



**NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230**

NSF 17-048

Frequently Asked Questions (FAQs) for NSF 16-615: Transdisciplinary Research in Principles of Data Science Phase 1 (TRIPODS)

TEAM COMPOSITION AND ELIGIBILITY

1. I work in field A, and my co-PIs work in fields B and C (or I am in the Dept. of D, and my co-PIs are in the Depts. of E and F; or I have a Ph.D. in G, and my co-PIs' degrees are in H and I). Do we meet the requirement for "significant and integral participation" by all three of the statistics, mathematics, and theoretical computer science communities?
2. Is it better to submit a single-institution proposal or to form a multi-institution team? Is it better to focus on a small number of activities or to try to address all the goals of the program?
3. How many co-PIs are appropriate in total? How many co-PIs are appropriate in each of the three disciplines?
4. My collaboration has more than five PIs and co-PIs, but FastLane gives space to specify only five. Can we have more than five PIs and co-PIs?
5. Are there limits on the number of proposals an individual may submit?
6. Are there limits on the number of Senior Personnel?
7. Do TRIPODS proposals count against CISE or MPS program limits on the number of proposals allowed per PI/co-PI per year?
8. Do attendees of the Theoretical Foundations of Data Science workshop have any advantage or special status when submitting proposals?
9. Are researchers in academic departments other than computer science, mathematics, and statistics at a disadvantage?
10. Is there a preference for existing institutes for mathematics or computer science?
11. Can my institution submit more than one proposal?
12. Many data science programs are focused on Master's students. Is it necessary to have Ph.D. students involved in a TRIPODS project? Are undergraduate institutions eligible?
13. Are there any advantages for institutions in EPSCoR (Experimental Program to Stimulate Competitive Research) jurisdictions?
14. Can employees of Federal agencies, Federally Funded Research and Development Centers, for-profit entities or foreign organizations submit proposals in response to this solicitation?
15. Can I ask for support of foreign collaborators while they are in the US or must such support come from foreign organizations?

FOUNDATIONAL ACTIVITIES AND RELATIONSHIPS TO OTHER ENTITIES

16. What areas of research activities can be proposed for a TRIPODS project?
17. What is the right balance between theory and applications?
18. Are data collection and long-term data management in scope?
19. What is the role of domain scientists? Can a domain be the primary focus?
20. Is it necessary to engage in all of the "center-like" activities listed in the solicitation?
21. My institution/department/team is developing a new major/Master's/Ph.D. program in data science. Is this in scope for TRIPODS?
22. Is there any relation between TRIPODS and the National Science Foundation Research Traineeships (NRT) program?
23. What is meant by "leveraging existing NSF investments such as Big Data Regional Innovation Hubs, Mathematical Sciences Research Institutes, and Software Infrastructure for Sustained Innovation as appropriate through collaborations or partnerships?"
24. Will there be future TRIPODS solicitations?

PROPOSAL PREPARATION AND SUBMISSION

25. May I discuss my proposal with NSF Program Directors?
26. Who are the TRIPODS Program Directors, and how should I contact them?
27. How likely is my project to get funded?
28. How do I submit a proposal to this program?
29. What is required in the Letter of Intent?
30. Do I need to use Grants.gov or FastLane to apply?
31. Are duplicate submissions allowed?
32. What are the page limits for proposal?
33. What costs are allowable?
34. Are there restrictions or guidelines on how to apportion budget subject to the limit of \$500,000 per year?
35. What should be included in the Data Management Plan?
36. What should be included in the Collaboration and Evaluation Plan?
37. What is the difference between supplementary documents and single copy documents?
38. Should I seek letters of support from interested parties?
39. Are letters of collaboration allowed?

TEAM COMPOSITION AND ELIGIBILITY

1. **I work in field A, and my co-PIs work in fields B and C (or I am in the Dept. of D, and my co-PIs are in the Depts. of E and F; or I have a Ph.D. in G, and my co-PIs' degrees are in H and I). Do we meet the requirement for "significant and integral participation" by all three of the statistics, mathematics, and theoretical computer science communities?**

It is up to the proposers to make the argument that the PIs provide expertise necessary to meet the program's goals. Each proposal is required to have a collaboration and evaluation plan, as a separate supplementary document, which must describe the backgrounds and different expertise of the PIs, how they relate to the proposed work, and how the PIs plan to collaborate. The

collaboration and evaluation plan will be evaluated by the panelists or reviewers as part of the proposal review process. This approach gives the community the freedom to consider teams that might be excluded by virtue of a strict rule.

2. Is it better to submit a single-institution proposal or to form a multi-institution team? Is it better to focus on a small number of activities or to try to address all the goals of the program?

