**National Artificial Intelligence Research Institutes (NAIRI):** [**NSF 20-604**](https://www.nsf.gov/pubs/2020/nsf20604/nsf20604.htm)

**Instructions for Proposers**

(Prepared by BRDO, Sept. 2020)

**Proposals must address one or more of the following themes, as defined in the
solicitation**:

* Theme 1: Human-AI Interaction and Collaboration
* Theme 2: AI Institute for Advances in Optimization
* Theme 3: AI and Advanced Cyberinfrastructure
* Theme 4: Advances in AI and Computer and Network Systems
* Theme 5: AI Institute in Dynamic Systems
* Theme 6: AI-Augmented Learning
* Theme 7: AI to Advance Biology
* Theme 8: AI-Driven Innovation in Agriculture and the Food System

**All Institutes should address the following desiderata:**

* Advance foundational AI research
* Conduct use-inspired research
* Actively build the next generation of talent
* Consist of multidisciplinary groups of scientists, engineers and educators
* Leverage multiple organizations *(new requirement this round)*
* Serve as nexus points for collaborative efforts

**Special requirements/limits:**

* Budget: $16M to $20M per Institute (up to $4M per year for 4 or 5 years)
* An individual may be designated as Senior Personnel (PI, co-PI, or
faculty-level participant) on only ONE project team submitting to this solicitation.

***Formatting instructions: 8.5” x 11” pages; 1" margins on all sides;*** *Arial, Courier New, or Palatino Linotype at a font size of 10 points or larger, or Times New Roman at a font size of 11 points or larger, or Computer Modern family of fonts at a font size of 11 points or larger. Headings in blue are mandatory. All the content listed is required, unless otherwise indicated.*

**Outline and Required Proposal Sections**

*Section numbering follows the solicitation*. *All page limits must be strictly observed.
Suggested page lengths for sections of the Project Description are provided for guidance only.*

1. **Cover sheet.**

* Proposal title must be preceded by "AI Institute: "
* The title should describe the project concisely and be understandable to a technically-literate reader.

2. **Project Summary** (Limit: 4600 characters total, including spaces). Should be informative to others working in the same or related field(s) and understandable to a broad scientific audience. Include the following four components with the subheadings indicated:

* **Overview:** Provide a description and rationale for the proposed Institute, research theme and objectives, education and workforce development activities, and community building activities.
* **Intellectual Merit**: Describe the potential of the Institute to advance knowledge.
* **Broader Impacts**: Describe the potential of the Institute to benefit society and contribute to specific, desired societal outcomes
* **Keywords**: Include a keywords section as the last line of the Project Summary, stating the Institute theme. If the proposal addresses more than one theme, list them all, with the most relevant first. Indicate any special emphasis in sectors relevant to partner agencies by including keywords that both identify these sectors and call special attention to agencies (e.g. “DHS” or “FHWA”).

3. **Project Description** (Limit: 25 pages, including figures, tables, and illustrations). Include the following major sections, using the section headings provided. Be sure to fully detail substantial collaborations and engagements with partner organizations in the course of the description since such details cannot be included in the Letters of Collaboration (see below).

3.a. **Overview and Rationale** (*Suggested length: ~1.5 to 2 pages*)

* Describe the challenges that engendered the proposal and the importance of specific aspects of this challenge that you aspire to solve.
* Discuss the timeliness of the problem and why this is an ideal time to address it.
* Explain why the National AI Research Institutes program is particularly suited to support this effort.
* Discuss the long-term strategic goals and potential impact of the proposed Institute.

3.b. **Description of the Research Plan of the Institute** *(Suggested length: ~12 to 15 pages)*

* State the overall vision and long-range research goals of the Institute.
* Describe the proposed research area(s)/theme(s), how this plan both advances foundational research and leverages use-inspired research, and how these efforts will be integrated in service of the Institute's research vision.
* Lay out a five-year timeline for the implementation.
* Indicate the specific role of each partner organization or participant in each research topic/goal area. The research plan should provide sufficient detail to allow assessment of its scientific merit and justify the necessity for the proposed mode of operation.
* Explain how the proposed research relates to other state and national research capabilities (including related centers, institutes, facilities, and national laboratories) as well as international programs in the proposed fields of research.
* If the Institute involves the development of shared research facilities, describe your plans to build, manage, and sustain such facilities.

