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Tech Labs Program
Directorate
Directorate for Technology, Innovation and Partnerships (TIP)
National Science Foundation
2415 Eisenhower Ave
Alexandria, Virginia 22314

On behalf of IEEE and IEEE-USA, we are pleased to submit this response to the Request for Information regarding the NSF Tech Labs program. We believe the Tech Labs model is a vital evolution in the U.S. innovation stack, specifically designed to bridge the "Innovation Gap" by decoupling high-impact research from traditional academic constraints. By utilizing Other Transaction (OT) Authority and milestone-based funding, Tech Labs can provide the agility and operational autonomy required to move "orphan technologies" through the final mile of engineering toward industrial readiness.

We advocate for a program design that empowers dedicated, full-time RDI teams to focus on overcoming technical bottlenecks without the friction of institutional overhead. We look forward to supporting the NSF in ensuring that the next generation of critical technologies is not only discovered in the United States but is also manufactured and scaled by a domestic workforce. We welcome further dialogue on this innovative program. Please direct any questions to Ryan Cunius at (202) 530-8339 or r.cunius@ieee.org.

1. **Briefly describe your organization, capabilities, services offered, ownership model, and size.**

IEEE is a member-governed 501(c)(3) non-profit dedicated to advancing technology for the benefit of humanity, with IEEE-USA specifically representing over 150,000 U.S. members. As a technical authority in Washington, D.C., the organization ensures federal policies are sound and supportive of domestic career vitality while managing the technology life cycle through key pillars, including technical literature, workforce development, and policy advocacy.

The organization maintains a significant global footprint, managing over 1,000 active industry standards, 900 of which are under development, to ensure technical interoperability and security. Governed by member-elected volunteers and professional staff, IEEE's non-profit ownership model ensures that its priorities remain focused on the long-term health of the profession and global competitiveness rather than short-term profit.

2. **What, if any, substantive comparative advantage (as compared to standard grants and other existing NSF programs) could the NSF Tech Labs program model provide in efforts to accelerate and advance U.S. competitiveness – either across various key technologies or within a specific technology focus area?**

The Tech Labs program represents a fundamental shift in the U.S. innovation engine by decoupling high-impact research from traditional academic constraints. Unlike the DARPA or SBIR/STTR models, which can be limited by rigid milestones or small-scale commercialization goals, Tech Labs addresses critical national technologies through reduced administrative friction. By bypassing the indirect costs and bureaucratic delays typical of university research offices, the program enables autonomous velocity. This model enables real-time adaptation in fast-moving sectors such as semiconductor packaging and AI power systems; discoveries made early in a project can dynamically steer the technical path for the remainder of the performance period, ensuring federal funds are always aligned with the most promising breakthroughs rather than stagnant proposals.

A recurring bottleneck to U.S. competitiveness is the "Innovation Gap," where theoretical academic solutions fail to meet industry implementation standards. The Tech Labs model bridges this divide by integrating academia, industry, and end-users from the project's inception. Central to this success is the Phase 0 Foundation, a dedicated period for team creation and partnership formation. Rather than requiring a pre-formed team, Phase 0 ensures that technical expertise is strategically matched with the appropriate industrial partners before development begins. This industrial-first approach ensures that technology is not merely invented in the U.S. but is inherently producible by domestic workers utilizing resilient, local supply chains.

To compete globally, the U.S. must move beyond the traditional grant scale of $100k to $200k. The Tech Lab model recognizes that complex hardware and systems engineering require a significant upfront investment, typically ranging from $5 million to $10 million. This capital allows teams to procure specialized equipment and hire dedicated staff that smaller SBIR grants cannot sustain. To manage this investment effectively, Tech Labs implements a streamlined stewardship model. By replacing onerous accounting mechanisms and frequent project manager check-ins with tangible, milestone-based de-risking goals, the program ensures that the focus remains entirely on technical deliverables and national impact rather than administrative reporting or academic citations.

