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Topics of Interest URLs

NSF announces that a revised version of the NSF Proposal & Award Policies & Procedures Guide (PAPPG), (NSF 18-1) has been issued (effective January 29, 2018)

NSF Proposal and Award Newsletter

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New feature aims to draw journals into post-publication comments on PubPeer

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Calling on librarians to help ensure the credibility of published research results

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The Art of Translating Science

How to Talk to a Science Denier without Arguing

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Many academics are eager to publish in worthless journals

Make reviews public, says peer review expert

Sowing the Seeds of Diversity in Engineering

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Biological and Environmental Research Earth System Model Development and Analysis

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MSPnet Hub

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A Number of Proactive Policing Practices Are Successful at Reducing Crime; Insufficient Evidence on Role of Racial Bias
Beginning College Students Who Change Their Majors
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Prediction of and Resilience against Extreme Events (PREEVENTS)
NA’s Gulf Research Program Awards $10.8 Million to Address Systemic Risk in Offshore Oil and Gas
Request for Information on the Office of Disease Prevention Strategic Plan for Fiscal Years (FY) 2019-2023
Dear Colleague Letter: Rules of Life (RoL): Forecasting and Emergence in Living Systems (FELS)
Opportunities in Intense Ultrafast Lasers: Reaching for the Brightest Light
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Survey of State Government Research and Development: FY 2016
Emails shed light on controversial DOE request to remove ‘climate change’ from abstracts
ERIC Releases Revised Selection Policy
IES Accepting Proposals for Research and Development of Education Technology
IES Announces its FY 2018 SBIR Phase I Program Solicitation
Organizing the Proposal Narrative

Funding solicitations vary widely in prescribing how a project description (research narrative) must be organized. Some agencies, such as NSF, leave it largely up to proposal authors to organize the narrative, while other agencies, such as the USDoED, may require specific section headings and section subheadings. If you are new to grant writing, you may be relieved to discover that an agency has specified in detail the organization of the proposal narrative. But if you are more experienced, you may chafe at a highly prescribed narrative structure that may seem unnecessarily redundant or contrary to your preferred organization. Moreover, the prescriptiveness of a research narrative can vary within agencies, depending on program areas and/or solicitation.

This is certainly the case at NSF, where some solicitations require a specific narrative organization, while others only suggest a general organizational structure based upon how the applicant chooses to address a series of questions or topics. In still other cases, the solicitation may refer the applicant to the Grant Proposal Guide. (As noted in a companion article in this issue of the newsletter, NSF announced that a revised version of the NSF Proposal & Award Policies & Procedures Guide (PAPPG), [NSF 18-1] has been issued [effective January 29, 2018].)

The GPG does a nice job of specifying the key information that must be included in the project description, but it leaves to the author(s) of the research narrative to organize how those topics will be addressed, as noted by the following quote from the GPG:

*The Project Description must contain, as a separate section within the narrative, a section labeled "Intellectual Merit". The Project Description should provide a clear statement of the work to be undertaken and must include the objectives for the period of the proposed work and expected significance; the relationship of this work to the present state of knowledge in the field, as well as to work in progress by the PI under other support. The Project Description should outline the general plan of work, including the broad design of activities to be undertaken, and, where appropriate, provide a clear description of experimental methods and procedures. Proposers should address what they want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified. These issues apply to both the technical aspects of the proposal and the way in which the project may make broader contributions... The Project Description also must contain, as a separate section within the narrative, a section labeled "Broader Impacts". This section should provide a discussion of the broader impacts of the proposed activities.*

Less prescriptive and more open-ended agency requirements for the project description, such as the GPG quote above, may lull even some experienced authors into spending an insufficient amount of time thinking about how to structure the proposal narrative.
to optimally order sections such as the project’s vision, goals, objectives, activities, rationale, outcomes, etc.. Too often the author(s) of the project description may begin the first narrative draft with little thought to where the narrative needs to go and how it needs to get there logically and efficiently. This is most often the case with proposals that offer minimal guidance on how to organize the narrative.

The intentionally nonlinear literary device of stream of consciousness does not work for proposal writing as it does in literature. Keep in mind that one of the most famous examples of the stream of consciousness technique *Ulysses* by James Joyce—is often begun but rarely completed by readers. Reviewers and programs officers will not hesitate to set aside a disorganized and meandering proposal narrative. The bottom line here is that if the funding agency does not impose a narrative framework upon the author(s), then they must impose that framework upon themselves.

Unfortunately, a poorly organized proposal is a problem that often only reveals itself after a full first draft is finished and distributed internally for review and comment by participating colleagues and research office support staff. Revising the organizational structure of a poorly organized proposal narrative can be a frustrating, challenging, and time-consuming task. That is reason enough to take the time to think through the best narrative framework before the author(s) begin writing.

Establishing a strong proposal organization can be as simple as beginning a proposal with a section heading titled “Introduction and Overview.” This serves as a page or page and a half “mini proposal” wherein you address the core topics noted in the above GPG quote, specifically explaining, as NSF recommends, “what (you) want to do, why (you) want to do it, how (you) plan to do it, how (you) will know if (you) succeed, and what benefits could accrue if the project is successful.” This is excellent advice for any proposal in any discipline to any agency, and it has the added benefit of outlining a logical sequence to the topics addressed in the narrative that will be expanded upon in the rest of the project description.

When these generic GPG questions are not fully addressed in the proposal, or are addressed but appear out of sequence, leaving the reviewer without essential information needed to understand the project early in the narrative, then the proposal is not well organized. Getting the organizational framework right is the author’s(s) critical task and should be completed before the writing starts rather than evolving in a helter-skelter fashion as the writing progresses.

Moreover, the organizational framework is intertwined with the proposal activities and needs to be developed with that foremost in mind. For example, if you plan a road trip from Boston to San Francisco, you don’t set out merely to drive in a westerly direction. Like a cross country route that is optimized by Goggle or Apple Maps, the narrative structure must also be optimized by the authors before they begin the journey, not during or after it.

In conclusion, finding the best organizational framework for the research narrative is one of the most important tasks for the proposal author(s) after identifying and defining the “great idea” to put forward in response to the funding solicitation. Done well, the organizational framework illuminates the great idea and makes it accessible and memorable to reviewers and program officers; done poorly, the organizational framework can obscure the great idea and make it unrecognizable to reviewers.
The old political adage “follow the money” is often used in a pejorative sense as a means of finding the true motivations underlying political shenanigans. But it can also be applied, if more neutrally, by those trying to better understand the investment priorities of federal research agencies to which they are submitting proposals. As all who work in grant writing know, one of its fundamental tenets is that funding success requires an understanding of the mission and culture of the funding agency. It is just another variant of the basic grant writing advice: “know your audience and write to them,” something that would seem self evident but is often not fully followed in practice to the detriment of a proposal’s review.

