



July 30, 2018

Phillip Singerman  
Associate Director for Innovation and Industry Services  
National Institute of Standards and Technology  
100 Bureau Drive  
Gaithersburg, MD 20899-2200

**RE: RFI Response: Federal Technology Transfer Authorities and Processes**

Dear Mr. Singerman:

The University City Science Center, a nonprofit organization located in Philadelphia, Pennsylvania, hereby submits this letter in response to the National Institute of Standards and Technology's (NIST) Notice of Request for Information (RFI): Federal Technology Transfer Authorities and Processes.

**I. Background on the Science Center**

The University City Science Center is a private, independent, nonprofit technology-based economic development organization serving the Greater Philadelphia region. Our 31 nonprofit shareholders include many of the leading colleges, universities, hospitals, and research institutions in Pennsylvania, New Jersey, and Delaware.

The Science Center is a dynamic hub for innovation, entrepreneurship, and technology commercialization. For more than 50 years, we have helped scientists, entrepreneurs, startups, and growing and established companies throughout the region as they move their technologies into the marketplace, where they can benefit the region and the world. We accomplish this by offering a steady stream of networking, professional development, and entrepreneurial support programs designed to leverage the rich resources available on our campus and in the region. Since we were founded in 1963, graduate organizations and current residents of the Science Center's business incubator have created more than 15,000 direct jobs that remain in the region today.

The Science Center has been a recipient of several federal funding awards designed to help accelerate the commercialization of research, including a recent grant awarded to the Science Center by the Biomedical Advanced Research and Development Authority (BARDA), within the U.S. Department of Health and Human Services, for up to \$500,000 over five years to join the new Division of Research, Innovation and Ventures (DRIVE) Accelerator Network. The award will augment the capabilities of the Science Center's existing accelerator programs that identify and promote innovations in national health security.

Over the past decade, the Science Center has made federal policy change a priority and has actively engaged in policy discussions relating innovation and entrepreneurship. Stephen Tang, the former President and CEO of the Science Center, served on the Department of Commerce's National Advisory Council on Innovation on Entrepreneurship (NACIE) for two terms, first as a member in 2014-16 and later as Co-Chair in 2016-18. Dr. Tang also served as a member of the Department of Commerce's Innovation Advisory Board (IAB) in 2011-12, and the Science Center's multi-institutional proof-of-concept program, QED, was featured in the IAB's 2012 Report to Congress required by the America COMPETES Reauthorization of 2010. Finally, the Science Center has participated in several Congressional hearings (before the Senate Commerce, Science and Transportation Committee, Joint Economic Committee, and House Small Business Committee), co-hosted Congressional briefings, and facilitated numerous meetings on Capitol Hill.

## II. Response to Stakeholder Questions

- (1) What are the core Federal technology transfer principles and practices that should be protected, and those which should be adapted or changed?
  - a. **Support and Improve the Small Business Innovation Research and Small Business Technology Transfer (SBIR/STTR) Programs:** The SBIR/STTR programs currently provide capital to researchers and startups to further development and bridge innovation gaps. These programs have been highly successful in accelerating the creation of innovative ideas to solve our country's large-scale problems and may be the most successful programs for federal investment that translates into small company growth. However, some changes to SBIR/STTR could help strengthen and improve the ability of the program to transition research to the marketplace. On March 4, 2016, NACIE sent recommendations to the Department of Commerce that included recommendations for the SBIR/STTR programs (<https://www.eda.gov/files/oie/nacie/meetings/20160303-SBIR-STTR-Recommendations-NACIE.pdf>). Among those, the Council recommended that the SBIR/STTR programs modify the criteria and composition of the program's review panels to make commercialization potential a more prominent factor in funding decisions. NACIE also recommended the required engagement of intermediary organizations in supporting the development of startups throughout the SBIR/STTR programs at various Federal agencies. The Science Center strongly supports these recommendations from NACIE and encourages NIST to implement them into its own SBIR/STTR programs. Facilitating communication with commercialization intermediaries at an early stage provides researchers with access to market information, business strategies, and other tools that might not otherwise be given attention during the research and development stages.

NACIE provided several other recommendations to strengthen the commercial outcomes for the SBIR/STTR programs. These will be discussed in full below, as other ways to improve the transfer of technology, knowledge, and capabilities resulting

from federal research and development (R&D) to benefit U.S. innovation and the economy.

- b. **Focus on a Cluster and Regional Innovation Ecosystem:** Each of our country's geographic regions have unique strengths and cultures, meaning that a one-size-fits-all national innovation policy would be an inefficient use of time and resources. There are many regions across the country utilizing local resources to make statewide and even national economic impacts. The Federal government has supported these cluster-focused ecosystems through several important programs. For example, the Science Center strongly supports the Economic Development Administration's (EDA) Regional Innovation Strategies Program competition to spur innovation capacity-building activities in regions across the nation and provide cluster grants to support the development of seed capital funds. Similarly, the Small Business Administration (SBA) is investing in regional innovation clusters throughout the U.S. that help foster interconnection between public and private entities, such as universities, private companies, and small businesses.

