

**NSF-NCS Proposers' Webinar**  
**November 23, 2015**

**SPEAKER SEQUENCE**

1. KEN WHANG, Welcome/Outline
2. ALEX LEONESSA, Themes 1 & 2
3. LAURA NAMY, Themes 3 & 4
4. GREGG SOLOMON, Emphases & Limitations
5. HÉCTOR MUÑOZ-AVILA, Proposal Classes
6. KATE ARRINGTON, Review Criteria

**SPEAKER 1: KEN WHANG**

[slide 1]

Welcome to this webinar for proposers for the 2016 competition of Integrative Strategies for Understanding Neural and Cognitive Systems, or NSF-NCS.

This is the second competition of this program, involving four different directorates at NSF.

My name is Ken Whang of the Directorate for Computer and Information Science and Engineering, and I'm here with my fellow program officers from the Directorates for Education and Human Resources; Engineering; and Social, Behavioral, and Economic Sciences.

We're going to be introducing ourselves, and what's new in the NCS program, then we'll take all of your questions, which you can submit as we go along to [ncs@nsf.gov](mailto:ncs@nsf.gov).

[slide 2]

Today we're going to cover this program's scope and context, especially the four integrative themes around which it's organized; general emphases and limitations that you should keep in mind, that apply across the whole program; and then we'll get into the specifics of both the INTEGRATIVE FOUNDATIONS and the CORE+ SUPPLEMENTS what each of these proposal classes is all about, and what you need to do to apply, and the criteria by which your proposals will be evaluated. Then we'll be answering all of your questions which, again, you can submit as we go along to [ncs@nsf.gov](mailto:ncs@nsf.gov).

[slide 3]

Before we get started, let me emphasize the importance of reading the solicitation, at [nsf.gov/ncs](http://nsf.gov/ncs), as well as NSF's general guidelines.

Everything we're going to tell you today comes from those documents, and those are the documents that reviewers will read, and by which your proposals will be judged.

You can think of this webinar as a guided tour that hits a lot of the highlights, but not as a substitute for the solicitation and the Grant Proposal Guide.

Note that the Grant Proposal Guide has recently been revised, and that the newest version, NSF 16-1, will be in effect in January.

Especially if you haven't applied recently to NSF, please take some time to go through the guidance on proposal preparation, including all of the recent changes. Please note in particular:

- the requirements to discuss Broader Impacts in your Project Description,
- and the absolute enforcement of hard deadlines at 5pm (to the minute and to the second), your local time.

My colleague Alex Leonessa, of the Engineering directorate, is going to tell you next about the overall context and scope of this program.

SPEAKER 2: ALEX LEONESSA

[slide 4]

Thanks. I'm the program officer for General and Age-related Disabilities and Engineering.

As Ken mentioned, this is the second issuance of the NCS solicitation. It's one of several different NSF activities related to the President's BRAIN initiative, and to NSF's multi-year effort on Understanding the Brain.

All of this is described on our website at [nsf.gov/brain](http://nsf.gov/brain).

You'll see more information there about funding opportunities related to this broader effort, as well as workshops and other events that have been shaping our agenda.

Some of these opportunities may be a good match for projects that you'd like to seek funding for, possibly in addition to or instead of the NCS solicitation, so I encourage you to take a closer look.

[slide 5]

The NCS solicitation is organized around four integrative themes. Each theme represents an emerging focus of multidisciplinary interests where innovative, integrative perspectives can come together to have a major impact.

[slide 6]

We are looking for new integrative approaches that can capture these scientific opportunities, and that could have a transformative scientific impact on the field and on a broad research community.

We want to see projects that are bold and risky, that go beyond what can be done in a single disciplinary approach

to tackle challenges that would otherwise be intractable.

This is not going to be “business as usual.”

These proposals should bridge across scales, levels of abstraction or levels of analysis, and integrate across different disciplinary, methodological, or technological approaches.

We want to bring together and build on the leading edges of multiple scientific communities; to bridge critical gaps, and also to challenging existing paradigms.