When this advice is not followed it is more often due to carelessness or inexperience than to any difficulty in determining the mission and culture of the funding agency. Fortunately, the mission and culture that guide funding agency’s research investment priorities are very straightforward and easily understood, particularly as a strategic framework that helps guide the proposal authors in the writing of the research narrative so as to ensure it meets the most important objective of demonstrating to the funding agency how the proposed research brings value added benefits to the agency’s research mission priorities and advances the field in a significant way. A case in point here in terms of understanding a funding agency’s core research mission is the new 134 page report of November 15 by NSF “FY 2017 Agency Financial Report.”

The report describes how the agency’s allocation of fiscal resources, nearly $8 billion annually, is linked to its research mission priorities. The very valuable implicit information contained in this report reveals the characteristics that represent agency proposals that have successfully aligned the proposed research and narrative description with NSF’s research priorities.

We are told clearly and repeatedly in the report, for example, that to be successfully funded at NSF the proposed “research must align with the agency’s investment in high-risk, foundational research key to staying on the cutting edge of science and technology.” While casual readers may read this NSF statement without giving it sufficient attention, they do so at the peril of their proposal. Implicit in this statement in the report is that funding success at NSF depends on the authors describing specifically why their research is “foundational” to the field and how the proposed research is at “the cutting edge” of the field.

Of course, making this claim places an additional burden on the proposal authors who must be able to place their research in the current state of the field and the specific context of the proposed research. This requirement calls upon a member of the research team to be informed beyond a narrow disciplinary context to convey this broad awareness in a convincing way. The bottom line here is that readers of this report must first glean from it what is required in the research narrative to clearly align it with NSF’s overarching research objectives, and second, must then apply those global agency goals to the writing of a specific project description informed by a full understanding of how seriously NSF expects its governing principles to be applied at the level of individual funding solicitations.
This report is replete with an intermingling of NSF fiscal allocations for priority research directions. Further, these directions are mapped to governing principles related to a focus on basic and transformative research that will advance scientific frontiers and reflect national priorities, and consequently keep U.S. researchers and research institutions at the forefront of innovation globally.

Another of many key takeaways in this report is NSF’s decision to focus its investments and awards “where scientific disciplines converge, which reflects the blending of scientific disciplines and engagement of creative partnerships to address complex problems.” It would be easy for the causal reader to skim over this language in the report as blue-sky visioning with no requirement to map this vision to his or her individual proposal narrative. That would be a mistake. Moreover, the report notes in the context of programmatic budget allocations within the agency that NSF “funded research pushes the boundaries of innovation and productivity, sometimes leading to new fields of scientific inquiry and new theoretical paradigms.”

The wise reader of this fiscal report will think hard about what NSF is communicating here with respect to its expectations for proposed research proposed and how that research is discussed in the research narrative. It is important to understand that a specific proposal to a specific funding solicitation at NSF is governed by a more global set of research values that will play a determinate role in whether or not research is funded.

As the above language in the report makes clear, NSF is dramatically accelerating its support of research “where scientific disciplines converge.” Do not read this as a typical PR statement put out by a communications office; instead, take it as language that will affect your research success in significant ways during the review process. Moreover, think about what is implied by this explicit statement. For example, implicit in the statement of awards made “where scientific disciplines converge” is that it presupposes an interdisciplinary research team in a field of national importance that can make legitimate claims that the research pushes the boundaries of innovation and productivity that may lead to new fields of inquiry and new theoretical paradigms. Again, this is not a trivial expectation and it is one that poses a major challenge to the proposal authors to communicate that the proposed research aligns with the global vision of NSF and also maps to the very specific vision, goals, and objectives of a specific solicitation.

Where there may be much in this 134-page fiscal report that is not of interest to anyone in particular, specific parts of it will be of acute interest to everyone. Most importantly, this report will give researchers a deeper understanding of how NSF assigns internal budget allocations to prioritized areas of research focus. It also reveals the expectations guiding funding decisions from the global to the individual level.

Realistically, those who may benefit most from reading this report likely will not. This means that it will fall to research offices to familiarize themselves with this report and use that knowledge to assist faculty in writing more competitive research proposals to NSF. A solid understanding of the mission and culture of that agency and its governing research principles is a major factor in deciding who will and who will not be funded. This report reveals the agency expectations underlying how that funding decision is made.
“Generic Gems” from NSF Civil Infrastructure Webinar

Last September 29, NSF announced the following information in a Dear Colleague Letter: Announcing Creation of the Engineering for Civil Infrastructure (ECI) Program, which is Replacing the Engineering for Natural Hazard (ENH), Geotechnical Engineering and Materials (GEM), and Structural and Architectural Engineering and Materials (SAEM) Programs: “The Division of Civil, Mechanical and Manufacturing Innovation (CMMI) within the National Science Foundation's Directorate for Engineering, announces creation of the Engineering for Civil Infrastructure (ECI) program. The ECI program represents a new and integrated vision for fundamental research to underpin transformative innovations for the built environment that are resilient, economical, and adaptable to enhance national prosperity and societal benefits. In support of this vision, the ECI program replaces the Engineering for Natural Hazard (ENH), Geotechnical Engineering and Materials (GEM), and Structural and Architectural Engineering and Materials (SAEM) programs. ECI will also support research in construction engineering that is compatible with this vision.”

On December 6, NSF offered the Engineering for Civil Infrastructure Webinar to provide an overview presentation and answers to questions on the new National Science Foundation (NSF) program entitled “Engineering for Civil Infrastructure (ECI),” (NSF 17-073Y). The ECI program is a core research program (see CMMI core programs) within NSF’s Directorate for Engineering, Division of Civil, Mechanical and Manufacturing Innovation (CMMI). The webinar also addressed the NSF program, Leading Engineering for America's Prosperity, Health, and Infrastructure (LEAP HI). LEAP HI proposals confront engineering problems that are too complex to yield to the efforts of a single investigator — problems that require sustained and coordinated effort from interdisciplinary research teams, with goals that are not achievable through a series of smaller, short-term projects.

Within this context, the Webinar addresses the December 4 Dear Colleague Letter: ENG/CMMI Call for NSF Big Ideas Proposals. This Big Ideas DCL is complemented by another recent DCL: On April 3, 2017, the National Science Foundation issued the Dear Colleague Letter (DCL): Growing Convergence Research at NSF to catalyze new research directions and advance scientific discovery and innovation across the 10 Big Ideas for Future NSF Investments. It is important to note NSF’s following advice: “Proposals may be submitted to CMMI core programs during the CMMI unsolicited proposal submission windows. Principal investigators are strongly encouraged to contact their program director(s) before proposal preparation and submission to determine if their research topic falls within the scope of the program. In the proposal, principal investigators should indicate the relevance of their proposed research to any of the Big Ideas identified in both the overview statement in the Project Summary and the Project Description.”