NIST should encourage the creation of these regional/cluster ecosystems of innovation within their own programs, including the Manufacturing Extension Partnership (MEP) and NIST's national labs. Federal funding could also be used to extend successful state and local programs beyond jurisdictional boundaries in clusters and ecosystems with multi-jurisdictional footprints. Moreover, Federal programs should be more open to "reinvesting" in ideas that work, rather than typically seeking to fund only new concepts – the bias toward new ideas can ultimately limit the impact of models that, while not completely "new," are not yet fully developed.

- c. **Continue to support public-private partnerships:** Over the last few decades, commercialization intermediaries have matured and become more prevalent across the country. Sometimes called Technology-Based Economic Development (TBEDs), these entities often play a pivotal role in regional innovation ecosystems by connecting promising research with market forces and potential capital.

Federal policies have only started to acknowledge the value of these TBED entities and encourage participation of commercialization intermediaries in federal programs aimed at technology transfer. Commercialization intermediaries understand regional and sector-specific markets, and thus help facilitate successful public-private partnerships by identifying and working with partners that will benefit from specific collaborations.

- (2) What are the issues that pose systemic challenges to the effective transfer of technology, knowledge, and capabilities resulting from Federal R&D? Please consider those identified in the RFI as well as others that may have inhibited collaborations with Federal laboratories, access to other federally funded R&D, or commercialization of technologies resulting from Federal R&D.

- a. **Obstacles in the Federal Lab-to-Market Model:** The Federal government is responsible for the development of many innovative and exciting technologies to advance our country's most pressing problems. However, there are currently few incentives for researchers to test market applicability. Federal researchers that work in labs, particularly those under a Government Owned, Government Operated (GOGO) model, lack information and incentives related to focusing research towards commercial viability.

A few labs have created model partnerships with area technology transfer organizations to assist with identifying research with market potential and pulling it out of the lab setting.

- b. **University Research Challenges:** While research universities are vital in developing new and innovative technologies, university researchers are often prohibited from using university resources after certain steps have been taken to achieve a patent. Commercialization intermediaries have worked to fill this gap and provide lab space, business acumen, and access to potential funders to assist the researcher with bringing their products to market. Unfortunately, these prohibitions deter researchers from pursuing commercialization opportunities. Patent laws should be reformed to allow for research developed in university settings to continue to evolve within these settings in partnership with non-profit technology transfer entities.
- c. **Need for Greater Coordination Within NIST and Broader Federal Government on Innovation Policy:** Greater emphasis on technology transfer and commercialization within NIST's labs and programs, and greater coordination with other federal agencies on innovation policy, are necessary to spur additional economic growth. As the Information Technology and Innovation Foundation (ITIF) noted in their 2016 memo on Innovation, Productivity, and Competitiveness ([http://www2.itif.org/2016-white-house-transition-memo.pdf?\\_ga=2.86405272.1476219819.1531946699-1569448547.1531946699](http://www2.itif.org/2016-white-house-transition-memo.pdf?_ga=2.86405272.1476219819.1531946699-1569448547.1531946699)), "federal agencies have the ability to drive innovation not only in their own programs and operations, but also in the broader economy." Even with NIST's current work, more is needed to ensure that innovation is appropriately addressed throughout the entire government and that agencies learn from each other about best practices for the innovation community.

In 2015, the Department of Energy created the Office of Technology Transitions, which maintains a centralized focus on commercial output of DOE research activities, including the work of their 17 national labs. NIST should create a similar entity that acts as a central repository of commercial resources and outputs from NIST research and assists NIST technology and research programs with creating goals that incorporate market adoption.

(3) What is the proposed solution for each issue that poses a systemic challenge to the effective transfer of technology, knowledge, and capabilities resulting from Federal R&D? Please consider the approaches identified in the RFI.

- a. **Solutions to the Federal Lab-to-Market Model:** As discussed above, there are currently few incentives for researchers in national labs to test market applicability. The Science Center supports legislation last introduced in the 114<sup>th</sup> Congress that would incentivize the national labs to partner with non-governmental entities for the commercialization of technology, allow the labs to enter into public-private partnerships to facilitate commercialization, and create an integrated overall strategy for the national labs.

Additionally, many researchers are inexperienced and disincentivized to dedicate time to company formation and capital sourcing. NIST should develop stronger public-private partnerships with regional commercialization intermediaries to commercialize the research and development emerging from NIST's national labs. For example, the federal government could allow TBEDs to review national lab technologies and assist with the selection of those projects that have the highest potential for commercialization. These reforms would allow for NIST's labs to be able to translate their innovative research into commercially viable products.