The private market frequently fails to fund technologies that are vital for national resilience but offer low immediate profit margins. Tech Labs serves as a corrective mechanism for these "orphan" technologies, those too expensive for venture-backed startups and too risky for established firms. By providing non-dilutive capital to bridge this margin gap, the program secures Sovereign Technical Capability. This strategic focus ensures that the U.S. and its allies maintain control over the foundational building blocks of the modern economy, safeguarding national security and public utility against global supply chain vulnerabilities.

3. **Could your team become an NSF Tech Lab? (Y/N)**

From the perspective of a global technical organization like IEEE, we would not be a Tech Lab. They must function as a high-execution engine capable of independent operation. While societies should not act as the "engine" itself, they serve as the critical connective tissue for the technical workforce. Rather than managing labs, IEEE is positioned to scale the innovation ecosystem through extensive workforce development programs. This partnership ensures a steady pipeline of talent that is up-skilled via specialized continuing education and certification tracks, connected through global peer networks that bridge the gap between academia and industry, and standardized in technical proficiency to ensure Lab outputs meet global market expectations. Ultimately, while Labs focus on execution, organizations like IEEE focus on empowering the people who make that execution possible.

For the Tech Labs program to achieve high-impact outcomes, it must empower teams to operate at the velocity of the problem rather than the bureaucratic cycle. Several existing organizational models are well-suited to transition into the Tech Labs framework because they are already oriented toward applications rather than theory. These include Independent Research Organizations (IROs), which maintain academic rigor without restrictive "indirect cost" silos; Research Spin-offs and Startups, which possess breakthroughs that are pre-competitive or tangential to a parent company's core business; and

Public-Private Consortia, which already manage multi-stakeholder relationships but currently lack the flexible, high-risk capital required to navigate the technology translation "Valley of Death."

The management of a Tech Lab must differ fundamentally from a traditional grant-funded lab. Success requires Pragmatic Leadership, led by bridge-builders such as startup veterans or non-profit technical leads who have experience taking a product from concept to deployment. Complementing this leadership is the requirement for Operational Autonomy, which allows Lab leadership to pivot resources, change technical direction, or alter team composition immediately based on milestone data. This agility removes the dependency on annual NSF reviews or university board approvals, allowing the research enterprise to adapt in real time to technical successes or failures.

A common failure in technology translation is the reliance on part-time personnel, such as faculty with heavy teaching loads or rotating graduate students. The Tech Lab model replaces this with a committed, full-time workforce. Furthermore, high-impact outcomes depend on the verification of Collaboration. This must be validated through binding letters of commitment from partners, including industry, national labs, or philanthropies, specifying the exact infrastructure, data, or personnel they are contributing. By integrating an Agile Workforce Pipeline through organizations like IEEE, Tech Labs can consistently attract specialized domestic talent as they scale from Phase 1 to Phase 2

The Tech Lab structure is designed to be the "missing link" in the U.S. innovation stack. While universities conduct fundamental discovery and startups focus on commercialization, the Tech Lab handles the dedicated engineering of the transition. By focusing on the "how" of domestic production and systems integration, the program ensures that the United States does not just invent the future, but also maintains the infrastructure and workforce required to build and sustain it.

4. **What program design choices would contribute to the success of the Tech Labs mechanism? What program design choices would present potential barriers?**

Structure

For the Tech Labs program to succeed where previous models have plateaued, it must be structured as a specialized research enterprise rather than a standard grant-funded project. The scope of a Tech Lab should not be limited to basic discovery. Instead, it must encompass the entire translational arc, from finalizing early-stage academic research to preparing technology for industrial use or dual-use federal applications.

- The Lab's scope should be defined by a specific, high-priority technical bottleneck rather than a broad scientific discipline.
- A key component of the Lab's scope is ensuring that the technology can actually be manufactured or deployed at scale within the U.S. ecosystem.

The ideal management structure is one that provides operational autonomy, allowing the team to pivot based on research results without the lag of committee-based decision-making.

