

BERKELEY RESEARCH DEVELOPMENT OFFICE

National Artificial Intelligence Research Institutes (NAIRI)

Accelerating Research, Transforming Society, and Growing
the American Workforce

NSF 22-502

BRDO INFO SESSION FOR UC BERKELEY FACULTY

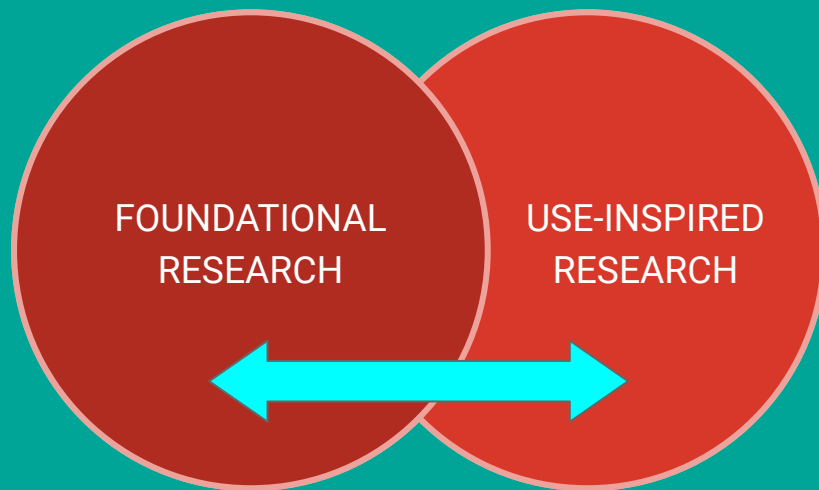
Introduction

- USG is making a long-term investment in AI research by funding AI Research Institutes, aiming for *transformational* advances
- This is **Round 3** of the NAIRI solicitation
- 6 themes guide this year's FOA, with new agency & industry sponsors
 - Submissions **MUST** have a principal focus in one of the 6 themes
- **Funding:** \$4M/year for 4–5 years, one Institute per theme/track (total: 7)

Desired Elements for all AI Institutes

- AI Institutes must include the following elements as part of their research vision and explicitly address each within the proposal. Institutes should:
 - **Advance foundational AI research**
 - **Conduct use-inspired research**
 - **Actively build the next generation of talent**
 - **Build a coherent and multidisciplinary group of scientists, engineers and educators**
 - **Each institute should be comprised of multiple organizations working together to create significant new research capabilities**
 - **Be a nexus point for collaborative efforts**

Foundational & Use-Inspired Research



Workforce Development

- Workforce development is a key theme of this FOA
- Think of innovative ways to engage students/future workforce
 - Innovative teaching and learning methods
 - Undergraduate and advanced degree focus
 - Consider students underrepresented in STEM
 - Internships
 - Professional placements
 - Outreach within and external to UC Berkeley
- Consider educators as key partners (internal or external)
- Reach out to BRDO for help!

Scientific Themes

- Theme 1: Intelligent Agents for Next-Generation Cybersecurity
- Theme 2: Neural and Cognitive Foundations of Artificial Intelligence
- Theme 3: AI for Climate-Smart Agriculture and Forestry
- Theme 4: AI for Decision-making
- Theme 5: Trustworthy AI
- Theme 6: AI-Augmented Learning to Expand Education Opportunities and Improve Outcomes
 - AI-Driven Digital Platforms to Expand and Accelerate STEM Learning in PreK-12 Settings
 - AI-Augmented Learning for Individuals with Disabilities

NOTE: Theme titles may be broader than what NSF aims to fund. Carefully read each Theme description in the solicitation to ensure your vision is well-aligned with NSF priorities for this NAIRI competition.



IBM & Affiliate Participation Guidelines

- Only Theme 1: Intelligent Agents for Next-Generation Cybersecurity is sponsored by an industry funding partner- IBM
 - IBM may not participate as a collaborator in any Theme 1 proposals, but IBM may participate in proposals to Themes 2-6
 - Individuals affiliated with IBM may participate in Themes 2-6 proposals.