Through this program and the broader BRAIN effort, we are envisioning a connected portfolio of transformative, integrative projects that link investigators and communities, to tackle the challenges of understanding the brain in action and in context.

The four integrative themes this year include two that are continuing from the first competition, and two new themes that I’ll hand over to my colleague Laura Namy to introduce.

[slide 7]

The first theme, “Neuroengineering and Brain-Inspired Concepts and Designs,” is focused on the confluence of new insights that are coming out of neuroscience and cognitive science on the one hand, and from a range of rapidly developing technology disciplines on the other.

The integration across these areas is leading to significant innovations

inspired by the brain, or directed toward the brain.

These include technologies for imaging, sensing, recording, or affecting real-time brain activity and behavior; computing paradigms; brain-computer interfaces; augmented and adaptive systems; and other computational and bioengineered systems.

We are looking for projects that are bringing neural/cognitive and technological perspectives together, synergistically, to advance these frontiers.

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The second theme is looking broadly at “Individuality and Variation,” at all scales of neural and cognitive processes.

This is not only about individual differences among people, or diversities of cell types, but how we analyze these kinds of variability at all levels, and come to understand their functional importance.

So considering signals, representations, learning, development, individual, cultural, and group processes, and so forth,

What are functionally important aspects of individuality and variation? What is the role of noise?

Alongside many domain-specific issues, what are some of the domain-general statistical and modeling challenges? How do we explore, describe, and come to understand the role of naturally occurring variability?

Both of these themes continue from last year. Now let’s hear about the two new themes.

SPEAKER 3: LAURA NAMY

[slide 9]

Thanks, Alex. I’m Laura Namy. I’m the program officer for Developmental and Learning Sciences in the Directorate for Social, Behavioral, and Economic Sciences, and I’ll be introducing the two new themes that we’re rolling out this year.

In almost every area of cognitive science and neuroscience we’re familiar with the inevitable oversimplifications involved in trying to study inherently complex phenomena –especially in controlled lab settings.

This third theme, on “Cognitive and Neural Processes in Realistic, Complex Environments” is about moving beyond static, artificial experimental settings and addressing the kinds of complexity and interactions that we see in nature.

This is not meant to be an exhaustive list, but some examples of how this theme might play out includes: adaptive processes during complex physical, social, and educational interactions; flexibility and contextual aspects of all kinds of learning; experimental paradigms that leverage immersive environments or other simulation or synthesis methods; and integrative approaches involving mobile technologies or cyber-human interactions.

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And finally the fourth theme, on “Data-Intensive Neuroscience and Cognitive Science”

builds on recent developments that are enabling data-gathering and analysis on a very large scale, and changing how neural and cognitive processes can be explored, modeled, and understood. As many of you know, the directorates at NSF all have their own “big data” initiatives, this is the NCS’s interest in advancing knowledge in a more integrative way.

Neural and cognitive data pose a lot of unique challenges, especially with respect to their scale and heterogeneity; their complexity at the behavioral, cognitive, and biological level;

and the many different contexts that come into play when data are collected and used across a broad community.

The research and innovation responding to this theme, to enable large-scale analysis, modeling, aggregation, sharing, and open science

should confront all of these complexities

and should be driven by the goal of neural and cognitive discovery that requires data-intensive approaches to succeed.

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Across all four themes, we’re interested in general advances in theory and methods, technological innovations, educational approaches, enabling research infrastructure, and workforce development.

Many of these research activities can dovetail with related infrastructure and training efforts. You’re encouraged to leverage existing standards, frameworks, platforms, and other resources, and to build on associated infrastructure projects as appropriate.

My colleague Gregg Solomon is now going to tell you more about some important emphases and limitations that apply to all of the themes, and all of the proposal classes, of this competition.

**SPEAKER 4: GREGG SOLOMON**

[slide 12]

Thanks a lot Laura. I’m Gregg Solomon from the Education and Human Resources Directorate.

Whichever theme or themes you’re thinking of, and whichever proposal class,

listen up, because I'm talking to you.