All of which gets us to the generic value of the webinar. While specific to Leap HI, program officers use the webinar to make several key observations that should be taken to heart by anyone writing a proposal to NSF. They specifically encourage investigators to include in the project description (1) a Research Integration Plan; (2) a Leadership and Management
Plan, particularly as it reflects the Research Integration Plan; and (3) on larger multidisciplinary projects, a statement of project goals **not achievable through a series of smaller, shorter-term research projects**.

Apart from LEAP HI, the absence of a strong research integration plan and the failure to link the management plan to the research integration plan are two of the more common failings of proposals declined for funding by NSF. Too often, so-called management plans fail to give reviewers insight into how the project will be managed to achieve its proposed goals and outcomes; instead, they merely list the names of the project leadership team and the roles they will play, with no further explanation than if the management plan were nothing more than a directory of participants. It cannot be emphasized enough how important the linkage must be between the research integration plan and the management of that plan.

Of course, the most common mistake proposals make when it comes to the research integration plan is to fail to have one. A collection of siloed research descriptions does not qualify in any way as a research integration plan. Moreover, a research integration plan must evolve with the planning and writing of the proposal itself and not be added at the last minute prior to submittal. Preparing the research integration plan is one of the more critical topics the research team must address in all phases of developing a successful project description. NSF program officers repeatedly emphasize this point in the webinar. Research offices can offer this invaluable advice to faculty pursuing funding from any federal funding agency, not just NSF. Integration is as crucial to a research narrative as it is to the mathematical training engineers and scientists receive in integral calculus.

Two other important generic points emerge in the webinar’s general discussion:

1. **It can be of value to submit a one- or two-page research technical abstract to a program officer for discussion prior to submitting a proposal, particularly addressing the place of the research in the current state of the field, research challenges addressed, clear identification of the critical gaps in current understanding of the field, explanation of the scientific basis for the proposed research that builds on a current understanding and highlights the novelty and promise of the proposed methods for bridging current knowledge gaps, and the proposed research approach and methodology;**

2. **Addressing broader impacts does not always mean you must propose an educational or outreach program. More typically, it means that the statement of broader impacts should fit the context of the proposed research. And so, in the case of the LEAP HI program, broader impacts could be economic, environmental, habitat comfort, or societal benefits in terms of resource and energy efficiency, life cycle, adaptability, resilience, etc.**

In conclusion, this webinar specific to Engineering for Civil Infrastructure is another demonstration that much in successful grant writing is generic rather than specific by agency and program. The “Generic Gems” in NSF webinars, or any federal agency webinar for that matter, are very instructive, particularly to research offices that can incorporate them into their “corporate knowledge base” and offer them to faculty who are often too rushed and over committed to search for this kind of information.
NSF’s new version of their Proposal & Award Policies & Procedures Guide (PAPPG) will take effect for proposals submitted on or after January 29, 2018. For those who are not familiar with the PAPPG, it’s the default “instruction manual” for NSF proposals. When you are working on a proposal to a core program (also called an “unsolicited” or “investigator-initiated” proposal), you’ll go to the PAPPG for information on the number of pages allowed, the font size, the components required, etc. The same holds true when responding to a solicitation except in cases where the solicitation includes instructions that conflict with the PAPPG; in those cases, the solicitation instructions take precedence. Some of these changes are discussed below.

**New Intellectual Merit Section in the Project Description**

The biggest change in the new PAPPG is that a separate, labeled Intellectual Merit section is now required in the Project Description. This has been the case for Broader Impacts for a number of years, and when that change was made, many PIs had their proposals returned without review for not following those instructions. Don’t let this happen to you with the new Intellectual Merit requirement!

In the new PAPPG, the discussion of this requirement is a bit confusing. They state in Section II.C.2.d (i) that “The Project Description must contain, as a separate section within the narrative, a section labeled "Intellectual Merit" and then go on to describe what needs to be included in the 15-page Project Description (objectives, relationship of the work to the state of the knowledge, work in progress, etc.) rather than what needs to be included specifically in the Intellectual Merit section within the Project Description. For that reason, you may need to reassure your PIs that they don’t need to somehow cram all of the contents of the Project Description into the Intellectual Merit section. Instead, refer to NSF’s description of Intellectual Merit elsewhere when deciding what needs to be included.

To understand what NSF means when they say “Intellectual Merit,” go to Section III.A.2 in the PAPPG, where they define Intellectual Merit as encompassing “the potential to advance knowledge” in terms of five elements:

1. The potential of the proposed activities to advance knowledge and understanding both within its own field and across different fields
2. The extent to which the activities suggest and explore creative, original, or potentially transformative concepts
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?
Clearly, the PI will need the entire 15 pages of the Project Description to address all of these elements adequately, but the Intellectual Merit section is a great place to summarize the most important points. If we were thinking about the proposal as if the PI were a lawyer addressing a jury, this is where the PI will make their opening arguments (i.e., summarize the case they plan to make), and the rest of the proposal is where they will present the evidence that convinces the jury. Often, one of the best ways to clearly articulate the new knowledge that will result from the proposed project is to state the research questions that will be answered or the hypotheses that will be tested. The PI should also remember that any important qualifications or resources should also be mentioned here such as key preliminary data or prior work, publications by the PI or team in prestigious journals related to the research topics, or key collaborations that will help the project be successful.

The PI should keep in mind that this section is a great opportunity to concisely summarize the main arguments for intellectual merit in a way that can easily be absorbed by the reviewer (and often copied into the review sheet) at 2 am. For this reason, the Intellectual Merit section shouldn’t be several pages long (or merely a new name for the Research Plan or Methodology section)—it should be a synthesis of the important ideas of the proposal, provided by the PI so that the reviewers don’t have to synthesize those ideas on their own. Moreover, this section should not just be a repetition of the Intellectual Merit section in the Project Summary. While the main points will be the same, the PI has the freedom to write a more compelling Intellectual Merit section in the Project Description since constraints related to space and lack of formatting won’t apply.

Other PAPPG Changes
Other significant changes include:

- The Budget Justification can now be up to 5 pages long (up from the previous 3-page limit).
- **Collaborators & Other Affiliations Information** must be entered using a standard [NSF COA template](an Excel file). This change was made last spring, but it’s now included in the PAPPG.
- The description of those who must describe **Results from Prior NSF Support** was clarified to state that any PI or co-PI on the proposal who received prior NSF support with: 1) an award with an end date in the past 5 years; or 2) any current funding, including any no cost extensions. This is in contrast to the previous PAPPG, which stated Prior NSF Support must be described by “any PI or co-PI identified on the proposal [who] has received NSF support with a start date in the past five years (including any current funding and no cost extensions).

