Please stand by for realtime captions.
Good afternoon. Thank you for joining today's conference. Please continue to hold as we will begin momentarily.

Once again, we thank you all for dialing to today's conference call. Please continue to hold. The conference will begin momentarily. >>

Good afternoon everyone.

Welcome to today's conference call. At this time your lines have been placed on listen only for today's conference until the question-and-answer portion of the call. At which time you will be prompted to press star one on your touchtone phone. Please be sure to unmute your phone lines and record your name when prompted so that I may introduce you to ask your question.

Our conference is also being recorded, and if you have any discrepancies, you may disconnect at this time.

I will turn the conference over to NSF. You may begin.

Thank you.

Good afternoon everyone and welcome to the webinar for the TRIPODS + X program. My name is Nandini Kannan. I am a Program Director in the Division of Mathematical Sciences (DMS) in the Directorate for Mathematical and Physical Sciences (MPS) at NSF.

What we would like to do is start with introductions. We have a number of division directors and assistant directors and deputy assistant directors in the room, so we will just go around the table and do introductions, and then we would talk a little bit about the agenda for the meeting today.

My name is Deborah Lockhart, I am Deputy Assistant Director for the Directorate for Mathematical and Physical Sciences.

Hi, my name is Jim Kurose and I am the Assistant Director leading the Directorate of Computer and Information Science and Engineering (CISE)

Hi, my name is Lin He and I am a Program Director in the Chemistry Division.

My name is Chris Stark and I am a program officer in MPS/DMS

My name is Rahul Shah and I am a Program Director in CISE/CCF.

My name is Eva Campo and I am a Program Director in the Division of Materials Research in MPS.

My name is Alexis Lewis and I am a Program Director in CMMI in the Directorate for Engineering.

I am Eduardo Misawa, Director, Engineering Education & Centers in the Directorate for Engineering.

I am Chaitan Baru, Senior Advisor for Data Science in CISE

I am Balasubramanian (Bala) Kalyanasundaram, Acting Division Director in CISE/CCF.

My name is Tie Luo and I am the Deputy Division Director for Mathematical Sciences.

My name is Juan Meza and I am the Division Director for Mathematical Sciences.

I am Tracy Kimbrel and I am a Program Director in the CCF Division.

Thank you very much. So we will go through the agenda. The first part of the agenda for today's webinar will have a welcome from directorate leadership; MPS Deputy Assistant Director Deborah Lockhart and CISE Assistant Director Jim Kurose will give opening remarks. Next, I will present a brief a brief overview of the program. Then CCF program director Tracy Kimbrel will go over some specific things you will need to pay attention to submit a proposal, including both the administrative details and the solicitation specific review criteria that will be used to evaluate the proposal.

Rahul Shah and Chris Stark will then talk about the list of contacts both within NSF and at the 12 TRIPODS Institutes which we will describe shortly, and then finally we will have a Q&A session.

I am going to turn this over to Deborah Lockhart to give some brief opening remarks.

Good afternoon everyone. On behalf of the Directorate for Mathematical and Physical Sciences, better known as MPS, welcome to this webinar. I am delighted to be here. And I believe this is a great example of collaboration across all of NSF.

TRIPODS and TRIPODS+X are the result of a number of years of planning. They all started with CISE and MPS who collaborated last year in supporting 12 TRIPODS awards that brought together theoretical computer scientists, mathematicians and statisticians.

You will be hearing more about some of these collaborations a bit later on. But I do want to thank my CISE and MPS colleagues for starting this effort, and our brand-new partners in TRIPODS+X from around the rest of the foundation.