As described in the solicitation, the program is open to multiple types of proposals and approaches. A prospective team should determine the approach that it feels is best suited for the research community, keeping in mind the eventual goal of supporting large-scale institutes in Phase II (subject to the availability of funds). Possible approaches include forming a full team in Phase I, or forming a smaller team focusing on a subset of programs goals with the aim of merging with one or more other Phase I team(s) for Phase II. Competing approaches will be evaluated via NSF's merit review process.

3. How many co-PIs are appropriate in total? How many co-PIs are appropriate in each of the three disciplines?

TRIPODS does not have a preferred or recommended number of PIs and/or co-PIs. The appropriate number of PIs and/or co-PIs will depend on a given project. Proposers should focus on assembling teams capable of carrying out the projects they are proposing, which should, of course, be aimed at meeting the objectives of the program as described in the solicitation. Balance among areas is more important than absolute numbers.

4. My collaboration has more than five PIs and co-PIs, but FastLane gives space to specify only five. Can we have more than five PIs and co-PIs?

Proposals are limited to one PI and four co-PIs. Proposers may add further staff as Senior Personnel. A project that involves several organizations may be submitted as linked collaborative proposals, with each individual proposal within the collaborative group (project) including one PI and up to four co-PIs.

5. Are there limits on the number of proposals an individual may submit?

No individual may be PI or co-PI on more than one TRIPODS Phase I proposal. (As stated in the solicitation, if this rule is violated, any proposal after the first, based on time of submission, will be returned without review.) An individual may serve as Senior Personnel on any number of TRIPODS Phase I proposals.

6. Are there limits on the number of Senior Personnel?

No. Although the Letter of Intent module in FastLane provides space to list only four Senior Personnel, there is no limit for this program. You can list additional Senior Personnel in the "other comments" section, as detailed in the submission instructions.

7. Do TRIPODS proposals count against CISE or MPS program limits on the number of

proposals allowed per PI/co-PI per year?

No. The TRIPODS program is not subject to, nor does it count against, limits imposed by other NSF programs.

8. Do attendees of the Theoretical Foundations of Data Science workshop have any advantage or special status when submitting proposals?

No.

9. Are researchers in academic departments other than computer science, mathematics, and statistics at a disadvantage?

No, provided that they are qualified to carry out the proposed activities. Proposals will be judged on the quality of plans to develop TRIPODS Institutes for research and training activities, and the PIs' qualifications to conduct and oversee those activities.

10. Is there a preference for existing institutes for mathematics or computer science?

No.

11. Can my institution submit more than one proposal?

There is no limit on the number of proposals from a given institution.

12. Many data science programs are focused on Master's students. Is it necessary to have Ph.D. students involved in a TRIPODS project? Are undergraduate institutions eligible?

Although involvement of Ph.D. students is not required, institutions/departments that do not confer Ph.D. degrees may wish to consider teaming with those that do. As described in the solicitation, the following organizations may submit proposals: "Universities or four-year colleges accredited in and having a campus located in the United States, or nonprofit, nonacademic organizations in the US associated with educational or research activities. Multi-institutional consortia are permitted, but a single entity must accept overall management responsibility."

13. Are there any advantages for institutions in EPSCoR (Experimental Program to Stimulate Competitive Research; <https://www.nsf.gov/od/oia/programs/epscor/index.jsp>) jurisdictions?

TRIPODS program directors will pursue EPSCoR support through NSF's Office of Integrative Activities, as appropriate. It is not necessary to notify the TRIPODS team of your EPSCoR status.

14. Can employees of Federal agencies, Federally Funded Research and Development Centers, for-profit entities or foreign organizations submit proposals in response to this solicitation?

As stated in the solicitation, proposals may be submitted only by the following: "Universities or four-year colleges accredited in and having a campus located in the United States, or nonprofit,

nonacademic organizations in the US associated with educational or research activities."

15. Can I ask for support of foreign collaborators while they are in the US or must such support come from foreign organizations?

Foreign collaborators are expected to cover their project costs. TRIPODS awards cannot be used to pay for foreign researchers while they are outside the US, or for their travel costs to visit the US. However, costs of hosting a foreign collaborator at a US institution for a short period may be considered on a reciprocal basis if required for the success of the project.

FOUNDATIONAL ACTIVITIES AND RELATIONSHIPS TO OTHER ENTITIES

16. What areas of research activities can be proposed for a TRIPODS project?

The program is intended to be inclusive across all areas pursuant to the principles of data science. The research areas listed in solicitation are examples only and are not intended to be exhaustive. The workshop report referenced in the solicitation and available at <http://www.cs.rpi.edu/TFoDS/> contains additional material regarding research areas, but like the solicitation, is not exhaustive. Foundational research, involving aspects of (all three of) mathematics, statistics, and theoretical computer science, that addresses data analysis — from acquisition, through decision making, to archival/retirement — is in scope.

