

Please stand by for realtime captions.

We are proud to present this webinar to you. We have had a lot of interesting questions

regarding the new solicitation. We have made ourselves available to answer any questions you might have. Also to introduce this new solicitation in terms of what it is all about, and what emerging networks is all about. Modern science has become truly interdisciplinary and solving complex problems of the 21st century. It will require integrating traditional physical chemical and biological sciences with the social and behavioral sciences. It will take collaboration across fields of research and dialogue between and among diverse groups of people. This is a part of the reason we are introducing some of these exciting solicitations. I first want to have the members of the working group introduce themselves.

I am a program analyst associated with the biological sciences directorate. >>

I am a biologist. I am also with the biological sciences directorate.

I have introduced myself. >> I am a program director in the computer information science and engineering electorate.

I am a rotator. >> My home's institution is Johns Hopkins University.  
>> Is Dena on the line?

No.

She is a program director from the geosciences directorate.

Hello , everybody, and welcome. I am a rotating program director in the social -- directorate. My home institution is the Ohio State University.

I am a program director. Our job here today is to just help you.

Thanks to you all for turning in on this. We are going to briefly go over the solicitation and then open it up to questions and answers. Please direct any of your questions to the Q&A button. Just click that and write your question. We are happy to respond to that. Welcome, and we will move to the next slide.

Let me just say a few words about the solicitation and what emerging networks are. The understanding rules of life big idea seeks to understand the rules that predict the observable characteristics of living organisms . Living beings exists at all levels of an organization.

They interact with each other in both time and space. They are now a number of understanding rules of life solicitations building on this big idea. Hours adds to these efforts to focus on how living

systems interact with each other in their environments. Emerging networks arise from these interactions and are complex and often unexpected. Such networks occur at all levels. Between natural, social, and engineered systems. The behavior of emerging networks of living systems depend on, but cannot always be predicted by, the behavior of their smallest components. Such as molecules, cells, or Bergeson's and's or populations or whatever the lowest level of those networks happens to be. For the solicitation we are looking for projects that help us understand how these kind of networks arise and evolve. I will turn it over to Grace for the next slide.

Thank you your I will briefly go over the objectives of the solicitation. The first want to conduct basic research focused on understanding the properties of networks of living systems, which are coupled with natural, social, and human engineered systems. Environments can involve -- solicitation will support research and activities using convergent science. We will support potential the groundbreaking investigations that cross disciplines , involve an integrated stem education and outreach into the values of all activities and research the project undertakes. The fourth objective in the URoL EN program is to support projects that take interdisciplinary approaches to better understand emergent networks and their mechanisms , emphasizing projects that cross multiple levels of complexity and/or temporal skills in taxa from anywhere within the tree of life. I will now hand this over to Jeremy.

Thank you. There should be a clear fit within the NSF mission of basic research. It should have a clear and strong intellectual merit. You should also have a clear and strong broader impacts to society. Is should show a clear effort to determining the rules of emergence for networks of living systems and their environments. Convergent approaches are essential to exploring emergent networks across various scales. Convergent research is one of the 10 big ideas for future investment. Identified in 2016. The characteristics include the research is driven by specific and compelling problem and inspired by a deep question and societal need and there is deep integration across disciplines. There is also an expectation that the products will develop new theories, reliable predictions, or engineer herbal interventions and technologies based on a rule of life. The final characteristic is the integration of stem education and outreach to engage the public and provide training for the next generation of researchers.

This slide is on how the proposals -- we want to tell you this because you should keep these in mind about how proposals are going to be evaluated.

>> The bottom line is to get a proposal from you. If you are interested in pursuing the research ideas. I will talk briefly about some of the key components. This is not an exhaustive list , but make sure to -- pay attention to all of the requirements.

The proposal title must begin with URoL EN . This is required at. Make sure to address the following things. Identify a rules of life topic and also to describe the proposed work, and trying to make a compelling story. What do you plan to do, and why are you doing that? What will happen if you are successful? Also the knowledge of your work

to the convergent research that has been described earlier. The broader impact. You must have a session to address broader impacts. Do not do more than one the one that is most relevant to the proposed work here.

Here is some important information to keep in mind. The budget. No more than \$3 million. For a duration Noma longer than 60 months.

Hi. I think we momentarily lost him, so I would like to continue if everyone can hear me okay. The budget should be no more than \$3 million. The duration should be no more than 60 months. The full proposal due date is May 10. That is based on the time of the submitters location. There can only be one single proposal. With some boards. Collaborative projects are not permitted. In terms of

PI and co-PI requirements. Must represent research relevant to at least 2 engineering directorates. No more than one submission per PI or co-PI is allowed. I think we are on the last slide now. Betsy.

Seems like we have lost Betsy. If you have any questions please feel free to contact any of the program officers here today. As well as emailing this email. Someone will get back to you and be able to answer your questions. I believe now we will start the Q&A portion. Betsy is back.