These activities are part of Harnessing the Data Revolution for 21st century science and engineering. The result of the strong connection to NSF's role in supporting Convergent Research. These are two of NSF's 10 Big Ideas about which you may have already heard. For TRIPODS+X, we expect to go beyond TRIPODS and engage with other science and engineering disciplines. This will encourage the true interaction of domain

scientists and engineers from across NSF supported disciplines with mathematicians, statisticians and theoretical computer scientists, that is, with people who work in fundamental data science. There are huge possibilities to address applications as nearly every scientific domain is now dealing with vast amounts of data, often complex, often being collected at outstanding rates, often from a variety of sources. The ability to handle the complexity, variety and volume of data will require new ideas and the joint efforts of many different kinds of researchers. We hope this new program will encourage the simultaneous development of, and synergy between, new fundamental ideas in data science and their advancement in applications.

I hope this webinar will be informative. I wish you all the best as you develop your collaborations.

Jim.

Thank you, Debbie.

So, Deborah has really said it all, I just want to welcome everybody on behalf of I guess the CISE Directorate but really all of NSF to the webinar here. And actually, I also want to start with a shout out and thanks to the team here for putting this together because there are many directorates involved here, many program directors as you have heard, and it takes a lot to put these things together so I want to thank the team for their vision and everything they have been doing and harkening back to TRIPODS and I will give a special shout out to Nandini and Tracy for their leadership for both of these and getting these things together.

Debbie mention convergence and you probably have heard that word a lot about this sort of long-term deep integration between different research areas. And certainly, I like to say that TRIPODS is the quintessence of convergence because it really does the original TRIPODS was looking at mathematicians, statisticians, theoretical computer scientists bringing them together and now we are adding domain sciences as well. And so really when we at NSF talk about convergence, we often use TRIPODS and TRIPODS+X as an exemplar for what we mean about that. For those of you who are out there thinking about submitting proposals, that means this is really is about the deep integration of different areas and people working together. So it is not about stapling subsections together -it's really about that long-term engagement with each other.

So, we're really excited to be launching TRIPODS+X here and we are really excited about how the first TRIPODS solicitation's been going. So again, we are really looking forward to great things and thank everybody for their interest.

Thank you very much. To Deborah Lockhart and Jim Kurose.

We will now move on with the rest of the presentation. You have already heard a little bit about TRIPODS -we are just going to give you a brief overview of the program. So TRIPODS stands for Transdisciplinary Research in Principles of Data Sciences. It is a joint program between 2 directorates at NSF: The Division of Mathematical Sciences within the

Directorate for Mathematical and Physical sciences and the division of computing and communications foundation CCF within the directorate for Computer and Information science and engineering.

The program supports two of the 10 Big Ideas as both Debbie and Jim alluded to: The first one is Harnessing Data for 21st century science and engineering and the second big idea, which is a process idea, is Growing convergent research at NSF.

TRIPODS in particular focuses on the algorithmic, mathematical and statistical foundations of data science, and here convergence as was previously described. refers to research driven by specific and compelling problems in any domain science and engineering, that features deep integration across disciplines.

A little bit more about harnessing the data revolution. There are five themes which are listed here and how these relate to TRIPODS. The first harnessing the data revolution theme refers to fundamental research in mathematics, statistics, and theoretical computer science. And this is everything that represents TRIPODS. TRIPODS also has components that about fundamental research of data-centric algorithms. TRIPODS+X brings in the system component as well as data-driven research in all the research domains which is Theme 3. And both TRIPODS and TRIPODS+X have strong educational and curriculum development components.

The goal of TRIPODS, the original program was to bring together and integrally involve all three of the communities: statistics, mathematics and theoretical computer science. You may notice that we list these in different order throughout the solicitation and this presentation, and that is a very deliberate association. We want to make sure that no one of these disciplines should be seen as having any more or less important role than the others. And as we repeat here and in the TRIPODS solicitation, all three disciplines must be involved in TRIPODS activities.

All the TRIPODS institutes conduct center-like activities integrating research, education, and training.

So, for the phase I solicitation, which began in FY 17, we are supporting 12 smaller Institutes, at a level of funding of about $500,000 per year for three years. As mentioned again, all three communities are actively involved. And the projects include both research and training aspects of an Institute for these principles of data science.