17. What is the right balance between theory and applications?

The focus of TRIPODS is on foundations, but relevance is essential. Engagement with real-world application domains is important to the extent necessary to ensure the "right" foundations are being developed.

18. Are data collection and long-term data management in scope?

Foundational questions in these areas are in scope. The TRIPODS solicitation refers to "the entire data to knowledge to action pipeline." For instance, representation of data is an area that could be pursued: what is the best representation of data for a particular application; and how does one collect, store, validate, and share data for this representation; etc. Note this is simply one example, and no preference should be inferred by virtue of this example.

19. What is the role of domain scientists? Can a domain be the primary focus?

Domain scientists should serve as a resource for a TRIPODS institute to maintain connectivity to real-world issues and ensure relevance. That said, while practical applications serve as drivers, foundational work should be broadly applicable. Bear in mind that proposals will be reviewed by a broad range of mathematicians, statisticians, and computer scientists, and thus focusing too narrowly on a particular domain may not have the broad appeal to be considered competitive in the context of the goals of the TRIPODS program.

20. Is it necessary to engage in all of the "center-like" activities listed in the solicitation?

The anticipated Phase II TRIPODS program (subject to the availability of funds) is intended to support comprehensive research and education programs in foundations of data science. It is expected that the envisioned Phase II Institutes will engage in most or all of these activities. The smaller Phase I projects are expected to concentrate on some aspects of both research and education, while not necessarily addressing all the aspects listed in the solicitation. Phase I projects are intended to develop and demonstrate the capacity to operate a Phase II Institute. This may involve significant effort in a subset of the activities, along with more limited effort, or a credible plan to develop capacity, in other listed activities.

21. My institution/department/team is developing a new major/Master's/Ph.D. program in data science. Is this in scope for TRIPODS?

Although curriculum development and shaping, including defining "principles of data science," are important goals of the program and some activities in these areas are expected, it is important for Phase I projects to engage the research community, including performing research and developing research capacity in preparation for Phase II proposals.

22. Is there any relation between TRIPODS and the National Science Foundation Research Traineeships (NRT) program?

No. While training of students and postdocs is expected to be a component of a TRIPODS Institute (indeed, it is expected to occur naturally as a result of the research activities of the Institute), the program is not focused primarily on traineeships.

23. What is meant by "leveraging existing NSF investments such as Big Data Regional Innovation Hubs, Mathematical Sciences Research Institutes, and Software Infrastructure for Sustained Innovation as appropriate through collaborations or partnerships?"

Centers and Institutes working on related areas should communicate and take advantage of each other's capabilities, coordinate and avoid duplication of effort, etc. TRIPODS is focused on foundations. Related organizations can be sources of input on foundational problems and areas, and can help ensure relevance. Joint efforts such as workshops and symposia bringing together multiple research communities may be appropriate.

24. Will there be future TRIPODS solicitations?

As detailed in the solicitation, the TRIPODS program is anticipated to consist of two phases, subject to the availability of funds. In Phase I, represented by NSF 16-615, the program will support approximately 8 TRIPODS Institutes for a duration of three years, each at a planned level of up to \$500,000 per year. Approximately two years after Phase I awards are made, a solicitation for Phase II proposals for larger Institutes is anticipated. Phase II will potentially support a smaller number of Institutes at a significantly higher level of funding for a duration of five years, subject to the availability of funds. Institutes will be encouraged to seek additional support from other sources, such as industrial partners. In the anticipated Phase II, the CISE Division of Computing and Communication Foundations (CCF) and the MPS Division of Materials Research (DMS) may elect to provide partial matching incentives for such additional support (subject to availability of funds).

PROPOSAL PREPARATION AND SUBMISSION

25. May I discuss my proposal with NSF Program Directors?

Yes, to assist in determining whether TRIPODS is a suitable program for a given proposal, prospective PIs are encouraged to discuss planned submissions with Program Directors, after reading the entire solicitation (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf16615) and all of these FAQs. Please be considerate of Program Directors' time and refrain from scheduling separate meetings or calls with multiple Program Directors in the same program. Once submitted, the substance of proposals may not be discussed with NSF Program Directors until after merit review is complete.

26. Who are the TRIPODS Program Directors, and how should I contact them?

The current TRIPODS Program Director team is listed on the program page: https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505347. PIs should send inquiries to the TRIPODS team using the email address tripods@nsf.gov.

27. How likely is my project to get funded?

Your proposal will be reviewed by panelists or reviewers with expertise in the topics covered in your proposal, using the standard NSF merit review criteria and the additional solicitation specific review criteria. Program Directors cannot provide proposers with further advice regarding the likelihood that a specific proposal would receive funding.