The full list of significant changes and clarifications can be found in the [first section of the PAPPG](first section of the PAPPG).
Why International Collaboration?

Research collaborations at U.S. universities have progressed from collaborations within one’s own institution, to regional, to national, and now to international collaborations. Why is this occurring? Primarily, it is because the questions of interest to science and engineering are global, interdisciplinary by nature and require scalable international partnerships for success. Another major factor is that global R&D spending doubled from 1990-2000 (NSF, NCSES), and this trend continues apace. Internationalization of research is also rapidly progressing due to increasing graduate student and faculty mobility, accompanied by advanced information and communications technologies, which make collaboration easier.

More sources of funding are out there, and many international funders welcome collaborations with researchers from the United States. Funders located in other parts of the world have different languages, cultures, and research funding environments in operation. This fact presents challenges, not only for faculty and students who are interested in international collaboration, but also for U.S.-centric research development and research support infrastructures at U.S. universities. International grants are riskier, and there are more potential problems both in the formulation of the proposal, as well as in the context (i.e., across-cultural and language barriers outside the United States) in which the research projects are implemented.

What Are International Funders Looking For?

So, how can a faculty member take advantage of the increased funding available and be competitive in the global arena?

First and foremost, the PI needs to consider Intellectual Merit and Broader Impacts (IM/BI) questions, just as s/he would in the domestic context. Is the research novel? Does it address a gap in the literature or unaddressed need? Does the team have the capacity to carry out the grant if awarded?

The IM/BI question is more or less the same in the global context, with several key exceptions. First, the project’s references to the literature could be very different if peer-reviewed articles were originally published in Chinese or Spanish or German, for example. Will the review committee be familiar with and have confidence in the research cited? Second, IM is also subject to the conventions of the review process. In other words, the PI must be aware of review conventions that are impacted by the mix of academic (disciplinary) and national cultures. Ideas about intellectual leadership may need to be tweaked. For example, in certain contexts, it’s rare for a junior faculty member to be listed as PI over a more senior researcher. In another example, there may be a reluctance to “accept” literature from research produced in other countries if it is not seen as “relevant”.

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By Rick Nader
ARFS Consultant specializing in international collaboration, foundations and international research collaboration.
Second, the PI may have to go beyond “standard” assurances of capability if operating internationally. When I was a rotator at the National Science Foundation’s Office of International Science and Engineering, I remember reviewing technically excellent proposals that didn’t adequately address cultural and language preparation (especially for students). This has implications for the success of the research if left unaddressed. Proposals that failed to take into consideration key regulations (abroad) on conducting field research in certain regions, became omissions that derailed the project’s success and also put the trust between partners in peril.

Most international funders don’t overtly require Broader Impacts, but PIs need to fully understand the international funders’ expectations, and where BI equivalents are in play, be sure to address these in ways that the foreign funding agency (to NSF in this case) expects these to be addressed.

Beyond IM/BI considerations, to be successful internationally, it’s important to look at the proposal/project in terms of three factors: its alignment, funding potential, and partner attributes. We’ll walk through each factor below.

**ALIGNMENT** – Will the PI’s research align with the internal and external environment?

**Internally**, will the research line up with college, department, or strategic plans for research? Why is this dimension a consideration? Because, inevitably, international projects may be riskier, take more time and generally be more difficult to accomplish. Therefore, it will be important for the PI to consider how s/he will answer the question “Why is this mathematics research project important to do,” for example, “in Bangkok as opposed to right here at home in Boston?” and is mathematics research a departmental priority if not in the U.S. context?

**Externally**, the project’s alignment in the international affairs environment might need to be considered in light of *foreseeable* disruptive situations in the partner country. I recall a case where a research project was going well until the Russians invaded South Ossetia, as part of the Republic of Georgia’s ongoing territorial dispute. Usually, PIs with deep experience in these countries can somewhat mitigate this threat to the accomplishment of the research, but this can be a bigger problem for less informed PIs or student researchers without international affairs knowledge, and it can certainly be challenging for universities without robust risk management plans.

**FUNDING** – Will the research project lead to or leverage additional funding (U.S./global)?

When a PI considers the funding environment in the United States, there is a fairly predictable (or discoverable) “set” of potential funders (public and private), depending on the nature of the research and how the research questions are posed. There is also an easily discoverable pathway or process for continued and future funding in the wheelhouse of most research development or PI skillsets. This predictability becomes more complex and less assured in the global context. What does the PI really understand about sustainability and continued funding, or even complementary funding sources with which to match or leverage, let’s say *Horizon 2020*, for example. It will be important for PIs to accurately interpret the international funder’s depth and breadth of funding opportunities over longer time horizons, and to understand corresponding future funding mechanisms in different country contexts, including the United States. If the international funding agency is new to a particular country, as was, for example, the National Natural Science Foundation in China 20 years ago, it’s likely to
draw on the experiences of established funding agencies such as the U.S. NSF, as it did. However, PI’s should not assume that modelling and replicating are the same. The NNSFC is not an NSF “in China”; rather, it’s an NSF with Chinese characteristics (no social or political science RFPs, for example).

**PARTNER Attributes** – Will the PI be able to demonstrate mutual intellectual contribution, unique positioning, and satisfactory research infrastructure for the partner?

Another consideration in order to be competitive for international external funds includes being able to describe why this international partner is uniquely or convincingly the best partner for this research, and perhaps increasingly, why the U.S. partner is. We know that U.S. funders often first ask the question, why couldn’t this research just as easily be done in Milwaukee as opposed Milan. While more international funders have great faith and confidence in the U.S. system, it’s still important for PIs who are operating abroad to convince international partners and funders that a strong international research support infrastructure is reciprocally available at the U.S. institution. A convincing case needs to be made that all of the research partners are fully capable of implementing their specific global research tasks, at the same time being uniquely qualified to fulfill these complementary roles.

In summary, U.S. PIs may increasingly need to demonstrate their research project’s alignment, long-term funding potential and their own and their partner’s capabilities to carry out the research to maximize your research project’s competitiveness.

Next month, we’ll describe and refer readers to two National Academy of Science reports published in recent years outlining critical considerations which, if not accounted for, could negatively impact the success of international research funding.