The usual activities associated with the center or institute-like project are supported by these awards and they include activities like workshops, training of graduate students or and postdoctoral fellows, workforce development and community building.

Finally, we come to this new program, we are here to talk about, this is TRIPODS+X. It expands the scope of TRIPODS to include all the disciplines supported by NSF. And as stated in the solicitation, the program seeks to support research and training activities leading to solutions to data-

driven challenges in other areas of science and engineering, as well as advances in foundational data science knowledge.

In addition, TRIPODS+X projects aim to build robust data science communities, through curriculum development efforts and mechanisms to foster integration, interaction and builds bridges between research communities.

I will now hand over the presentation to Tracy.

I've got some details on what's required. In TRIPODS+X proposals, and how they will be evaluated. We're taking three types of proposals in TRIPODS+X. Educational tracks can request up to $200,000 to develop and pilot approaches to define and address curricula and workforce development needs related to data science, at any or all educational levels.

Research track proposals can request up to six hundred thousand dollars for interdisciplinary projects bringing together members of the TRIPODS disciplines and other fields of inquiry, with demonstrated value on both sides of the partnership.

Visioning track proposals can request up to two hundred thousand dollars to foster relationships between research communities via workshops and conferences, innovation labs, and other community-building and direction-setting activities

To submit a proposal to TRIPODS + X, you need to form a team consisting of at least one PI or co-PI from a discipline other than mathematics, theoretical computer science, and statistics, and at least one member of one of the 12 TRIPODS teams. As Nandini mentioned, we'll be listing the 12 TRIPODS Institutes later on in the presentation

Of course, all proposals are subject to the NSF Proposal and Award Policies and Procedures Guide (the PAPPG; you may hear this referred to as the PAPP Guide). Full proposals are due May 29th. In addition to the usual Project Description, we're asking for a Project Coordination Plan of up to two pages. This document should clearly define the roles of the PI and co-PIs and their plans for collaboration and coordination, along with a detailed timeline. We also require a letter from the lead PI of the participating TRIPODS team. This is just the simple format described in the PAPPG acknowledging that you intend to collaborate as specified in the project description. Please see the solicitation for more details on these requirements.

Please note that the project description (that is, the main section) of a Visioning Track proposal is limited to eight pages. For the other two tracks, the usual fifteen-page limit applies.

In addition to the standard review criteria Intellectual Merit and Broader Impacts used to evaluate all NSF proposals, we've defined some special criteria for TRIPODS+X. Reviewers will be asked to familiarize themselves with these and consider all of them when evaluating proposals. These include bringing together "field" or "domain" scientists and

engineers with data science foundations researchers to address emerging data-driven research challenges and/or educational needs.

The additional review criteria also include considerations of the quality and value of the plans for collaborating. Your proposal should demonstrate that the team's expertise is well-suited to your project and clear roles are defined. These criteria are detailed in the solicitation, which you should read carefully.

And next up is Rahul Shah.

Okay so on this slide and next, are the participating organizations at NSF. And the coming slides I will provide program director contacts. As you will see many, but not all NSF divisions are listed. DMS and CCF are leading the effort. And, also other CISE and MPS divisions are also participating. Two of the engineering divisions are also participating; also participating are the Directorate for Geological Sciences as well as the Division of Social and Economic sciences and Office of Integrative activities.

Proposals in all areas supported by NSF are welcome. But the areas listed here will be given priority and we suggest seeking new collaborations in these listed areas.

The slide shows the PD contact of the core team Nandini, Tracy, Christopher and myself. So next I will go over the participating divisions.

So, Division of Astronomical sciences; The topics of interest include foundational data science for astronomical data of increasing size and complexity, extend user-friendly interfaces using the principles of Human-Computer Interaction (HCI), long tail of value-added smaller data sets, and data streaming applications.

Next, we go to Division of Chemistry. Here the division of Chemistry is interested in supporting data-driven discovery in the research track.

Next, we come to the Division of Materials Research. Here the program director is Eva Campo. The topics of interest here include data-centric approaches, data analytics for materials research involving material synthesis, microstructure properties and so on.