As Alex and Laura mentioned, everything submitted under this solicitation needs to be relevant to one or more of the integrative themes, but it's not enough just to say that a topic or method is related.

There are many different ways that you could be working on an engineered system, dealing with variability, looking at a complex behavior, or working with a lot of data.

What we need to know is how your project is going to push the frontiers along one or more of these dimensions.

Your proposal needs to articulate how it will advance the foundations of one or more of the themes, and what kind of impact that will have.

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Another important emphasis in this solicitation is on high-risk, high-payoff approaches.

As investigators, you have a lot of different project ideas in your head, some of them solid, important, maybe somewhat predictable; and probably some others that run off the beaten path, in new directions that haven't been tried before.

As funders, you can think of us as having a risk portfolio as well, with a mix of lower-risk and higher-risk projects.

This solicitation is for the high-risk end of that portfolio.

Risk can be notoriously difficult to evaluate, because most proposal writers tend to sweep it under the rug rather than discussing it explicitly, so reviewers can understand the nature of the risks and potential rewards, and how the investigators plan to manage these issues.

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Finally, we're looking for integrative approaches, both in terms of the expertise and perspectives that are going into these projects, and the intellectual payoffs and community impact that result from the projects.

We want you to build on leading-edge research across multiple disciplines, and to be proactive about having an impact on a broader intellectual community.

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Before we go into detail on the proposal classes that are available, I need to warn you of a couple of things:

First, you can participate in only one proposal at most in the 2016 fiscal year. That includes INTEGRATIVE FOUNDATIONS and CORE+ SUPPLEMENTS.

Second, your proposal needs to be consistent with the missions of the participating directorates, which for this year are computing, education, engineering, and social, behavioral, and economic sciences.

Finally, keep in mind that INTEGRATIVE FOUNDATIONS is only for collaborations involving at least two investigators bringing together complementary expertise. That is not required for CORE+ SUPPLEMENTS.

With that, Hector Munoz will give you some more background on each of the proposal classes in this solicitation.

SPEAKER 5: HÉCTOR MUÑOZ-AVILA

[slide 16]

Thanks, Gregg. I'm Hector Munoz-Avila of the Division of Information and Intelligent Systems, where I manage our artificial intelligence portfolio under the Robust Intelligence program.

There are three different proposal classes that are mentioned in the solicitation, each representing a different level of collaboration and coordination. As we've mentioned, there are two opportunities that are active in 2016, INTEGRATIVE FOUNDATIONS and CORE+ SUPPLEMENTS.

A third proposal class is anticipated, subject to availability of funds. INTEGRATIVE FRONTIERS will be intended to support larger, highly integrative projects that require multiple threads of integrative research, in a sustained coordinated effort.

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In the current competition, INTEGRATIVE FOUNDATIONS will be the largest proposal class available.

These are for collaborations that will develop foundational advances that are deeply connected to a broad scope of important research questions in cognitive and neural systems.

Your proposal needs to demonstrate the transformative potential of your project idea, how it will advance the foundations of one or more theme(s),

and also situate what you're proposing within a broader intellectual context of work that you will connect to and contribute to.

These projects must involve collaborations of at least two investigators with distinct but complementary expertise. They are expected to range from half a million to a million dollars, in cumulative total costs, over a 2- to 4-year award period.

[slide 18]

As needed, these projects can explicitly build on another associated project or projects. For example, there could be a related infrastructure project, or another research project that is synergistic with the project goals. You can see the solicitation, in Section 5, for instructions on how to do that.

[slide 19]

For all of the INTEGRATIVE FOUNDATIONS projects, a letter of intent will be required, due in just two and a half weeks. Your letter of intent needs to be submitted in FastLane, and must include all of the basic information on:

- who's involved in your proposal;
- what the project is going to be about, in a way that conveys the major innovation and the integration of the project, with enough detail for us to start identifying reviewers;
- what theme or themes are being addressed;
- which participating directorate or directorates it is relevant to;
- why this doesn't fit an existing NSF core program;
- and finally, a little bit about the distinct areas of expertise, approaches, or disciplines that you are bringing together, and a brief explanation that backs that up.