28. How do I submit a proposal to this program?

Please carefully read and follow the instructions provided in (i) the solicitation (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf16615) and (ii) the NSF *Proposal & Award Policies & Procedures Guide (PAPPG)* (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf17001). If you need additional help preparing and submitting your proposal, we recommend that you contact your institution's Sponsored Projects Office. Note that Letters of Intent are required (from the lead institution only for multi-institution collaborative proposals) ahead of the full proposal deadline.

29. What is required in the Letter of Intent?

A Letter of Intent should provide a brief overview of the plans to develop a TRIPODS Institute, and a list of all PIs, Co-PIs, senior personnel, and institutions to be involved, including all collaborative proposals and subawardees. These are entered in FastLane in two text boxes limited to 2500 characters, with the overview in Synopsis, and any personnel beyond the four lines in FastLane in Other Comments. See the solicitation (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf16615) for additional information.

30. Do I need to use Grants.gov or FastLane to apply?

You may use either Grants.gov or FastLane.nsf.gov. In determining which method to utilize in the

electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. Chapter II, Section D.3 of the *PAPPG* provides additional information on collaborative proposals.

31. Are duplicate submissions allowed?

No. Proposals submitted in response to this solicitation may not duplicate or be substantially similar to other proposals concurrently under consideration by any NSF program.

32. What are the page limits for proposal?

The standard 15-page limit applies to the Project Description, and the Project Summary is limited to 1 page. The Collaboration and Evaluation plan is limited to 5 pages.

33. What costs are allowable?

Please refer to *PAPPG* Chapter II.C.2.g.xiii:
https://www.nsf.gov/pubs/policydocs/pappg17_1/pappg_10.jsp.

34. Are there restrictions or guidelines on how to apportion budget subject to the limit of \$500,000 per year?

Please see the *PAPPG* Chapter II.C.2.g.xiii:
https://www.nsf.gov/pubs/policydocs/pappg17_1/pappg_10.jsp and consult with your Sponsored Research Office for allowable costs.

35. What should be included in the Data Management Plan?

A plan for management of data and sharing of the products of research is a required element of the proposal. The Data Management Plan should describe how the project would conform to NSF policy on the dissemination and sharing of research results. (See *PAPPG* Chapter II.C.2.j: https://www.nsf.gov/pubs/policydocs/pappg17_1/pappg_2.jsp.) Proposers should note that the NSF data sharing policy requires investigators to share data gathered under an NSF grant with other researchers "within a reasonable time" after the data are generated. The policy also recognizes that investigators and their employers have a legitimate interest in protecting rights to inventions that are developed under an NSF grant. Details about NSF's intellectual property policy can be found at *PAPPG* Chapter XI.D: https://www.nsf.gov/pubs/policydocs/pappg17_1/pappg_11.jsp. The degree to which the proposed Data Management Plan demonstrates intellectual merit and broader impacts will be considered by the review panel as part of the standard NSF merit review criteria.

36. What should be included in the Collaboration and Evaluation Plan?

Each proposal is required to include a Collaboration and Evaluation Plan as a separate supplementary document (limited to 5 pages). This plan must describe the expertise in the three disciplines provided by the PIs as required under "Who May Serve as PI" as well as plans for

working together to meet the goals of the program. The Collaboration and Evaluation Plan must also describe clear measures of success for the project, including developing capability and capacity for a potential Phase II proposal, and a plan for evaluating success. This plan will be evaluated by the panelists or reviewers as part of the proposal review process. Proposals without this document will be returned without review.

37. What is the difference between supplementary documents and single copy documents?

Supplementary documents, including the Data Management Plan, Collaboration and Evaluation Plan, and Postdoctoral Mentoring Plan (if required), are uploaded by the lead institution, are associated with the entire project, and are made available to reviewers. Single copy documents, such as Collaborators and Other Affiliations (COA) and Suggested Reviewers, are associated with an institution's individual submission, used only by Program Directors, and not shared with reviewers. NSF requires each PI, co-PI, and Senior Personnel to enter COA; to make this information machine searchable, TRIPODS requires the use of a spreadsheet template (available at <https://www.nsf.gov/cise/collab/>) that can be uploaded directly (as .xls or .xlsx) into FastLane for each individual.

38. Should I seek letters of support from interested parties?

Letters of support are not allowed and should not be submitted.

39. Are letters of collaboration allowed?

Engagement of unfunded collaborators (for instance, researchers at industrial research labs) is encouraged. Such arrangements should be described in the Facilities, Equipment and Other Resources sections of a given proposal, as appropriate. Letters of collaboration confirming the intent to participate are recommended and encouraged. Letters of collaboration should be limited to stating the intent to collaborate and should not contain endorsements or evaluation of the proposed project. The recommended format for letters of collaboration is as follows:

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