I am. Sorry about that. My computer shut down.

No problem.

If you want to handle the start of the Q&A I think that is where we are at.

Great. We are going to go through the questions that you have submitted to us.

Have you already answered the question about recording?

I have not. I was just reminding everyone they can use the email address on the screen if they have a question that is very specific to their ideas.

Great. I will just add to that. If you would like to submit specific questions regarding the proposal for please do send a one page summary of the hypotheses you were going to test as well as the directorates of the PIs who are represented in the research program. If you do not mind answering the first question about whether this was going to be available to folks.

Sure. The recording will be made available. It will be on the program page. There will be a link at the bottom to this recording. Probably about a week after. You will be able to view this again or pass it on to any of your colleagues who have maybe not been able to join.

Thank you. The next question Grace is going to answer is about infectious disease. If you do not mind reading the question aloud first and then answering it. That would be great.

Sure. The infectious disease systems included in the scope of the understanding the rules of life program or are they off the table because they are and IH territory? This is a great question. Being from the engineering directorates and biology and health cost are I am often asked the question of how we deal with the medical research. There was an engineering directorates that I am in. We are allowed to do the proof of principle research, but anything that is proof of practice or clinical trial is definitely not in NSF's purview. Tomorrow address the answer relative to this solicitation it supports basic science. To the extent the proposed research is about basic science and grounded in basic science approaches and understanding -- if it touches upon biomedical systems that would be in scope as long as they're released 2 directorates that would support the project. I think the best way to really answer the question is for you to submit to the project team working group your specific proposal idea.

Anyone else wants to supplement?

That is great. Thank you. There is another question in regards to collaborative proposals. >>

The answer is no collaborative proposals. It will just be one single proposal. The collaborative proponents. That is the answer.

Thank you. The next question is will there be additional deadlines beyond May 2021? Right now it is rich and that there is just this one deadline, and we are hoping there will be another one the following year. Of course, that is always directed by congressional allocation. We do not typically know what our budget is a year in advance, but we will certainly advertise it as soon as we have that information in terms of updating the solicitation. The next question is when the word evolution is used in the solicitation does it mean evolution in the context of natural selection or in the context of temporal change? That is what investigators focusing on ecological responses to environmental change be appropriate? That is absolutely appropriate as a topical area. We used the word involving environments to include both biotic and abiotic drivers. We just tried to make it as broad as possible. Certainly the environmental change are at large in terms of abiotic drivers of change is certainly something that would be included as something appropriate for the solicitation in terms of the emerging networks that result from that. Ashley would like to answer the question in regards to international, so I will let her take that over.

There was a question about if the program of those including collaborators, and the answer is that it is possible to have international collaborators, but I encourage people if they are interested to look at the solicitation because there are specific bullet points as to what the budget could be used for.

Thank you. There is a question about emergent networks.

The answer is yes. I would like to remind the community to pay attention to the definition of emerging networks. Also the kind of characteristics that we like the proposal to address to have. We spent a lot of time to find the right language and explain what we are looking for. Different people have different interpretations, but make sure to study it very carefully. Thank you.

Thank you so much. The next question is by 2 directorates do you mean you must have one PI who would typically submit their work outside of the biology directorate if other PIs typically submit to the biology directorate? So that is correct. If you have a PI who typically submits to the director of the requirement of the solicitation is that there would be a PI from another directorates that is represented in the solicitation, and that we have listed within the solicitation, and is represented here today. Thank you. That was a good one.

Moving along here. Grace would like to answer the question about 2 engineering divisions.

I think that was referring to my answer involving 2 different directorates. I may have said 2 different engineering directorates for what I meant to say was 2 different directorates supporting a project.

Thank you. There is a question about is there a maximum number of PIs. I will go ahead and jump in here on that one. You are allowed to submit five, but you can have senior personnel -- additional senior personnel listed that also submit their bio sketch as well. You are not limited in terms of the number of PIs. The only thing that is restricted as you could only submit to this particular solicitation once a year as a PI or co-PI. Then we also require they be from different directorates. At least 2 from different directorates. Moving down to see other questions that people are ready to answer. Some of these have already been answered. One of the questions is the prior research has been financed through philanthropy, and so weather as a PI if you should mention relevant results from the research or are we only looking for results that arose from NSF funding? Certainly in your proposal you are more than welcome to write about results. Prayer research that you have done with any kind of funding. Specifically the results from prior NSF support. Specific to the past five years of your research that has been funded from NSF. That is a very specific section, but you are more than welcome to include previous research that has been funded by other organizations. There is a question about stem education. It is for students and other professionals. For example, high school teachers that would be a part of that. There are a number of questions that have arose here about what we mean by convergent research. We have written a little bit about this in the solicitation, but convergent science is broadly the idea that there is a really pressing scientific or societal question that could be answered using basic or fundamental scientific approaches. It is these really pressing questions that are pressing in the scientific realm or even in the overall societal realm, but that are used to answer these basic science questions. That is what we mean by convergent science in terms of the impetus of the question. It also includes a very interdisciplinary roach. Using that approach is expected to be working with each other learning the terminology and integrating

those different disciplines thoroughly so that they have feedback with one another and the students that are trained through this research approach are truly interdisciplinary. It involves a couple of different aspects. One is it is a very pressing need, and it has this real interdisciplinary approach. Okay. I am going to latch the program directors have one they would like to answer while I look through. That was the one I just answered.