3.c. **Education and Workforce Development** *(Suggested length: ~1.5 to 3 pages)*

* Present your plans to actively build the next generation of talent for a diverse well-trained workforce through new and innovative approaches to education and workforce development with the goal of advancing AI knowledge and education.
* Describe how the Institute will integrate research and education.
* 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.
* Describe plans for the mentoring and professional development of participants involved in institute activities. Activities should be described in sufficient detail to allow assessment of their intrinsic merit, potential effectiveness, and anticipated contribution to a highly competent new generation of the AI workforce.
* Plans may also include mechanisms to engage participants in informal settings (e.g., museums, nature centers, libraries; TV/film; citizen science; other on-line experiences).

3.d. **Broadening Participation Plans** *(Suggested length: ~1.5 to 2.5 pages)*

* Describe the Institute’s objectives for broadening participation.
* Outline the evidence-based strategies you will use to achieve these objectives, based on relevant literature.
* Describe plans for increasing diversity through the participation 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. This could, for example, intentionally target specific combinations of groups (e.g., by race/ethnicity, gender, and/or disability) with an analysis of how institute activities impact their participation in the AI workforce.
* Describe the contributions and roles of partnering organizations in the Institute’s broadening participation plans. If appropriate, describe plans for partnerships with minority-serving institutions, women's colleges, and organizations that primarily serve persons with disabilities. Explain why these organizations were selected and what they will contribute. Indicate the role of students and faculty from these organizations and how they will be fully integrated and engaged into Institute activities.
* Explain how progress will be measured and, if necessary, how strategies will be adapted.
* Activities should be described in sufficient detail to allow assessment of their intrinsic merit and potential effectiveness.

3.e. **Collaboration and Knowledge Transfer** *(Suggested length: ~1.5 to 3 pages)*

* Describe how the Institute will be a nexus point for collaborative efforts, including plans to link organizations, people, ideas, problems, and technical approaches for maximum impact.
* Linkages should involve significant intellectual exchange and could involve, for example, mechanisms such as internships or novel use of cyberinfrastructure to enhance connections.
* Present your plans to integrate partner organizations and participants into a diverse Institute that is more than the sum of its parts.
* Discuss your plans to effectuate knowledge transfer (i.e., the exchange of scientific and technical information between the Institute and external non-academic stakeholders such as industrial partners or public policymakers with the objective of applying that knowledge).
* State specific goals for knowledge transfer and the expected impact of your activities in this area (for example, internships or the novel use of cyberinfrastructure to enhance connections).

3.f. **Key Personnel, Management and Integration Plan** *(Suggested length: ~1.5 to 3 pages)*

* Describe the multidisciplinary group of scientists, engineers and educators comprising the Institute and their suitability to conduct large-scale, long-term research for the advancement of AI and the fielding of AI-powered innovation in application sectors of national importance.
* Describe the network of organizations comprising the Institute and their relationships to one another.
* Include a diagram of the organizational relationships and reporting structure among the key areas of responsibility.
* List key members of the Institute’s Management Team and explain their specific roles and areas of responsibility, including in the day-to-day management and operations of the Institute.
* Describe the relevant experience and qualifications of the lead PI, Managing Director/Project Manager (required position, distinct from PI), and other key members of the management team to lead and manage a complex, multifaceted, and innovative enterprise that integrates research, education, broadening participation, and knowledge transfer.
* Describe the processes you will use to: prioritize Institute activities; select research projects and to integrate them with one another and with other Institute activities; identify and sunset projects that cease to align with Institute goals; allocate funds and equipment across Institute activities and among partners; resolve conflict; and select a replacement for key leaders if needed.
* An External Advisory Board is required for all AI Research Institutes. Describe plans for the Board, the types of expertise you will seek in its members, and the ways in which they will interact with the management team and other elements of the Institute. Do NOT identify or approach potential members unless the Institute is funded.

*Beyond the above solicitation-specific contents, the Project Description must also include the following 3 required separate sections, using the headings given below. Place each of these sections anywhere in the Project Description you think will be most effective. These sections count as part of the 25 page limit.*

**Intellectual Merit** *(Suggested length: ~1-2 paragraphs)*

* Discuss the anticipated significance and impact of the proposed work in the relevant field(s).
* Explain how this work will advance the present state of knowledge in these and other fields.