- b. **Solutions to the University Research Challenges:** NIST should prioritize and encourage the development of multi-institutional regional mechanisms to facilitate technology commercialization with the assistance of intermediary TBEDs. The Federal government should encourage academic institutions to work together on joint initiatives in technology commercialization that will allow funding to be more effectively deployed, thereby increasing the likelihood of successful outcomes. These outcomes will include the creation and growth of high-tech companies, high-paying jobs, and high-demand medicines, medical devices, and other technologies that, in turn, will fuel economic development in the United States and beyond. Such collaborations can be successfully organized and managed by neutral, intermediary organizations with connectivity to the marketplace. Regional strengths can be emphasized, and appropriate incentives to collaborate and communicate can be provided, in order to foster an environment that facilitates the productive exchange of ideas and technologies.

For its part, the Science Center has established a multi-institutional model for university and TBED partnerships which can help bridge the gap in funding and expertise that universities need to commercialize their research. The Science Center has developed and currently operates two commercialization programs – QED and Phase 1 Ventures – that leverage the participation of multiple interests in the science and technology sector, including academia, industry, venture capital and other groups. These programs have been recognized by government agencies at all levels, as well as by foundations and other private sector interests, as models for technology commercialization.

**QED Proof-of-Concept Program:** Our QED Proof-of-Concept Program – which we established in 2009 as a privately-funded pilot initiative, and subsequently expanded into a public-private partnership with government support – is the nation’s first multi-institutional proof-of-concept center (POCC). QED funds early-stage academic research projects in the life sciences and health IT and helps position them for transfer to the commercial sector. The program – named “QED”, after the Latin phrase “quod erat demonstrandum” or “proven as demonstrated” – provides funding and business advice for academic researchers throughout the Greater Philadelphia region who are developing early-stage life science and health IT technologies with high commercial potential. QED helps promising researchers translate their publicly-funded basic research into privately-funded technology commercialization and product development opportunities. As angel investors, venture capitalists, and established companies increasingly shift their investments to later-stage initiatives, QED fills a critical gap in the innovation pipeline.

QED leverages the Science Center’s relationships with universities, companies and other interested parties, driving technology transfer and new business formation, advancing entrepreneurship, and encouraging innovation, competitiveness, and knowledge-based retention and expansion. The program’s key operating principles are (a) to focus existing regional resources on substantially reducing early-stage business risk, and (b) to evaluate and position early-stage technologies for follow-on investment by established companies and private investors, thereby reducing the proliferation of sub-scale, undercapitalized ventures already in the market.

As of January 2018, QED has screened more than 600 submissions from participating researchers at institutions throughout Pennsylvania, New Jersey and Delaware, and has helped researchers develop 94 proof-of-concept plans, with 31 receiving financial support to execute their plans. Ten of the funded projects have transitioned into the private sector via a license or option to the technology, together raising over \$22 million in follow-on investment for continued development and growth.

**Phase 1 Ventures:** Following the successful launch of QED, in 2014 the Science Center initiated a new multi-institutional commercialization program, Phase 1 Ventures (P1V), a technology accelerator for new business formation and growth. P1V identifies and guides the development of promising new companies around technologies that have moved beyond the initial technical proof-of-concept stage. P1V is a managed and standardized process to launch new companies in a cost-efficient manner, leveraging SBIR/STTR funding. P1V tests the scientific and market feasibility and strength of technologies for new company formation and launch, thereby enhancing the ability of these projects to attract grants and private sector investment.

Since it launched in 2015, P1V has enrolled and assembled 28 teams developing products in drug development, gene therapy, diagnostics, biomaterials, machine learning, and energy. Technologies have come from institutions throughout the region, including Drexel University,

Lehigh University, Rutgers University, Temple University, Thomas Jefferson University, the University of Delaware and the University of Pennsylvania.

Through its QED and P1V programs, the Science Center has been able to promote greater collaboration and dialogue among universities in the technology transfer process, which are essential to successful commercialization. Organizations – such as the Science Center – that have a proven track record in technology commercialization can be utilized as reference points in order to develop a national model for efforts to accelerate commercialization. NIST should prioritize federal investment in programs like QED and P1V, in order to scale up, expand, and/or translate these programs to other parts of the nation.