Next, we come to CISE division of Computer and Network Systems. At CNS. Darlene Fisher is the Program Director. Topics of interest include data analytics, reliability, systems, knowledge engineering, security, network optimization, and machine learning based techniques.

Division of Information and Intelligent systems. Has all the topics in which they work. Which include data mining, machine learning, data integration, fusion and management, data modeling, data visualization, applications in biology and health domains, privacy, security and so on.

Division of Civil, Mechanical and Manufacturing Innovation is also participating here. Alexis Lewis here is the program director from CMMI. The topics include manufacturing and materials, natural hazards, transportation and energy/smart grid

Also participating is Engineering Education and Centers. Eduardo Misawa hers is the program director on this one. And topics of interest are advancing engineering research by collaborating with data scientists.

Directorate of Geosciences is also a participant in this program. Now they have four different programs here which all will be participating. And they are the Office of Polar programs, Atmospheric and Geospace Sciences, Earth Sciences, and Ocean Sciences. Topics of interest include data analytics for polar ice data, tropospheric weather, air quality , inside earth materials, paleontology, plate tectonics, ocean basins and so on.

Last but not the least, the Division of Social and Economic Sciences. Here the topics of interest include social networks their structures and dynamics, Health related data, cyber crimes, economic transactions and mechanisms, and public opinion information and manipulation.

With this, I hand it over to Chris.

Thank you, now we will give you even longer list of the TRIPODS projects and the contacts within them. The first two slides are a union list and after that you will see two sides for each project. Don't worry about copying things down. The slides will be available through the TRIPODS+X website.

The first site I'll call out is the University of Arizona. Fields of interest for TRIPODS+X include astronomy, planetary sciences, related fields, Earth Sciences, geoscience, life sciences notably systems biology and genomics, medical sciences, precision medicine, and health informatics.

The lead PI for Arizona is Helen Zhang from Statistics

The Brown University project has a list of fields of interest that include image analysis, structures of large networks, causal structure in networks including gene regulatory networks and issues such as HIV transmission.

Lead PI for the Brown project is Jeffrey Brock from the Mathematics Department

The University of California Berkeley project has a list of fields of interest that include combining science-based models of data with data-driven models. Astronomy cosmology issues, genetics and medical imaging and the social sciences.

The lead investigator on the team is Michael Mahoney who is present in applied mathematics, statistics and computer science.

The University of California Santa Cruz project has a list of fields of different interest that already include astronomy, biology, the social sciences, privacy, interpretability and fairness in software systems, and physical sciences generally.

The lead investigator for Santa Cruz is Lise Getoor from Computer Science with special interest in machine learning and AI.

Columbia University has a list of fields of interest for TRIPODS+X which includes astronomy, chemistry and materials research, sensing and imaging questions, the health sciences and smart cities.

And the lead PI for Columbia is John Wright. From computer sciences with interest in mathematics and the algorithm aspects of the data problems.

Cornell University has a list of fields of interest that includes social science in a variety of flavors, biological sciences and robotics. In the lead for Cornell is Killian Weinberger from computer science and machine learning.

Georgia Tech has a list of fields of interest that include engineering, again written pretty broadly, materials science, biology and many more. That's true for most of these sites.

And the lead is a Statistician Xiaoming Huo.

This is a collaborative project with 3 sites – this is probably a preview of things we will see in the full-blown TRIPODS with multiple sites involved. This involves Lehigh University, Northwestern University, and SUNY Stony Brook. Fields of interest for collaboration here include bioinformatics including protein alignment, civil engineering, chemical engineering, supply chain problems and logistics, renewable energy, physics including spectroscopy, reinforcement learning, robotics, and computer vision. In the lead for this Katya Scheinberg a computer scientist from Lehigh.

The Massachusetts Institute of Technology MIT has a list of fields of interest for collaboration that includes biology, computer networks, health and social sciences. The lead PI for this project is Piotr Indyk from the Computer Science department with particular interest in algorithms.