- Management should be led by stakeholders intimately involved in the problem, such as veteran startup founders, non-profit technical directors, industrial R&D leads, or emerging technology leaders backed by strong mentors and advisors.
- The Tech Labs will require a committed core team. Key personnel must be full-time or have a contractually guaranteed percentage of effort that ensures the project remains the primary focus.

- The Lab should operate under a board of directors or a steering committee that includes end users (industry or government partners) who will eventually adopt the technology.

Eligibility

Eligibility should be broad enough to capture the best talent yet restricted enough to ensure national security and speed.

- **Eligible Organizations:**
  - **Independent Research Organizations & Non-profits:** Ideal for their ability to sit between academia and industry.
  - **Startups and Small/Mid-size Businesses:** These entities are naturally incentivized to move quickly and achieve market readiness.
  - **Consortia:** Public-private partnerships that bring a "team of teams" approach.
  - **Universities (with caveats):** Universities should only be eligible if the project is structured outside normal university governance.
- **Security Restrictions:** To maximize the impact of federal investment, any team with significant participation, ties, or funding from foreign, adversarial nations must be restricted.

Intellectual Property (IP)

Maximum impact is achieved when IP rights are spelled out at the proposal stage.

- **Pre-existing IP:** Teams must arrive with clear "freedom to operate" regarding their pre-existing IP.
- **Collaborative IP Models**: Borrowing from successful cooperative research models, the IP should be structured to allow all participating stakeholders (industry and non-profit) a clear path to utilize the Lab's outputs.

5. **What opportunities do you see for synergy with research and development efforts that are or could be funded by industry or philanthropic organizations? What partnership structure would allow Tech Labs to leverage federal and private support for maximum benefit?**

To maximize impact, the NSF Tech Labs program should adopt a consortia-based approach that integrates federal capital with existing private or philanthropic investments. By functioning as an "accelerator," the program provides a milestone-driven framework to advance technologies that align with social missions but lack high-profit commercial paths. To ensure stakeholder commitment and validate real-world utility, NSF should implement matching requirements—either in-kind or financial—during Phases 1 and 2.

This model specifically addresses the challenge of industry abandoning low-margin technologies that offer significant public goods. Tech Labs de-risks these projects for both small and large businesses by funding expensive prototyping phases where the private return on investment is too slow to justify the risk. This creates strategic alignment in which NSF provides the technical "push" through funding, while philanthropies provide the "pull" by guaranteeing initial adoption or deployment.

6. **What translational problems, challenges, and/or bottlenecks could be addressed within 3-7 years with this program design? Answers can be broad or specific.**

From an IEEE perspective, the U.S. R&D ecosystem currently suffers from a lack of functional integration rather than a lack of innovation. The Tech Labs program can bridge this "Innovation Gap" by funding the "final mile" of engineering for high-utility infrastructure technologies that lack a traditional high-profit margin. By focusing on technical deliverables over commercial dividends, Tech Labs can mature these orphan technologies to a state of proven readiness within 3–7 years, allowing government or philanthropic entities to adopt them directly. Furthermore, the program serves as a critical technical bridge for startups that hit the $10M–$50M industrial-scale prototyping funding wall, preventing domestic R&D from being lost to foreign interests during expensive testing phases.

Additionally, the Tech Labs model addresses the disconnect between academic research and manufacturing by providing a formal structure for small, agile teams to leverage high-cost infrastructure, such as foundries and supercomputing. By operating autonomously outside the traditional university bureaucracy and its high indirect costs, Tech Labs can execute at the speed of industry and focus resources on the research enterprise rather than institutional overhead. This approach ensures that technology development occurs in parallel with the creation of manufacturing protocols and training modules, enabling new innovations such as semiconductor architectures to be produced domestically by a ready U.S. workforce.

The Tech Labs program must also incorporate a proactive Technology Graduation Strategy that begins before the 3–7-year mark to ensure that program advancements do not stall at the end of the funding cycle. Success could be defined by the successful handoff of orphan technologies to mission agencies, national laboratories, or private-sector consortia through customer-informed milestones co-developed with eventual adopters.