**Note:** The author, Rick Nader, has recently joined Academic Research Funding Strategies as a consultant. He provides assistance with strategic planning, proposals, and training for universities related to international collaboration, as well pursuing funding from private foundations, NSF, the US State Department, and USAID. Dr. Nader previously served as Senior International Officer while at Texas A&M University, University of North Texas and Mississippi State University, and served as a program manager at the Office of International Science and Engineering at the National Science Foundation. Please find more information about Rick at our About Us page.
The best strategy to avoid the common mistakes made in writing the research narrative is to correct them before you make them by anticipation and avoidance. At the least, it is helpful to start the process of writing the research narrative with a list of the characteristics of the poorly written research narrative and a list of the characteristics of the well written research narrative in mind. Moreover, if you learn by your mistakes as well as the mistakes of others, this list should grow and mature over time to become a very robust aggregate of what to do and what not to do in writing a research narrative. Of course, it is always preferred that you learn from the mistakes others have made in writing unsuccessful proposals, thereby avoiding reinventing the flat tire. Unfortunately, too many of us are experiential learners, a characterization familiar to anyone with teenage children, and seem destined to learn only from our own mistakes, but not those of others who offer us warnings that go unheeded.

Of course, a key preliminary step in this process is to avoid organizational mistakes in the research narrative from the get go, particularly as they relate to writing a research narrative that fails to respond fully to the funding solicitation. The most common unresponsive narratives are those that do not fully address the questions asked by the sponsor in the solicitation, or, too often, inexplicably answer questions that were not asked by the sponsor and have little or no relevance to the research goals and objectives detailed in the solicitation.

A good first step to ensure you write a well organized, fully responsive research narrative is to use the funding solicitation as a template to create the first draft of the proposal, thereby addressing the project goals and objectives, review criteria, and other referenced documents in the order and with the thoroughness expected by the sponsor. This initial template serves as the checklist ensuring that every question asked by the sponsor is fully addressed in the project narrative and in the order and context in which it was asked. This is particularly important because poorly structured and poorly organized narratives are excruciatingly difficult to correct.

Keep in mind that a well organized narrative is also a proportionally organized narrative. Proportionality brings balance to the project narrative in a way that establishes the relative importance, or the weighted relevance, of the topics you choose to address in explaining your research. For example, if buffers are not important to the research, don’t belabor buffers. Proportionally allocate narrative space within the page limit of the proposal in a way that best reflects a hierarchical ordering of the importance of what you most need to communicate about the significance of your proposed research. A similar proportionality should be achieved between what is described in the research narrative and what is requested in the budget.

Another important preliminary step prior to writing is to clearly understand your audience and write a narrative accessible to that audience. Most likely your audience will be agency program officers and reviewers. Therefore, in characterizing your audience it is important to understand the review process itself and thereby gain insight into the likely composition of the review panel and the expertise each member of the panel brings to the
review of your proposal. For example, is the review panel comprised of technical experts in a narrow field, or is it a more multidisciplinary panel required for cross disciplinary research, or does the panel include experts from outside the field that bring a broader perspective to judging the value of the research. Also, keep in mind that for larger research projects, a more diverse review panel may be required to address the multidisciplinary nature of the proposed research. Regardless, always write with a target audience in mind. In most cases the audience to have in mind is a “generic reviewer” who is scientifically literate but not an expert in the field.

With this in mind, consider prior to writing some of the common mistakes made in drafting the research narrative. It will benefit you to keep these in mind prior to writing rather than after the narrative has been completed:

- As you write, translate disciplinary jargon into plain English. Understanding your proposed research should not require members of the review panel to possess a Captain Midnight Secret Decoder Ring to make your narrative accessible to them.
- Get to the point of your research quickly in the narrative, preferably in the first paragraph or certainly on the first page, if the agency format allows it. Don’t bog down the narrative and the reviewers by writing a background section that reads like a long-winded history of the discipline starting with ancient Greek metaphysicians and plodding along century by century until, finally, you explain how this background culminates in your proposed research project.
- Keep in mind that successful proposals quickly answer some basic questions that are always asked by program officers and reviewers. Can you answer these questions about your proposed research in a clear and simple narrative style that explains your:
  o Research goals and objectives
  o Research plan
  o Significance of the research
  o Value-added benefits of the research and impact on an agency mission or a research field
  o Prior results/preliminary data that validate your capacity to perform
  o Barriers and challenges to achieving results and your plan for overcoming them
  o Payoffs from your success (answering the so-called “So What/Who Cares?” question).
- While writing in a clear and simple narrative style is difficult for even the most experienced writers, and typically requires multiple draft iterations to get it right, there are some common elements of the well-written narrative that must be kept in mind before, during, and after you write a first draft, for example:
  o Write sentences that channel Ernest Hemingway, not William Faulkner. Rhetoricians refer to Hemingway’s style or technique as paraxis, but in keeping with the advice in this article, “paraxis” is merely jargon for writing short, concise sentences, as opposed to Faulkner’s very long sentences that are meant to convey a hierarchy of dependent meanings, what rhetoricians might refer to as hypotactic polysyndeton. If you were explaining this in a proposal, in keeping with the spirit of this article, you would skip the jargon and simply state “Hemingway writes short sentences and Faulkner writes long sentences.” The
meaning is the same, but the jargon-free version makes the statement accessible to everyone. So how long a sentence should you write, you may ask? Einstein once said that “everything should be made as simple as possible, but not simpler.” The same might be said of sentence length in a proposal. It should be as long as required to communicate the key information, but no longer. For example, if your sentences are becoming overgrown with commas, semi-colons, coordinating conjunctions (e.g., and, but, for, or, etc.), and embedded and transitional phrases, somewhat like kudzu along Interstate 20 in Alabama and Georgia, it is time to break the long sentence up into shorter ones, no matter how proud you are of crafting it. Sentences in the range of 12 to 25 words are nicely succinct. If your sentence gets up to 35 to 40 words, it deserves a yellow caution light and an automatic review to find ways to shorten it. If your sentence word count gets in the range of 50, 60 or more words, that is a full red alert requiring the mandatory use of two or more periods ruthlessly applied! Overly long sentences choke the reader. Think of it like eating a navel orange—it is always best eaten in the sections nature intended rather than swallowed whole. Most importantly, excessively long sentences are not memorable to reviewers because they contain too many moving parts. Of course, a too long series of sentences may be memorable to the reviewers as the point in the proposal where they all became totally confused and exasperated with the author.

- **Specifics are good and generalities are bad.** Specifics serve both to test and prove the value of your ideas, and when they are lacking, it tells a reviewer that your ideas may also be lacking, or have yet to become fully developed. Stating a research goal, for example, without offering a specific research plan to transition the goal to an outcome, will leave the reviewers without the sufficient detail needed to judge the merits of your proposal. Generalities appear as glaring flaws to readers and reviewers alike, especially those searching for the specificity needed to make an informed critical judgment on the project’s merit. A narrative laced with generalities leaves the reader uncertain about what the proposer actually plans to do—the reviewers’ equivalent of the “where’s the beef?” question. In effect, generalities represent an implied promise to accomplish something important if funded, but leave the actual performance details vague.