The Ohio State University team has interest for collaboration in material science, social sciences, biology, geometric modeling for a variety of applications, and geosciences.

And the lead PI for Ohio State is Tamal Dey from the CS Department.

The University of Washington has a list of fields of interest include oceanography, robotics, Earth sciences and a variety of other areas. Here they emphasize the existing University of Washington e-science Institute.

The lead PI for this project is Maryam Fazel from electrical engineering, computer science, and math.

The University of Wisconsin at Madison has a long list of fields of interest for collaboration beginning with cognitive neuro science and psychology, network science, medical imaging, medical imaging, control systems, astronomy, power systems biochemistry, life sciences, material science and some other fields.

And the lead PI for Wisconsin project is Steve Wright from the computer sciences department with special interest in optimization.

That the last of those.

Thank you and just a quick reminder, the slides will be available both on the webinar link as well as the program page and all of this information will be available in the slides.

So, thank you very much for your attention. And as you can see there are a number program officers in the fields representing the different divisions and directives. We would like to take questions from the audience. You can do that in a number of ways. You can indicate to the operator that you would like to ask a question by voice. You can send your question via the chat feature, or the Q&A feature in WebEx if you wish to remain anonymous. We will turn it over to the operator. Please give instructions for those who want to use voice. And while we wait for questions to come in, we will go ahead and answer a couple of questions that we have prepared.

So, operator, could you go ahead and provide instructions for participants to ask questions?

Thank you. Now if you would like to ask a question over the telephone, please press star one on your touchtone phone. Please be sure to unmute your phone line and record your name when prompted so that I may introduce you.

Once again, it is star one at this time.

And the other option, the chat or the Q&A feature within WebEx.

So, while we wait for questions, we have a couple of questions that we have received over the past few weeks. The first question says are there limits to the number of proposals submitted by PIs or institutions? And the answer to that question; there are no per-institution limits. However, you will note in the solicitation that the 12 current PIs awardees are limited to five projects, with at most three in any one track.

The second question -- says many, but not all divisions of NSF are listed as participating in TRIPODS+X. Does that imply that some areas are out of scope? Again, Rahul mentioned that all areas of research supported by NSF are welcome. However, areas traditionally supported by the listed organizations will receive priority consideration.

One more question before we go to the phone lines. Can the X Co-PI be a computer scientist? And the answer is yes. Note that the CNS and IIS divisions in CISE are participating in TRIPODS+X. So those types of collaborative proposals are within scope.

Somebody messed up on the slides there.

We will have to clean that up.

And we will ask the operator do we have any questions?

We had one who came in from Mary Hill. Your line is open.

Hello, can you hear me?

We can hear you.

Okay. Great. Hi. I am Mary hill from the University of Kansas. From the geology department. What I wanted to ask is how does the coordination with existing tripods group work? Is there any procedure to that, or is it just word of mouth or being friends with somebody on the committees or just contacting them and calling them or sending them a one-page proposal or how should we approach that?

So, here's an answer to this. I'm sorry I thought we had a link to the NSF tripods.org. So, no we don't have a link on the slide, I'm sorry. So, a good way to find out who is involved in all of the institutions is to look through the slides, which we will make available, there is a website you can go to in nsf.tripods.org. And there are links to their webpages. And again, the slides will be available, so if you find someone there you think you might want to collaborate with, reach out to them, and tell them you would like to submit a joint proposal with them if they are interested. So somewhere in the presentation, we mentioned that the lead PI has to submit a letter of collaboration. They must get one of those PIs on board and submit a joint proposal with them. Through this webinar and through other materials available, we are making the information available and it's up to you to reach out to them and let them know that you would like to get involved if you can.

Is there any way for us to find out who is already involved in the maximum number that they can be involved in?

That is confidential information. However again if you look through the slides, you will have a point of contact for each of the 12 TRIPODS Phase I Institutes. They've also listed their topics of interest. All the PIs for the tripod institutions are aware and are looking forward to hearing from you.

