SCIENTIFIC INSTRUMENTATION FOR SENSING AND IMAGING TOPIC ANNOUNCEMENT FOR THE NSF X-LABS INITIATIVE

1.0 Purpose:

The National Science Foundation (NSF) Directorate for Technology, Innovation and Partnerships (TIP) announces its intent to solicit Written Proposals for NSF X-Labs teams in the technical domain of scientific instrumentation for sensing and imaging. This NSF X-Labs announcement is issued under the Other Transactions Agreement Solutions Offering (OTASO), *NSF-OTASO-FY26-XLabsInitative*.

2.0 The NSF X-Labs Initiative:

NSF X-Labs represent a bold, flexible, and outcomes-driven initiative designed to build and accelerate novel platform technologies capable of unlocking entirely new sectors, including new fields of scientific inquiry. The program will support full-time research and development (R&D) teams focused on use-inspired scientific breakthroughs and foundational platform technologies that traditional university and industry labs cannot easily address. NSF X-Labs teams will benefit from ambitious R&D goals, operational autonomy, milestone-based funding, and the ability to engage across academia, industry, national laboratories, and nonprofit sectors. NSF X-Labs will bet on ambitious, full-time teams working with urgency and purpose, and provide them with the structure, resources, and flexibility necessary to cultivate early-stage platform technologies that will accelerate breakthroughs and unlock entirely new sectors of the economy.

See Section 3 of *NSF-OTASO-FY26-XLabsInitative* or the latest amendment issued for information on the NSF X-Labs initiative's strategic objectives.

2.1 NSF X-Labs Topics and Missions

NSF will release specific Topic areas under the NSF X-Labs initiative via Topic Announcements. Topics will center on fields of research where breakthroughs could create or reshape entire scientific fields and technology sectors where U.S. competitiveness is a priority.

Proposing teams will specify their Mission, defined as the novel platform technology and key use-inspired research solutions that the proposed NSF X-Lab is uniquely suited to tackle. Missions must align with a current Topic Announcement released by NSF. Proposing teams should have a clear vision of how their Mission will result in an end-state that creates or reshapes an entire field of scientific research or sector of technology, and how their Mission is currently unmet by existing organizational structures and funding mechanisms.

3.0 Topic Description:

Every revolution in science has been preceded by a revolution in what we can measure, from the telescope to modern Magnetic Resonance Imaging (MRI) machines. Today, the frontier is starved for radically new modalities for sensing and imaging. We cannot watch a non-crystalline enzyme work at atomic resolution, probe the full dynamics of a working synapse, or identify the most reactive surface defect structures on advanced catalytic materials.

NSF X-Labs in this Topic will target specific platform technologies in sensing, imaging and supporting technologies that will form the basis for revolutionary new capabilities in scientific discovery and technology sectors. Teams might, for example, draw on quantum sensing, artificial intelligence (AI)-driven computational imaging, adaptive AI-based sensing algorithms, and/or entirely new modalities to redefine what we consider knowable.

Examples of relevant, currently unmet R&D challenges may include, but are not limited to: detection of molecular-scale single-reaction events across timescales of femtoseconds to seconds; MRI-free deep-tissue imaging; non-destructive biomolecule microscopy at exquisite resolution; high-sensitivity quantum sensors suitable for operation in a variety of environments; instruments intentionally engineered for next-generation AI training pipelines; and sensors to resolve whole-brain activity at cellular resolution across long timescales.

An NSF X-Labs Mission in this Topic must be transformative, accelerating breakthrough R&D in scientific instrumentation towards creating or reshaping new lines of research and technologies. Successful teams will overcome technical barriers facing sensing and imaging, develop platform technologies, demonstrate measurable impact on the U.S. science and technology landscape, and position their technologies for widespread use and investment in research and/or other sectors.

Examples of challenges **not** considered in scope for this Topic include computational or software solutions without practical integration into an instrumentation system, development of technologies where the impact is narrow and not widely deployable, fundamental research without potential for application in platform technologies, incremental advancement of the state of the art, or advancement of technologies that are already appropriately developed to the point of full-scale commercialization.

4.0 Other Transaction (OT) Award Details:

In response to this Topic Announcement, NSF anticipates issuing one or more Other Transaction (OT) contracts pursuant to NSF's statutory authority at 42 U.S.C. § 19116. Refer to *NSF-OTASO-FY26-XLabsInitative* or latest amendment issued for more information on period and place of performance, instrument and approach, eligibility, performance objectives for NSF X-Labs teams, programmatic phase structure, milestones and milestone-based payments, Written Proposal format and instructions, Oral Proposal Packages, NSF selection criteria, and the review and selection process. Proposers are expected to closely review *NSF-OTASO-FY26-XLabsInitative* before submitting a Written Proposal in response to this Topic Announcement.

An eligible organization can submit a maximum of two Written Proposals per Topic Announcement for Phase 0 as a lead organization. Senior/Key Personnel may be listed on a maximum of one Written Proposal per Topic Announcement.

5.0 Topic Timeline:

NSF anticipates awarding selected teams a 9-month Phase 0 with a Go/No Go selection period beginning after 7 months. NSF anticipates awarding teams selected for Phase 1 an approximately 24 to 36 month period of performance with the intention of renewing high performing teams for Phase 2 following subsequent Go/No Go selections.

NSF anticipates the following schedule for OT awards made in response to this Topic Announcement:

Written Proposal Submission Deadline	July 13, 2026; 5:00 p.m. Eastern
Oral Presentations	August 17 to August 21, 2026
Beginning of Phase 0	November 2026
Beginning of Phase 1 Go/No Go Selection	June 2027
Beginning of Phase 1	August 2027

6.0 Submission Details:

The NSF X-Labs initiative involves a two-step competitive evaluation, as described in *NSF-OTASO-FY26-XLabsInitative*. NSF will accept Written Proposals in response to this Topic Announcement and then invite a smaller number of proposing teams to submit an Oral Proposal Package and deliver an oral presentation. All Written Proposals submitted in response to this notice must comply with the content and format described in Section 10 of *NSF-OTASO-FY26-XLabsInitative* or the latest amendment issued.

Questions concerning this Topic Announcement may be accepted by the Government through 5:00 p.m. Eastern on July 6, 2026. Questions must be submitted via email to XLabs@nsf.gov. The subject line of any submitted questions must include the topic title: NSF-Topic2-FY26-XLabsSensingandImaging.

Written Proposals will not be accepted after **5:00 p.m. Eastern on July 13, 2026**. Proposals must be submitted electronically via the NSF submission website at https://nsfgov.my.site.com/xlabs.

7.0 Scientific Instrumentation for Sensing and Imaging NSF X-Labs Webinars:

Join the NSF TIP team for a webinar, including a presentation on key materials in the OTASO and Topic Announcement. A Q&A will follow the presentation. Respondents are recommended to review *NSF-OTASO-FY26-XLabsInitative* and the Topic Announcement before the webinar to maximize the effectiveness of the Q&A session.

Introduction to NSF X-Labs Funding Opportunity – Scientific Instrumentation for Sensing and Imaging
May 28, 2026, 1:00 p.m. - 2:00 p.m. Eastern
Register here: https://nsf.zoomgov.com/webinar/register/WN_UOZnoG6pQJqy0UnHsaQfYg

Q&A for NSF X-Labs – Scientific Instrumentation for Sensing and Imaging
June 23, 2026, 2:30 p.m. - 3:20 p.m. Eastern

Register here: https://nsf.zoomgov.com/webinar/register/WN_Mcc8FIOKRGySheb5ZpuowA