- **Superlatives are adjectives on steroids and must be stricken from the narrative.** Clarity and the lack of ambiguity are two of the most important characteristics of the successful proposal. Clarity is grounded on simplicity, detail, and specificity. Superlatives, on the other hand, are inherently ambiguous, substituting an amplified emotional appeal for specificity and detail. It may well be that your research is transformative, but a cascade of superlatives characterizing your research should originate from the reviewers rather than from you.

- **The antidote for generalities and superlatives is to quantify your research narrative.** Numbers matter. Numbers are the basis of comparative claims that inform program officers and reviewers alike and allow them to better judge the relative worthiness of your proposal. The old adage about a picture being worth a thousand words applies to the judicious use of quantitative information or data in the project narrative. You don’t
want to overwhelm reviewers with a cascade of quantitative information, **but neither do you want to leave them frustrated by its absence.** In this regard, too much quantification can be as problematic as too little. So it is important to be mindful of reviewers’ reluctance to sift through extensive quantitative data to determine the merit of your proposed project. That is not their job. It is the job of the author, however, to explain the significance of any data used in a narrative in the most economical way possible. Proposals are about ideas, and data need to be judiciously selected to support the merit of the ideas described in the narrative. **But data in and of themselves are not ideas.** Rather, your narrative needs to explain and illuminate the significant patterns in the data you present rather than pass that task onto reviewers.

- **Ambiguity introduces significant uncertainty into the research narrative,** although ambiguity in the narrative does offer one certainty—**an unfunded proposal.** This is because **ambiguity in the project description imposes unwanted riddles** on program officers and reviewers alike. Ambiguity originates from many sources, including ambiguous solicitations and researchers’ ambiguous readings and understandings of a well-crafted solicitation, the latter being the most common source. Ambiguity may also originate at the interface between the agency’s research vision, goals, and objectives and your research expertise and research interests. Ambiguity may arise when your research expertise does not map well to the agency mission priorities, or when you try to force fit your research expertise and interests to an agency solicitation, or when you ignore the agency research interests and put yours forward in hopes the program officers and reviewers won’t notice the mismatch. **In the end, the cure for ambiguity lies in writing multiple drafts of a narrative,** taking care that each iteration of the proposal improves its clarity.

- **Use visuals to clarify and integrate the research narrative.** Just as the Feynman diagrams brought clarity to understanding the interactions of subatomic particles, on a less grand scale, diagrams, graphics, figures, tables, pictorial representations, and other visuals can play a key role as an integrator of the research narrative. This holds true particularly in the case of complex project descriptions whose narratives describe interaction among multiple research strands. The graphical representation of a research vision, or diagrams showing how the component goals and objectives of a large project interact to form a coherent, synergized whole, **can make the proposal narrative less challenging both to write and to read.** In fact, graphical representations of the main ideas of a proposal discussed and developed concurrently with the drafting of narrative text, can help the members of the research team write their contributions to the overall narrative with more clarity and focus than might otherwise be possible. The end goal, of course, is to achieve a project description that integrates narrative graphics and narrative text so closely as to make both easily accessible to review panels and program officers, especially in those cases where complex interactions among various research strands must be accessible and memorable. Good ideas deserve and benefit enormously from the illuminating interplay between well-crafted narrative text and accompanying graphics.
Research Development & Grant Writing News

Research Grant Writing Web Resources
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**NSF PAPPG Update Webinar**
The National Science Foundation (NSF) is pleased to announce that it will offer an **NSF Proposal & Award Policies & Procedures Guide (PAPPG) Update Webinar** for the research community on **Friday, December 8th, 2017 from 2 – 3:15 pm EST**. The PAPPG details NSF’s proposal preparation and submission guidelines, and provides guidance on managing and monitoring the award and administration of grants and cooperative agreements made by the Foundation. The webinar will provide an overview of significant changes and clarifications to the PAPPG that will take effect on **January 29, 2018**. [Click here to view the presentation from webcast.](#)

**Be Careful to Pick the Right Funding Opportunity Announcement (FOA)**
Recent policy changes requiring clinical trial applications to be submitted to FOAs that specifically allow clinical trials, first announced in fall of 2016, impact how all NIH applicants choose a FOA, whether you are submitting a clinical trial or not.

Over the last year, each NIH Institute and Center has been carefully evaluating its research funding priorities and strategic goals and using that information to articulate their funding priorities for clinical trials. They are communicating their priorities through the funding opportunity announcements they issue.

The requirement to respond to clinical trial specific FOAs begins for applications submitted for due dates on or after January 25, 2018. NIH is reissuing any FOA that will accept clinical trial applications after that date. Many of these FOAs have already been issued, others will be published at least 60 days before the first due date for which they will accept applications. How can you tell which FOAs will allow clinical trials? Reissued clinical trial FOAs make clinical trial allowability clear in both the title and in section 2, and they include clinical trial review criteria.

Responding to the correct type of FOA ensures that you know what information you are expected to include in your application and that you can develop an application that is responsive to the review criteria. It also ensures that reviewers apply the correct criteria and give your application the best review possible.

Before beginning your search for an FOA, if you are doing human subject research you should use our [clinical trial tool](#) to determine whether NIH considers any of your studies a clinical trial.

If any study (or component) of your application meets the NIH definition of a clinical trial (even if your application includes other studies that are not clinical trials), you must respond to a FOA that allows for clinical trials.

If none of your specific aims include studies that meet the NIH definition of a clinical trial, be sure to respond to an FOA that does not require clinical trials. Check section II of the FOA; there will be a row entitled “Clinical Trial?” that should say either “Clinical trials not allowed” or “Clinical trials optional”.

[Click here to view the presentation from webcast.](#)
IES Accepting Proposals for Research and Development of Education Technology

Indicators for Monitoring Undergraduate STEM Education

Factors That Predict Postsecondary STEM Success for Hispanic Students
This study sought to identify factors that predict positive STEM-related postsecondary outcomes for students in Texas, and to determine whether the association between predictive factors and outcomes differs between Hispanic and non-Hispanic White students. The research team linked K–12 student academic data to college enrollment data for Texas public high school students who enrolled in colleges and universities in Texas during a period from the 2004/05 to the 2010/11 school years (seven cohorts). Regression models examined relationships between possible indicators (e.g., number and level of math or science classes completed) with the outcomes of interest (declaring a STEM major, persisting in a STEM major, and completing a STEM degree), while controlling for nonmalleable student and school factors as well as for cohort fixed effects. Interaction terms added to the models provided a separate estimate, for Hispanic, Black, non-Hispanic White, and Other ethnicity students, of the association of each indicator with each postsecondary outcome. Measures of academic experiences and performance in math and science during high school were strongly associated with postsecondary STEM outcomes. These associations were generally consistent for Hispanic and non-Hispanic White students. Statistically significant indicators of positive postsecondary STEM outcomes included number of math and science courses completed, number of Advanced Placement courses taken, highest-level math or science course taken, and state assessment scores. This study demonstrates that Hispanic students reap the same benefits of taking higher-level math and science courses in high school as do non-Hispanic White students. Future studies should consider possible factors influencing the academic experiences of Hispanic students in high school science and math, such as access to rigorous courses.