**Broader Impacts** *(Suggested length: ~1-2 paragraphs)*

* Discuss the broader impacts of the Institute’s proposed activities and how these will be achieved.
* Broader impacts may be accomplished through the research itself, through activities that are directly related to the specific research projects, and/or through activities that are supported by but are complementary to the project.
* Broader impacts activities typically contribute to the achievement of societally relevant outcomes, which may include but are not limited to the following: full participation of women, persons with disabilities, and underrepresented minorities in STEM fields; improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the US; and enhanced infrastructure for research and education.

**Results from Prior NSF Support** (Limit: 5 pages. *Suggested length: ~1 to 2 pages*)

If the PI or any of the co-PIs have participated as PIs or co-PIs in NSF awards with a start date within the past five years. *Report on no more than one award per individual; focus on* the award(s) most relevant to the proposed Institute.

The following information *must* be provided for each award:

(a) NSF award: award number, amount and period of support.

(b) Project Title.

(c) Results/Accomplishments (summarized under 2 subheadings, as follows

1. Intellectual Merit

2. Broader Impacts

If the award was made recently and there are no new results, indicate this and use this section to summarize the major research goals and expected broader impacts.

(d) Publications: Provide a complete citation for each publication resulting from the NSF award, either in this section, or in the "references cited" section. If none, state “No publications were produced under this award.”

(e) Research Products/Availability: Describe data, publications, samples, physical collections, software, and models, as described in any Data Management Plan, and address how they will be made available.

-----------------------------------------25 page limit for Project Description ends here-------------------------------------

**References Cited** (no page limit, include only bibliographic citations).

* List only references cited in the Project Description.
* Include names of all authors in the order in which they appeared in the original publication.
* Include persistent URLs (e.g., DOIs) if readily available; however, citations lacking these will not be considered non-compliant.
* If you wish to incorporate citations in documents other than the Project Description (e.g., Ethics Plan, Data Management Plan, Postdoctoral Mentoring Plan), full bibliographic references for these citations should be contained within the page limits of the specific document(s) and not in the References Cited.

**Biographical Sketches** (Limit: 2 pages each; use [NSF-approved format](https://www.nsf.gov/bfa/dias/policy/biosketch.jsp))

* A biosketch is required for each PI, Co-PI and all Senior Personnel.
* Do not include any personal information (e.g., home address, phone, marital status).
* Biographical sketches are expected to follow the policy found at https://www.nsf.gov/bfa/dias/policy/biosketch.jsp.

**Budget and Budget Justification** (Limit: 5 pages each for prime and subcontract justifications).

* Provide a budget for each year of the project, up to $4M per year for 4 or 5 years, consistent with the needs and complexity of the proposed Institute.
* The budget and budget justification should reflect start-up activities, including a mandatory initial strategic planning retreat of key personnel within the first 90 days.
* Funds allocated for research, education, broadening participation, and knowledge transfer areas must be discernible.
* Travel funds should include attendance at up to three site and/or reverse site visits as well as at other planned cross-Institute meetings.
* In accordance with proposal preparation instructions in the PAPPG (https://www.nsf.gov/pubs/policydocs/pappg20\_1/pappg\_2.jsp#IIC2g), if salary and person months are not being requested for an individual designated as Senior Personnel, such individuals should not be included in Section A of the budget; instead, their role(s) on the project should be described in the Facilities, Equipment and Other Resources section of the proposal.
* Subawards should be used for partnering organizations that will receive funding from the Institute.
* Note: Theme 8 is subject to additional budgetary requirements from USDA-NIFA; refer to solicitation for details.

**Facilities, Equipment, and Other Resources** (no page limit)

* List and describe the organizational resources that will be available to the Institute (e.g., dedicated space, access to facilities and instrumentation, faculty and staff positions, access to programs that assist with curriculum development or broadening participation, or other organizational programs that could provide support to the Institute).
* Include relevant resources to be made available to the project from collaborating organizations.
* Note that inclusion of voluntary committed cost sharing is prohibited.
* The description should be a narrative and must NOT include any quantifiable financial information.