So, I might suggest if you find a particular co-PI that you think might be interested in working with you, you can reach out to that person. If it is the team in general, then choose the lead. So, the lead is on the slides that Chris went through, the lead is at the top of each one.

And you can also reach out to your program officer within the division or directorate. So, if you have a point of contact for the directorate or geosciences, Eva Zanzerkia, and you can reach out and contact one of the program officers.

Any other questions?

We have no other questions at this time. Just a reminder, if you'd like to ask a question on the phone, please press star one. And record your name when prompted.

You want to let me read from the chat.

Sure. Is it preferred or required to form a collaboration with an existing TRIPODS center? Yes. Or could a new team be formed?

So back on slide 10 or so, it mentions that at least one co-PI has to be a PI or co-PI, it can be among any of the PIs or co-PIs on one of the existing 12 institutes, but at least one of them has to be a co-PI on every proposal submitted.

And it is required for a TRIPODS + X submission.

However, we want to add that the PI for a proposal submitted to TRIPODS+X could be from another institution as long as you have a partner at one of the Phase I tripods institutions.

Yes, and we actually encourage involvement with other institutions.

Why is computer vision not listed in IIS? Because Aidong did not put it on the slide of the list of topics she wanted us to highlight, but this is certainly is in scope

And we get down to the Q&A session. They are coming in chat also. Reviewing the program officers list, it appears that the division of biological sciences is missing. Can X be biosciences or is it ruled out?

So, we have already mentioned this that the listed organizations will have some priority consideration, but everything is in scope. So, what we're saying on this is we encourage people with existing collaborations in the areas that are not listed. You should go ahead and submit those proposals. And seek out new partners in other areas in the ones that are listed. And we encourage you to seek out new collaborations in those areas.

Right. And to add to that, you notice that on the slides for CISE IIS, that particular division does support biomedical research, and then imaging and also research related to electronic health records.

So, there are parts of biomedical sciences supported by other parts of the foundation.

Next question, each division or program has specific areas of interest- are these standard per program or specific to TRIPODS+X.

So, there's nothing specific. We put some examples on each of the slides. But for we take that back. This is going to vary by division. What we have from chemistry was to look at their DCL and look at the areas of interest there.

So, look through the slides and if you have questions on is this topic in scope, contact the program director. So, I think for CISE we did not really limit it to any subset of topics in CISE. And anything that you would usually be submitting to CISE, we would consider that in scope. Does anyone from another division want to give your view on that?

For chemistry, as you mentioned, we have a long list of topics we have included in the data-driven research DCL we released last year. We encourage the PI to go there to take a detailed look. But I would be happy to address any questions online if you want more information.

And you have answers for the other divisions that are participating?

So again, if you question, you can email one of us or send an email to the program officer in a particular division listed on the program page. And again, the slides will all be available after the webinar.

So next question does TRIPODS PIs have first go at vetting projects by not agreeing to request from potential collaborators? Yes, that's one way to view it. You must get them on board as a co-PI.

Many of the TRIPODS centers mentioned health as an area of interest. Are there special considerations with respect to NIH? Can a TRIPODS + X proposal discuss a data science-based complement to ongoing NIH projects meeting.

Right. So, some areas of biomedical data science are within scope. However, if it looks too much like an NIH project, ie application of existing methods, it is probably not within the purview of NSF. What we really want to do build links between foundation and data-driven applications so if you can show the connection then yes. Parts of biomedical data science are within scope.

Next question is what is the total number of research track proposals you expect to support? Is the number 12 given in the solicitation a hard limit?

No. And we don't really have any fixed allocation to the three tracks. We will see what comes in and support the best projects. If we get a whole bunch of really good ones in one track, it may be just disproportionately represented in the awards that go out.

Can an educational track proposal involve more than one domain science TRIPODS+X plus Y plus Z. Absolutely?

We would like to see more of those.