**c. Solution to Lack of Coordination and Priority of Innovation in Federal Government:**

In their 2016 memo on Innovation, Productivity, and Competitiveness ([http://www2.itif.org/2016-white-house-transition-memo.pdf?\\_ga=2.86405272.1476219819.1531946699-1569448547.1531946699](http://www2.itif.org/2016-white-house-transition-memo.pdf?_ga=2.86405272.1476219819.1531946699-1569448547.1531946699)),

ITIF recommended that every agency should appoint a chief innovation officer for every cabinet-level agency, along with other technology-related agencies. We believe that NIST qualifies as a “technology-related agency” and should appoint a chief innovation officer. This could be done through a clarification of the position of the Associate Director for Innovation and Industry Services. ITIF also recommended that these chief innovation officer meet together quarterly to exchange best innovation practices. NIST should be included in these conversations, given NIST’s role in our national lab system.

**(4) What are other ways to significantly improve the transfer of technology, knowledge, and capabilities resulting from Federal R&D to benefit U.S. innovation and the economy? What changes would these proposed improvements require to Federal technology transfer practices, policies, regulations, and legislation?**

**a. Allow SBIR/STTR Award Funds for Increased Commercialization Activities:**

While there is broad consensus on the importance of basic research through the SBIR/STTR programs, there remains the potential to improve the rate of commercialization of federally-funded research, which in turn will lead to more company formation, job creation, and economic growth. In the same recommendations mentioned earlier in this RFI, NACIE proposed that SBIR/STTR award funds should be used for increased commercialization activities. The Science Center supports a change in the SBIR/STTR statute, most recently proposed in bipartisan legislation passed by the House of Representatives and the Senate Small Business Committee in 2018 and included in the Fiscal Year (FY) 19 National Defense Authorization (NDAA) Conference Report, which would dedicate the use of these funds for commercialization programs and activities, such as market viability studies, prototype development, and business and manufacturing plans, if awardees choose to use the funding in this way. It also provides greater flexibility in the use of SBIR/STTR awards to meet the needs of the specific applicant and encourages the use of commercialization services provided by an intermediary in their local region. The



flexibility allowed under this provision will help to ensure that businesses are getting the business assistance that will best help them bring their ideas to market within their individual regions.

- b. **Increase the Amount of SBIR/STTR Award Funding Eligible to Pay for Commercialization Services:** In addition to NACIE's recommendation that there needs to be increased flexibility of funding within the SBIR/STTR program, the Council also recommended that a greater portion of SBIR/STTR awards be eligible to pay for commercialization services if awardees so choose. This recommendation was also offered in a joint report between ITIF and Brookings entitled "Localizing the Economic Impact of Research and Development: Policy Proposals for the Trump Administration and Congress." There is further evidence of the need for this highlighted in an internal study by the Science Center, which found that many of the companies they assist invest approximately \$100,000 in commercialization costs. In all cases surveyed, actual commercialization expenditure represented about 30 to 40 percent of their total costs. This underscores the need for greater dedication of SBIR/STTR funding towards commercialization services. In the same bipartisan legislation described above, SBIR/STTR grantees are permitted to use a greater amount of their award for these important, and costly, commercialization services. Specifically, the legislation would increase the amount of funding that can be used for commercialization from \$5,000 to \$6,500 per project in Phase I and up to \$50,000 per project in Phase II. This is essential to ensure that innovators have the resources they need to bring their ideas to market.
- c. **Creation of a Proof-of-Concept Program:** In a 2017 report entitled "How technology-based start-ups support U.S. economic growth" (<https://itif.org/publications/2017/11/28/how-technology-based-start-ups-support-us-economic-growth>), ITIF provided recommendations on how to improve the SBIR/STTR programs. They suggested the development of a proof-of-concept, or "Phase Zero," individual and institutional grant award program within major federal research agencies at the national level. A "phase zero" program would not only help more projects cross the "valley of death," but would also help enhance the infrastructure (e.g., expertise, personnel, support, venture capital engagement, etc.) and facilitate the cultural change necessary for universities, federal laboratories, and other non-profit research organizations to better support these types of commercialization activities. This type of program could be used to provide funding for projects like the Science Center's Phase 1 Ventures, to ensure that innovative ideas are identified and supported through the commercialization process.

### III. Conclusion

We appreciate your attention to this pressing issue and your consideration of our recommendations. Aiding our federal research programs with commercialization-related assistance is essential to solve our nation's pressing problems, to cultivate job creation, to improve our economic viability, and to



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spur additional innovation and entrepreneurship throughout the country. Please feel free to contact us if you have any questions or comments on this letter or if you would like any additional information. In addition, we would be happy to meet with you at your convenience to discuss our programs and proposals in more detail, and we invite you to visit us here at the Science Center in Philadelphia to tour our expanding facilities and learn more about how we support technology commercialization and economic development in the tri-State region.

Thank you for your consideration.

Sincerely,

A handwritten signature in cursive script that reads "Saul A. Behar". The ink is light gray and the signature is positioned above the printed name.

Saul A. Behar  
Vice President and General Counsel