**Current and Pending Support** (use [NSF-approved format](https://www.nsf.gov/bfa/dias/policy/cps.jsp))

* Current and Pending Support information must be separately provided for each individual designated as Senior Personnel and must follow the policy found at <https://www.nsf.gov/bfa/dias/policy/cps.jsp>.
* Include support from all current/ongoing projects and anticipated support from proposals under submission for future projects, including the present AI Institute proposal.
* Include support from all sources, including Federal, State, local, foreign, public or private foundations, non-profit organizations, industrial or other commercial organizations, and internal funds allocated toward specific projects.
* Include all resources made available to the individual in support of and/or related to all of his/her research efforts, regardless of whether or not the resource has monetary value.
* Include in-kind contributions (such as office/laboratory space, equipment, supplies, employees, students). If the time commitment or dollar value is not readily ascertainable, provide a reasonable estimate. NOTE: If the in-kind contribution is intended for use by the AI Institute, the information must be included in the Facilities, Equipment and Other Resources section of the proposal and need not be replicated in the individual’s current and pending support submission.
* For each entry, list the total award amount (including indirect costs) for the entire award period and the number of person-months (or partial person-months) per year the individual will devote to the project.

**Required Supplementary Documents**

**Ethics Plan** (Limit: 1 page)

* Provide a clear statement of the proposed Institute's policies on ethics training, responsible conduct of research, and intellectual property rights.
* Discuss the nature of the research, methodologies used, ownership of research and ideas, and roles and responsibilities regarding intellectual property.
* Describe the mandatory training program in ethics and responsible conduct of research that will be provided within the Institute’s cross-disciplinary and multi-organizational context for all Institute and subaward staff, including faculty, visiting faculty, industrial fellows, postdocs, and graduate and undergraduate students.
* Training topics should include the nature of the research, methodologies used, ownership of research and ideas, and roles and responsibilities regarding intellectual property.
* Discuss the relationship between the Institute's ethics plan and the broader consideration of ethics in AI.

**Data Management Plan** (Limit: 2 pages)

* Specifically address plans for data sharing across the Institute.
* Address any data management requirements specific to the NSF directorate, office, division or program under which your Institute falls, as these requirements vary considerably across NSF units. See <http://www.nsf.gov/bfa/dias/policy/dmp.jsp> for unit-specific guidance.
* If the relevant NSF units do not provide specific guidance, describe how the Institute will conform to NSF policy of the dissemination and sharing of research, including information on:
	+ Types of data, samples, physical collections, software, curriculum materials, and other materials to be produced in the course of the project;
	+ Standards to be used for data and metadata format and content (where existing standards are absent or deemed inadequate, document this along with any proposed solutions or remedies;
	+ Policies for access and sharing including provisions for appropriate protection of privacy, confidentiality, security, intellectual property, and other rights or requirements;
	+ Policies and provisions for re-use, redistribution, and the production of derivatives;
	+ Plans for archiving data, samples, and other research products, and for the preservation of access to them.
* If your plan does not fit within the 2-page limit, you may use part of the 25-page Project Description to provide additional data management information.

**Postdoctoral Researcher Mentoring Plan** (Limit: 1 page)

* Describe the mentoring activities to be provided to all postdoctoral researchers supported by the Institute, regardless of whether they reside in the submitting organization or partnering organizations.
* Explain how the Institute’s activities will especially enhance the professional development of postdoctoral researchers.
* Mentoring activities may include but are not limited to: career counseling; training in the preparation of grant proposals, publications, and presentations; guidance on ways to improve teaching and mentoring skills; guidance on how to collaborate effectively with researchers from diverse backgrounds and disciplinary areas; and training in responsible professional practices.
* The Mentoring Plan must not be used to circumvent the page limits of the Project Description.

**Letters of Collaboration** (Limit: 1 page each)

Letters should document collaborative arrangements of significance to the proposal and must not contain endorsements or evaluation of the proposed project. Letters of Collaboration must use the following wording provided by NSF:

If the proposal submitted by Dr. [*insert PI full name*] entitled [*insert Title of Proposal*] is selected for funding by NSF, it is my intent to collaborate and/or commit resources as detailed in the Project Description or the Facilities, Equipment, and Other Resources section of the proposal.