Collaborative Problem Solving Skills of U.S. 15-year-olds and Their International Peers
The focus of this Data Point is on the performance of students in the United States relative to their peers in 50 other education systems that participated in the PISA collaborative problem solving assessment in 2015. The PISA assessment of collaborative problem solving measured students’ ability to solve a problem by sharing the understanding and effort required to come to a solution, and pooling their knowledge, skills, and effort to reach that solution. Readers interested in more detailed data related to collaborative problem solving should also visit the NCES PISA website for data tables and figures.

Advanced STEM Course Opportunities and Course Completion Across Texas
The purpose of this study was to explore advanced STEM course offerings in Texas high schools and advanced STEM course taking among high school students to investigate variation in availability and enrollment for different school contexts and student groups. Using statewide
Longitudinal student records from 2007/08 to 2013/14 the research team examined patterns of course offerings using descriptive statistics from more than 1,500 public high schools in Texas, and student course completion patterns for close to one million students. Analyses revealed that access to advanced STEM courses in Texas has increased over this time period for schools in all locales, for schools with high and low proportions of economically disadvantaged students, and for schools with high proportions of minority students. High schools in urban and suburban areas and schools serving the highest proportions of Black and Hispanic students offered the greatest number of advanced STEM courses. In fact, a larger proportion of Hispanic and Black students in the state attended schools with the highest number of advanced STEM course offerings, compared to White students. However, despite this access to advanced STEM coursework, smaller proportions of Hispanic and Black students completed three or more advanced STEM courses than their White counterparts, even among a subgroup of high performing students based on math state standardized test scores in 8th grade. The findings from this study show that while Hispanic and Black students do lag White students in advanced STEM course completion, it is likely not because of lesser access to these courses. These findings point to a need for increasing Hispanic and Black student enrollment in those advanced courses and identifying mechanisms other than increasing course offerings to do so.
Retirement Countdown for Grants.gov Legacy Downloadable Forms
On December 31, 2017 Grants.gov will no longer allow applicants to download an entire application form package as a single PDF for offline data entry and later submission. For the 80% of NIH applicants that used ASSIST or institutional system-to-system solutions in FY2017, this change will have little impact. Die-hard downloadable forms users, however, need to switch to another submission option quickly.

Consult with your Office of Sponsored Research or whoever is in charge of submitting grants for your organization to determine which of the remaining options (ASSIST, institutional system-to-system solutions, or Grants.gov Workspace) is the best fit.

Our Submission Options page can help you compare features and considerations for each choice. If there is no business reason to choose one option over another, give NIH’s ASSIST a try. It’s a user-friendly, online solution optimized for NIH applications.

OPEN 2018 Webpage: https://arpa-e.energy.gov/open2018

This FOA marks the fourth OPEN solicitation in the history of ARPA-E. The previous OPEN solicitations were conducted at the inception of the agency in 2009 and again in 2012 and 2015. OPEN 2018 therefore continues the three-year periodic cycle for ARPA-E OPEN solicitations. An OPEN solicitation provides a vitally important mechanism for the support of innovative energy R&D that complements the other primary mechanism, which is through the solicitation of research projects in focused technology programs.

ARPA-E’s focused programs target specific areas of technology that the agency has identified, through extensive interaction with the appropriate external stakeholders, as having significant potential impact on one or more of the Mission Areas described in Section I.A of the FOA. Awards made in response to the solicitation for focused programs support the aggressive technical targets established in that solicitation. Taken in total, ARPA-E’s focused technology programs cover a significant portion of the spectrum of energy technologies and applications. ARPA-E’s OPEN FOAs ensure that the agency does not miss opportunities to support innovative energy R&D that falls outside of the topics of the focused technology programs or that develop after focused solicitations have closed. OPEN FOAs provide the agency with a remarkable sampling of new and emerging opportunities across the complete spectrum of energy applications and allow the agency to “take the pulse” of the energy R&D community. OPEN FOAs have been and will continue to be the perfect complement to the agency’s focused technology programs – a unique combination of approaches for supporting the most innovative and current energy technology R&D. Indeed, one third of the sixty projects featured in the first two volumes describing ARPA-E impacts stem from OPEN solicitations (https://arpa-e.energy.gov/?q=site-page/arpa-e-impact). Potential applicants to this FOA are strongly encouraged to examine the OPEN projects in these two volumes and all of the projects supported in the previous three OPEN solicitations (https://arpa-e.energy.gov/?q=site-page/open) for examples of the creative and innovative R&D ARPA-E seeks in its OPEN solicitations.
Dear Colleague Letter: Rules of Life (RoL): Forecasting and Emergence in Living Systems (FELS)

NSF seeks to highlight the importance of research that forecasts the direction and dynamics of change in living systems. The robustness and reproducibility of processes associated with the emergence of complex properties in biological systems suggests the existence of underlying general principles ("rules") across the spectrum of biological phenomena. Identification and application of these fundamental rules would be of high value to both the scientific community and the Nation. This Dear Colleague Letter (DCL) describes an initial opportunity to identify areas where such rules may exist, to catalyze approaches toward their discovery, and to focus efforts on using these rules for prediction and design of useful biological systems. Activities supported via this DCL include Conferences, EARly-concept Grants for Exploratory Research (EAGERs), and Research Advanced by Interdisciplinary Science and Engineering (RAISE) grants to create opportunities for enabling predictive capability.

Proposals funded via this DCL will help refine emerging research areas under the Rules of Life, one of the NSF’s ten Big Ideas. In Rules of Life, "rules" are the general principles or theoretical constructs that explain and predict the characteristics of living systems. NSF seeks to identify rules for phenomena that cross spatial or organizational levels (from the molecular and sub-cellular to organisms, populations, communities, clades, and biomes) and/or temporal scales (e.g., from macromolecular folding to development to evolutionary processes across all of life).