You stole it .

Would you like to elaborate? That is a pretty important question.

I was just going to say this has been discussed in considerable detail. There are a couple of places you can go for convergent research for a definition for that. I put a link in one of the answers that I typed out. Perhaps I should put it in the chat so that it is therefore everyone.

That would be great.

there is a question about a specific project examples you can provide. This is the first year of the solicitation, so we have written it so that it is fairly broad and open, and pointing people to research themes that are possible. That is included in the solicitation itself. Let me quickly see if I can pull up one of those themes as an example. The research is not limited to these themes, but we did include them to kind of give people a direction of what we would consider interesting and unexplored research. One example. Just getting to the third example of the things we have provided. Establishment of emergent properties of networks of living systems with social and human engineered systems that are influenced by involving environments as well as their associated feedbacks.

There is a range of different things we have included here. These are suggestions, so you can submit ideas that are not directly relevant to those themes .

Do you want me to answer it live?

Do you mind?

No.

From the solicitation guidance the PI that -- 2 and four-year institutions. Only nonprofit and nonacademic organizations.

>> Thank you.

Can you answer the question about if you can be a PI or co-PI on one of these emerging networks proposals if they are co-PI on another ?

One of the questions about perversions of -- integrated from different biological systems. Animals, plants, bacteria, etc., but not as vertically integrated from molecular to societal . The answer to that question would really just depend on what the questions are. Who the other researchers are. If you are a biologist you do have to collaborate in a convergent way with other disciplines.

Integrating the biological sciences with other disciplines represented on the solicitation. There is another question about that. Do you need to specify which programs of the 2 directorates that you want to review this?

>> I think the question is sort of different from how we operate. It is best if you specify of this 2 directorates that -- you can specify more than 2 certainly.

Thank you.

Any other MSO folks feel free to jump in and answer questions because I have a limited scope in terms of the questions I can see on my screen. If you have submitted to another rules of life solicitation or if you have been awarded something from one of those other solicitations that does not prohibit you from submitting to this rules of life emerging networks. That is just a cap on the -- simply for this solicitation.

The next question is in terms of the scope of the proposals. How important is application to human engineering systems as opposed to basic science if it focuses on understanding networks -- we were trying to make it as broad as possible to include all of the potential collaborations between PIs from the different directorates who are represented in the solicitation. You do not have to propose all of the networks of living systems that could be comport with natural or social environments. It could be a subset of those in terms of understanding a rule of life. It does not have to include all of those. We just read that in there so that it was clear that any of these possible variations were acceptable for this solicitation. A question about the budget. It is wonderful they can be -- is appropriate to submit a small-scale project of \$500 or less? Absolutely. That is perfectly fine. As with any budget justification that is submitted to the National Science Foundation we put a cap in their of \$3 million, but we expect any proposal that is submitted to the NSF will have a very clear budget justification justify all of the expenditures to conduct the research.

I think your earlier answer may have touched on the. Trying to be as broad as possible. Cover as many as you think you are interested and able to cover would be my suggestion.

Thank you. Any of the other NSF staff feel free to jump in because I cannot see more than four or five at a time on my screen.

>> The idea behind the question was how is this different than the other understanding the rules of life solicitations? I will direct people to the solicitation. Understanding the roles of life.

Overall for all of these understanding the role of life solicitation is based on developing a predictive understanding of how keep prep use of living systems emerge from interactions. The epigenetic's rule of life solicitation was looking at rules of complexity. In microbiota. Understanding the rules of life solicitation was centered around understanding rules of interaction. This solicitation is different than those different foundational activities because we are trying to understand the rules of emergence for networks

of living systems, and their environments. We talk about the types of interactions of these networks , and how they are complex and unexpected given the behaviors of the citizens when they are observed in isolation. You do not have to necessarily explore all of those different factors and systems. >> The next question is the language in solicitation seems to suggest there is a list of rules of life from which we should select when preparing the proposal.

The question is is this correct? And if so where is the list?

There is no list of rules of life. We are expecting the research teams to propose those rules of life using this convergent science approach and following the basic guidelines of the solicitation.

There is a question similar . Overlap with things that -- some small overlap would be okay. If it is a big overlap . I am beginning to question whether it would give good faith to either the emerging networks --

Thank you. We are at the end of our hour-long webinar. This is been recorded, so we will be posting this.

[ Event Concluded ]