societal and national importance. The experience of universities in this area will be helpful to addressing the societal challenge

areas. Relevant to programs where students and researchers take part TIP welcomes input on investment periods that exceed the nominal three-year focus.

Addressing opportunities at the intersections between the technology areas and the societal challenge areas is complex but critical. Creative inputs regarding where big bets can be fruitfully made to meaningfully advance the technology while addressing the societal challenges will be helpful. Areas of obvious intersection include advanced energy technologies, climate change, and sustainability.

The discussion also addressed the role of new funding and partnership mechanisms in catalyzing particular areas. Inputs are encouraged to consider the full spectrum of funding to inform the roadmap. TIP recognizes that success relies on efficiently working together rather than recreating research infrastructures in every institution. Institutional capacity-building needs to be addressed across a diverse set of institutions.

Accomplishing the desired innovation outcomes requires partnerships not just across sectors but also across diverse institution types. The partnerships of the future might be designed in the shape of regional consortia, e.g., that combines shared facilities, infrastructure, and resources toward use-inspired and translational spaces. TIP was described as an intentional and hands-on directorate that fund projects with concrete deliverables and milestones.

Conclusion

NSF leadership expressed their appreciation for the opportunity to interact with the group of university research leaders and emphasized the importance of their input to the process of developing the roadmap.