You won't get any feedback on your letter of intent. We will use the letters of intent to start planning the reviews and identifying appropriate panelists. Write your letter of intent with that purpose in mind.

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The proposal also has some special requirements.

You must address this program's solicitation-specific criteria in your panel summary.

And you must include separately labeled sections within your project description that address:

- a proactive strategy to maximize your project's integrative impact; and



the risks entailed by your project, how risks will be managed, and the relationship between the risks and rewards at stake.

If these required sections are missing, your proposal will be returned without review.

There are additional important instructions in Section 5 of the solicitation. Please review that carefully.

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The other proposal class that we have available this year is called a CORE+ SUPPLEMENT. This has a different purpose, and requires some explanation.

Historically, we've seen major advances in understanding the brain that come from fundamental contributions from other disciplinary communities.

Within our different directorates at NSF, we see a lot of new ideas coming in that have potential to connect to significant new integrative opportunities in cognitive and neural systems. Note that this is to enable exploration of a new scientific direction; it is not to support a straightforward extension of an existing project.

The CORE+ SUPPLEMENT is available for new and existing projects this year, to provide additional funding to make those connections happen. It can be applied to new or existing proposals in the CISE, EHR, or Engineering directorates.

The supplement can be for as much as \$200,000 in additional funds, or up to 20% of an existing award.

No letter of intent is needed for this, but you must contact your program officer in advance.

[slide 22]

To request a supplement as part of a new project, you'll embed a request as a supplementary document that you send in along with your proposal to another primary program, following the instructions in the solicitation. For an existing project, you can submit a separate supplemental funding request after discussing it with your program officer.

Some things that will be useful for you to communicate to your program officer include:  
how your supplement activity relates to your base project, and what the new direction is;  
how it relates to one or more of the solicitation themes;  
the extent to which it is a high-risk, high-payoff approach;  
and  
what you have in mind in terms of budget items and budget needs.

Again, please contact your program officer in CISE, EHR, or Engineering before you submit. Please also see the solicitation instructions for notifying us by e-mail of your submission.

Now, once you've submitted your proposals, how will they be evaluated?  
For that, let's turn to my colleague Kate Arrington.

**SPEAKER 6: KATE ARRINGTON**

[slide 23]

Thanks Hector. I'm a program officer for the Perception, Action, and Cognition program in the Division of Behavioral and Cognitive Sciences. All of the program goals that we've been talking about get incorporated into the review and decision process via the merit review criteria that are described in Section 6 of the solicitation.

As with all NSF proposals, your proposals under this solicitation will be considered according to NSF's standard Intellectual Merit and Broader Impacts criteria.

Intellectual Merit refers to the proposal's potential to advance knowledge, and  
Broader Impacts refers to potential to benefit society, beyond the purely intellectual impacts. These could include educational impacts, impacts on diversity, or in

many cases, technological, medical, or other types of impacts that are broadly beneficial to society.

In addition to these standard criteria, the solicitation lays out several considerations that are relevant to a proposal's Integrative Value and Transformative Potential:

Whether it is bold, potentially risky, and going beyond a typical disciplinary approach;

Whether it advances the foundations of one or more of the themes;

The extent to which it builds effectively on deep, complementary expertise, and will contribute to a broader intellectual context;

Whether it is effectively crossing temporal or spatial scales, levels of abstraction, levels of analysis, or disciplinary, methodological, or technological approaches;

How it will advance theory, methods, or educational approaches, or significant technological innovations;

What kinds of resources will come out of the project, and how they can benefit the research and education community at large;

And how it will contribute to development of an interdisciplinary cognitive science, neuroscience, neuroengineering, and education research workforce.

All of these are considerations you should keep in mind to determine whether or not this solicitation is right for you.

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We hope we've given you background that you can use to determine the appropriateness of this solicitation, and to prepare and submit a competitive proposal.

With that, we'll move to the question period. Thanks a lot for tuning in today.