In the context of computer science, is this program limited to theoretical Computer Science or are research projects in applied CS of interest as well. This may be the same the answer to what essentially is a question.

It's on the Q&A three slide. Yes, other areas of computer science can be the X of TRIPODS+X.

Are subawards to industry collaborations allowed? This is not any different than on any proposal for NSF with the usual rules that apply there.

Do we have any questions on the phone?

No, we do not have any questions on the phone.

Could one of the co-PIs for the X component be from a foreign university specifically in the United Kingdom?

So, we always welcome unpaid collaborators from anywhere. Typically, if there's a case that can be made that you need expertise that is only available with this one person who is not in this country, a modest amount as a subcontract, or consulting contract can be used to support that person's participation. This is not unique to TRIPODS+X. This just the usual NSF practice. And I've got the CISE viewpoint on this. I don't know if any other organizations want to add to that or something different.

Typically, NO- we would not have a co-PI getting salary.

So, you may want to check with individual program officers as things vary even within the NSF. I am going to throw out the next question to Chris. Our tripod institutes well-informed of the requirements of TRIPODS+X?

Yes, the TRIPODS PIs participate in a monthly teleconference with the TRIPODS management team. They have been advised that this is coming and we discussed with them.

So yes, they are expecting you to get in touch with them they expect to hear from you by email.

Okay so the next question: the research track proposal can have education track content, is there any page limits for the 2 parts?

The answer is no. It's a total of 15 pages. And you can choose to spend as much time talking about the research project as you like. But you want to tell us what are your plans for educational activities and how they bring together the two communities.

What is the purpose of the educational track? To design new curricula or train current students?

Do you want to answer this one?

Both we strongly encourage designing interdisciplinary curricula. And we need workforce and training students.

This is part of the work that the TRIPODS institutes are already collaborating on. We have a collaboration site on which they share material.

Okay. So, we have a bunch of questions on chat. Some areas of machine learning could be considered close to theoretical CS or optimization. When X equals machine learning. What kind of machine learning is adequate.

So, machine learning has theoretical and practical learning content. ML theory is a growing field within CCF. And it is driven by applications so yes, in the sense IIS is participating, the practical part of ML can be considered as X.

And this will be up to the reviewers. So, you need to convince them that you are outside the three disciplines for TRIPODS. And I think having a strong application component, you know a particular application and data for that application that is probably going to be what makes the difference and says this is outside foundations and more applied.

Next question over to Alexis.

Energy Grid is listed under CMMI as a priority topic, could you please elaborate on this topic?

Production, transmission, consumption or all of them. The term grid seems limiting.

That is the one area that's outside of my expertise in Engineering. So that was a brief list of areas that CMMI supports that could be of interest so we certainly will be looking at accepting proposals in all the areas of CMMI. But what we meant there by smart grid was really understanding how data science can help a number of areas in for example in civil infrastructure and those kinds of networks.

So, if you are familiar with the program in CMMI that are aligned with that, that would be the best way to figure out what that might mean. Or you can send email and we can have a more detailed conversation.

Okay the next question: should there be a balance between TRIPODS and X. So, for example if there are two TRIPODS co-PIs should there be 2X co-PIs?

So yes and no. Solicitation says there must be at least one of each. And we don't go any further than that. But if it's very heavily weighted to one or the other, then it's kind of not in the spirit of what we are aiming for here.

Right, and you will notice the solicitation specific criteria talk a lot about synergy and convergence so you want to make sure your team represents those ideals.

Are there limits on how many proposals can be led by the TRIPODS university?

I don't think we have any restriction on how many leads or co-leads, but the total number is five for TRIPODS phase I awardee, three in a category.

We are agnostic as to whether the TRIPODS Institute is the lead among the institutions on a multi-institutional proposal. It can be either way. They are just limited to five either way.

Is the 600 K total for just the X component or to be shared by the TRIPODS and the X? It's total for the entire project to be shared between the two institutions and you can choose how to split up the budget.