Individuals affiliated with IBM (currently employed by, consulting for, or on an active agreement to provide services for IBM) may participate in Theme 1 proposals subject to certain limitations and allowances:

- Such individuals may not participate in their capacity with the company.
- Such individuals may participate if they (i) hold a primary appointment at another organization not partnered on the theme (e.g., a primary academic appointment at an institution of higher education), as applicable to and defined by that organization, and (ii) do so strictly in their capacity at that other organization.

Theme overlap with previous FOAs

- (T6) AI-Augmented Learning was part of both previous FOAs
 - AI Institute for Student-AI Teaming (U Colorado Boulder)
 - AI Institute for Adult Learning and Online Education (Georgia Research Alliance)
- (T3) AI in Agriculture was part of both previous FOAs, but this time it's focused more on climate vs. the food system
 - AI Institute for Next Generation Food Systems (UC Davis)
 - AI Institute for Future Agricultural Resilience, Management, and Sustainability (UIUC)
 - AI Institute: Agricultural AI for Transforming Workforce and Decision Support (Washington SU)
 - AI Institute: AI Institute for Resilient Agriculture (Iowa SU)
- (T2) Foundations of ML was part of 1st round vs. Cognitive Foundations
 - AI Institute for Foundations of Machine Learning (UT Austin)

NOTE: Check abstracts of previously funded institutes to avoid replicating something that's already been funded; identify your unique focus and possible complimentary capacities if applicable

Funding Landscape/Previous NAIRI Awards

- [18 AI Research Institutes](#) funded in 2 previous rounds
- UC Berkeley is a sub-awardee in 3 funded AI Institutes
 - Next Generation Food Systems (Tarek Zohdi)
 - Student-AI Teaming (Thomas Philip)
 - Optimization (Alper Atamturk)
- NSF has a stated goal to involve all 50 states in AI research in some way.

Related to this year's Theme 3

Related to this year's Theme 6

NOTE: Though not a requirement, we suggest you ask team members to consider if they have existing partnerships in any underrepresented state that would be a good fit for your institute



NSF-LED NATIONAL AI RESEARCH INSTITUTES

The U.S. National Science Foundation (NSF) announced a \$220 million investment in eleven new Artificial Intelligence (AI) Research Institutes, building on the first round of seven AI Institutes totaling \$140 million funded last year. (The default map view below shows all awards combined).



This is an Interactive PDF and is best viewed using Adobe Acrobat. Hover cursor over dates below or circles to the right to display more information. If you have issues with these features you can download a standard PDF available [here](#).

2020 Awards

2021 Awards

★ LEAD ORGANIZATION ■ PRINCIPAL ORGANIZATIONS ● PARTNERS/COLLABORATORS



The map reflects the approximate location of the Institutes' lead and principal organizations (staffing and/or activity), as well as their initial funded and unfunded partners.
Note: Partners and collaborators related to an Institute may be represented with a single plot due to space limitations.

States that may add value

No NAIRI Activity:

- North Dakota
- Minnesota
- Wyoming
- Arkansas
- South Carolina
- Kentucky
- West Virginia
- Maine
- Vermont
- Rhode Island

Only Unfunded Collaborators:

- South Dakota
- New Mexico
- Louisiana
- Mississippi
- Florida

Building partnerships

- Proposal will be led by a PI – but multiple partners are needed (internal and external)
- Leverage existing collaborations
- Consider reaching out to colleagues to build new partnerships and add new disciplinary expertise to your team
- Pay attention to potential collaborators in states not part of, or underrepresented in, the institutes funded thus far
- Reach out to BRDO for help!

Preliminary Proposal Overview

- Preliminary proposal **required** – will lead to encourage/discourage feedback (not binding)
- 6 page Project Description, including:
 - Vision and integrated research goals of the Institute
 - Foundational AI research
 - Use-Inspired Research
 - Broader Impacts
 - Key Personnel and prospective organization

BRDO advice

- Reach out to relevant Program Officer to discuss your idea/fit/plan
- Focus on multidisciplinary team formation – reach out to potential partners early
- Focus on being responsive to FOA goals and criteria. All desired elements listed in FOA must be addressed!
- Check out BRDO NAIRI page for more information, inc. a proposal outline



Limited Submission

- UC Berkeley is allowed to lead TWO applications
- VCRO Limited Submission Deadline: **November 15th, 2021**
- NSF Preliminary Proposal Deadline: January 14th, 2022
- NSF Full Proposal Deadline: May 13th, 2022

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Any questions?