* Letters of collaboration are not necessary for subawardee organizations, whose commitment is explicit in the proposal.
* This solicitation does not authorize the use of letters of support (which—unlike letters of collaboration—evaluate, recommend, or endorse the proposal or its personnel). Applications containing letters of support may be returned without review.
* Partner companies listed in the solicitation (e.g., Accenture, Amazon, Google, Intel) are not permitted to participate in any way as collaborators (funded or unfunded) in a proposal responding to this solicitation.

**List of Project Personnel and Partner Organizations**

Provide a list of all personnel and organizations involved in the project, including all PIs, co-PIs, Senior Personnel, paid/unpaid Consultants or Collaborators, Subawardees, and Postdoctoral Researchers. The list should be numbered, with each individual on their own numbered line. For each, include (in this order): full name; organization(s); role in project. Internally separate these three pieces of information for each individual using semi-colons, as shown in the following examples:

1. Mary Smith; XYZ University; PI

2. John Jones; University of PQR; Senior Personnel

3. Jane Brown; XYZ University; Postdoctoral Researcher

4. Bob Adams; ABC Community College; Paid Consultant

5. Susan White; DEF Corporation; Unpaid Collaborator

**Single Copy Documents**

**Collaborators and Other Affiliations** (required)

* Each PI, co-PI, and Senior Personnel should provide their information separately, using NSF’s fillable linked COA template (available [here](https://nsf.gov/bfa/dias/policy/coa.jsp)) which contains five discrete Excel (.xlsx) sheets: (1) Individual Information; (2) Personal/Family/Business relationships [that preclude service as a reviewer]; (3) Ph.D. Advisors and all Ph.D. Thesis Advisees; (4) Co-Authors and Collaborators [past 48 months]; and (5) Editorial Boards and Co-Editors [past 24 months].
* For all individuals listed on these sheets, use the format Last Name, First Name, Middle Initial, Current Organizational Affiliation if known, as indicated in the template.
* Completed templates should be saved as .xlsx files.
* Do not alter the formatting of the template; NSF relies on it in managing reviewer selection.

**List of Suggested Reviewers or Reviewers Not to Include** (optional)

* If requesting that specific individuals be excluded as reviewers, include a brief explanation.

**Identification of Proprietary or Privileged Information** (if applicable).

**Collaborators and Other Affiliations** **for Non-Senior Personnel** (optional)

* If included, upload these under “Optional Additional Single Copy Documents,” not with Sr. Personnel COAs (above).

*Proposals that contain documents other than those listed above may be returned without review.*

**Cautionary Notes**

As a multi-organization activity, the proposal must be submitted as a single, integrated proposal by the lead organization, with proposed subawards to the other partner organizations. Linked collaborative proposals from multiple organizations will be returned without review.

Institutes are expected to build on other NSF investments and to coordinate and integrate with ongoing and new initiatives, including center-scale research, infrastructure, and workforce development activities. The Institute’s teams are expected to coordinate with their constituent organizations and partners to develop a concrete and workable plan for leveraging existing infrastructure resources.

If an individual is currently employed by, consulting for, or on an active agreement to provide services for a partner company listed in the solicitation (e.g., Accenture, Amazon, Google, Intel), they may not participate (as senior personnel or collaborator, funded or otherwise) in any proposal **on the theme** to which that partner company is contributing. However, that relationship does not disqualify the individual from participating in proposals **to other themes** in this program. Past arrangements are not generally disqualifying. Arrangements active between proposal submission and notice of decision are disqualifying. Individuals with partner company research awards structured as unrestricted gifts, grants, prizes, fellowships, or in-kind offerings may participate. (See the solicitation and [NAIRI FAQ](https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf20123) for more information).

**AI-Driven Innovation in Agriculture and the Food System** (Theme 8): Proposals focused on this theme must be identified in the Project Summary as seeking USDA-NIFA support and are subject to additional USDA-NIFA requirements. These include, at the pre-award stage, additional eligibility parameters, specific budgetary requirements (indirect cost limits, potential cost sharing, special requirements for equipment) and project commencement dates. BRDO recommends that PIs applying in this area explicitly address these requirements in their proposals and work closely with their RA to ensure that their budgets comply with all USDA-NIFA requirements.