Is the full list of team members listed on the web? You should see there are in the side you have a link to the TRIPODS webpage NSF-TRIPODS.org. There will be links to all the 12 TRIPODS institutions. They will have a list of all their participating senior personnel. If you have specific questions, you can always reach out to the lead PI for any of the awards, and you can as Chris mentioned, we had a meeting with them and they will expect to hear from you right after this webinar.

And there's a link showing right now -- the second one there the webinar page, on that page, it's kind of buried down at the bottom, but it's the webinar slide. You can get these slides and go back and so that has the links to all 12 of the institutes and you can go to the webpages for more information.

There is one at the bottom of Q&A.

Go ahead.

Is it appropriate for a statistician/ mathematician to be PI or co-PI for the TRIPODS + X? I will look at Chris for this one.

It's appropriate if that suits the mix of the problem in the foundational problem that you're tackling. So that we as Tracy says we are agnostic about the form of these proposals, and we will ask the reviewers to judge them on the substance of how well this advance the needs of other disciplines and on the foundational challenge the applied problem presents.

So, we don't care if you're in the math department or statistics department or computer science department, it's more on what the research that you are proposing to do and do you have the background to do that research, and if that is an applied problem X rather than the TRIPODS area. Then it's in scope.

But I will throw it out to Lynn, Alexis and Eduardo, for projects within the scope of chemistry or materials or engineering. You definitely want to see a PI from those disciplines.

Yes. We do. Like I do not think we want to put hard requirements for a chemistry proposal that the chemist must be the lead PI but we do want to see substantial component effort made by chemists, or doing chemical research. It doesn't even need to be chemist or associated with a certain department but we do want the proposal addressing certain chemical problems and a substantial contribution from the chemist.

Maybe I answer the question can you have a math/ stat person in addition to the tripods person. And I would say yes, as long as you also have your domain PI or co-PI PI.

Bring in a new data scientist for example, if you are also using the other co-PI.

We want to remind you that a solicitation does require submission of a collaboration plan. So please make sure you include that information. And it asks for qualifications of members of the team. And how the project will be coordinated. The roles and responsibilities for each of the PI or co-PI and identification of a coordination mechanism. And that information needs to be provided as a supplementary document.

All right. What about affiliated faculty at existing TRIPODS Institutes who are not PIs, co-PIs in the original TRIPODS grant. Do they satisfy the TRIPODS+X requirement of having one PI/co-PI from a TRIPODS Institute?

The key word is affiliated, I'm not sure what they mean by that.

If they were not part of the original list of PI, co-PI and senior personnel, they would be eligible to apply. So maybe the question is if the person is at that institution and has begun working with the TRIPODS Institute even though they are not listed on the proposal. Then my guess would be if the TRIPODS Institute identifies a person as a member, then that would count as the TRIPODS co-PI.

Right.

Thank you would need to reach out to the lead, as we mentioned, I'm sure they will be hearing from different communities over the next few weeks.

So, they will have to at some point make a determination.

And you can send us a question if you have something specific, you can send to us by email, or you should talk to the lead PI for a particular institution.

Any other questions? Do we have any more questions on the phone?

We have no questions on the phone.

Okay, I guess we are done.

We will give you two more minutes, and if there's no other questions, feel free to send us any additional questions via email. If you want to get in touch with an individual program officer, please go ahead and do so. The list of contacts is on the website.

Here is one we missed. Are the other list of contacts also considered a tripods member and a co-PI? And yes, so everyone that you see on the slides associated with one of the 12 institutes is one of the co-PIs.

Okay the slides are already available on the webinar page. Please feel free, does of this information is not clear, please let me know.

Otherwise, operator, I think we are ready to end the call. Thank you very much to everyone for participating. Thank you to all the program officers. Shout out to Katherine Otts for helping us get the technology to work. We are done with this meeting.

Thank you, ma'am. Now, you may now disconnect from the conference. We thank you for participating and have a great rest of your day. >> [Event concluded]