Reach out to BRDO at brdo@berkeley.edu for support!



EXTRA SLIDES

Broader Impacts Activities

Education & Workforce Development

Build the next generation of talent for a diverse well-trained workforce through new and innovative approaches. Participants may include undergraduate and graduate students, community colleges and post-doctoral researchers, skilled technical workforce, K12 students, and/or professionals looking to shift career focus.

Broadening Participation

Describe plans for increasing diversity of underrepresented groups, including women, minorities, and persons with disabilities, in all organizational levels of institute activities, and cite the relevant literature on effective practices. Describe plans, if appropriate, for partnerships with MSIs, women's colleges, and/or organizations that primarily serve persons with disabilities

Collaboration & Knowledge Transfer

Describe how the Institute will function as a nexus point for collaboration, including plans to link organizations, people, ideas, problems, and technical approaches for maximum impact. Knowledge transfer involves the exchange of scientific and technical information between the Institute and external non-academic stakeholders (such as industrial partners or public policy-makers) with the objective of applying that knowledge.

Theme 1: Intelligent Agents for Next-Generation Cybersecurity

- Partnership with DHS and IBM
 - IBM staff may NOT participate in proposals to this theme in any capacity
 - Faculty with funding from IBM may participate
- Goal: to address hazards of cyberattacks
- Deepen knowledge and capabilities in both AI and cybersecurity through transformational advances in agent-based AI systems
- Develop methods & improve ability of defenders to deter, protect, detect, and respond to cybersecurity risks
- Institute focused on advancing foundational AI research with a focus on reasoning and agency

Theme 2: Neural and Cognitive Foundations of Artificial Intelligence

- Partnership with DoD
- Institute will advance understanding of intelligence, both in nature and in engineered systems
- Build upon these advances to explain biological intelligence and design next-generation AI
- Convey a research strategy that is visionary, but also timely and appropriately scoped

Theme 3: AI for Climate-Smart Agriculture and Forestry

- Fully funded by USDA–NIFA. Address NIFA priorities in proposal!
- Agriculture occupies a major portion of the nation's landscape and plays a critical role in a rapidly changing climate
- Theme encourages the advancement of new and transformative approaches for modeling complex agricultural systems and systems interventions
- Research will demand more than mere application of established techniques
- Theme encourages the advancement of new and transformative approaches for modeling complex agricultural systems and systems interventions

Theme 4: AI for Decision-making

- Algorithms and reasoning mechanisms for decision making have been long studied in AI, fundamental challenges still need to be satisfactorily addressed
- Research will develop breakthroughs in AI that are framed by underlying principles of decision making, develop novel methodologies based on those principles and propose decision support of real-world use cases
- Team should include experts in AI and experts in other fields that study the foundations of decision making, such as philosophy, psychology, economics, management science.
- Include innovative approaches to education on the science of decision making at both the graduate and undergraduate levels.

Theme 5: Trustworthy AI

- Partnership with National Institute of Standards and Technology (NIST)
- Vital to develop AI technology that is not only powerful and accurate, but also trustworthy
- Proposals must integrate research in 3 dimensions:
 - Foundations of Trust and Trustworthiness
 - Building Trustworthy Systems
 - Ethical and Societal Considerations
- NIST seeks active collaboration with Institute in evaluation and metrics

Theme 6: AI-Augmented Learning to Expand Education Opportunities and Improve Outcomes

- Partnership with ED IES
- Focus: research and development of AI-driven innovations to radically improve human learning and education
- TWO TRACKS (each will get an award)
 - AI-Driven Digital Platforms to Expand and Accelerate STEM Learning in PreK-12 Settings
 - AI-Augmented Learning for Individuals with Disabilities

Frequently Asked Questions

- Can a proposal respond to more than 1 theme?
 - Yes, but identify the predominant theme
- Can a proposal NOT be a partnership between institutions?
 - Yes, but it should be clearly explained why that is. Purpose is to create AI research capacity across the country.
- Do I have to address all of the desired elements of each theme in the proposed Institute?
 - Yes, all elements have to be addressed.
- How many investigators can I list?
 - 4 PI/Co-PIs, no limit on Senior Personnel