Research activities under Rules of Life should lead to new and predictive understanding of how higher-order structures and functions result from the interactions of heterogeneous biological components with the environments in which they are found, and the associated evolutionary changes. These activities should bring together diverse teams of scientists to create novel framings and solutions for research problems. Currently, we are unable to predict the outcomes of many biological processes in spite of the fact that organisms occupy only a small portion of the potential phenotypic landscape. Although we have accumulated massive amounts of genomic and environmental data, we cannot synthesize a cell from its fundamental building blocks. Similarly, we do not understand the basic rules that underlie the emergence of multicellular structures, the regulation of circadian and seasonal rhythms, or how to re-engineer sustainable and resilient biological systems at any scale. Further, there are open scientific questions about the role of social interactions and experiences in reshaping the genome through genetic and epigenetic changes. One long-term outcome of the Rules of Life effort will be a set of comprehensive genome/environment-to-phenome theories with predictive capability. These theories could, for example, enable us to design phenotypes to respond to environmental challenges or lead to new technologies and industries.

We seek to define the key challenges and research imperatives to understand the organizational principles and rules of living systems, encouraging projects that include diverse disciplinary perspectives in addition to the biological sciences, including but not limited to those from: computer and information sciences, engineering, geosciences, mathematical and physical sciences, and social and behavioral sciences. Projects may address linkages between genomic and phenotypic diversity to encompass biological and environmental processes spanning the genome to ecosystem across multiple scales of space and time.
Dear Colleague Letter: Delay in Issuance of Revised Program Solicitations for CEDAR, GEM, and SHINE

On July 3, 2017 the Division Atmospheric and Geospace Sciences (AGS) released a Dear Colleague Letter (NSF 17-109) announcing our intention to eliminate deadlines for three program solicitations in the Geospace Section - Coupling, Energetics, and Dynamics of Atmospheric Regions (CEDAR), Geospace Environment Modeling (GEM), and Solar, Heliospheric, and Interplanetary Environment (SHINE). During the revision process we determined that additional modifications to the solicitations are required and want to inform the community that the anticipated release date for the revised CEDAR and GEM solicitations is March 1, 2018. We do not plan to release a solicitation for the SHINE program during fiscal year 2018. Investigators who are planning to submit a proposal to one of these solicitations before this anticipated release date are welcome to submit to the respective Solar Terrestrial, Aeronomy, and Magnetospheric Physics core programs. The Geospace Section remains committed to supporting the science objectives of the CEDAR, GEM, and SHINE programs.

We will continue to use a combination of ad hoc reviews and panel input to assess the intellectual merit and broader impacts of submitted proposals. Supplements, EAGERs, and RAPIDs will continue to be entertained anytime following communication with the appropriate Program Director as indicated in the NSF Proposal & Award Policies & Procedures Guide (PAPPG). Investigators with additional questions or concerns are encouraged to contact their program officer or the head of the Geospace Section.

Dear Colleague Letter: ENG/CMMI Call for NSF Big Ideas Proposals

On April 3, 2017, the National Science Foundation issued the Dear Colleague Letter (DCL): Growing Convergence Research at NSF to catalyze new research directions and advance scientific discovery and innovation across the 10 Big Ideas for Future NSF Investments. Consistent with this DCL, the Division of Civil, Mechanical, and Manufacturing Innovation (CMMI) of the Engineering Directorate invites organizations to submit proposals relevant to the following four Big Ideas, as they intersect with core CMMI topics defined in CMMI program descriptions:

- Work at the Human-Technology Frontier: Shaping the Future;
- Navigating the New Arctic;
- Harnessing the Data Revolution for 21st Century Science and Engineering; and
- Understanding the Rules of Life: Predicting Phenotype.

Proposals may be submitted to CMMI core programs during the CMMI unsolicited proposal submission windows. Principal investigators are strongly encouraged to contact their program director(s) before proposal preparation and submission to determine if their research topic falls within the scope of the program. In the proposal, principal investigators should indicate the relevance of their proposed research to any of the Big Ideas identified above in both the overview statement in the Project Summary and the Project Description. Principal investigators are also encouraged to develop proposals for submission to the LEAP HI solicitation (Leading Engineering for America’s Prosperity, Health, and Infrastructure). LEAP HI projects require sustained and coordinated effort from interdisciplinary research teams, with goals that are not achievable through a series of smaller, short-term projects. LEAP HI proposals addressing any of the Big Ideas identified above must also satisfy all requirements defined in
the LEAP HI solicitation. Proposers are reminded that LEAP HI proposals require submission of a Letter of Intent prior to proposal submission; the next deadlines for Letters of Intent are December 15, 2017 and July 16, 2018. For LEAP HI proposals, principal investigators are strongly encouraged to contact the program director, Bruce Kramer, before proposal preparation and submission to determine proposal fit.
Indicators for Monitoring Undergraduate STEM Education

Science, technology, engineering and mathematics (STEM) professionals generate a stream of scientific discoveries and technological innovations that fuel job creation and national economic growth. Ensuring a robust supply of these professionals is critical for sustaining growth and creating jobs growth at a time of intense global competition. Undergraduate STEM education prepares the STEM professionals of today and those of tomorrow, while also helping all students develop knowledge and skills they can draw on in a variety of occupations and as individual citizens. However, many capable students intending to major in STEM later switch to another field or drop out of higher education altogether, partly because of documented weaknesses in STEM teaching, learning and student supports. Improving undergraduate STEM education to address these weaknesses is a national imperative.

Many initiatives are now underway to improve the quality of undergraduate STEM teaching and learning. Some focus on the national level, others involve multi-institution collaborations, and others take place on individual campuses. At present, however, policymakers and the public do not know whether these various initiatives are accomplishing their goals and leading to nationwide improvement in undergraduate STEM education.

Indicators for Monitoring Undergraduate STEM Education outlines a framework and a set of indicators that document the status and quality of undergraduate STEM education at the national level over multiple years. It also indicates areas where additional research is needed in order to develop appropriate measures. This publication will be valuable to government agencies that make investments in higher education, institutions of higher education, private funders of higher education programs, and industry stakeholders. It will also be of interest to researchers who study higher education.


At the request of the Special Cyber Operations Research and Engineering (SCORE) Interagency Working Group and sponsored with assistance from the National Science Foundation and from the Office of the Director of National Intelligence, the National Academies of Sciences, Engineering, and Medicine appointed an expert committee to explore future research goals and directions for cybersecurity. The committee for this multi-phased sequential study considered future research goals and directions for foundational science in cybersecurity, and included relevant efforts in economics and behavioral science as well as more “traditional” cybersecurity topics. It considered major challenge problems, explored proposed new directions, identified gaps in the current portfolio, considered the complementary roles of research in unclassified and classified settings, and considered how foundational work in an unclassified setting can be translated to meet national security objectives. This abbreviated annex provides background information on the full classified annex resulting from the study.
Redesigning the Process for Establishing the Dietary Guidelines for Americans

What foods should Americans eat to promote their health, and in what amounts? What is the scientific evidence that supports specific recommendations for dietary intake to reduce the risk of multifactorial chronic disease? These questions are critically important because dietary intake has been recognized to have a role as a key determinant of health.

As the primary federal source of consistent, evidence-based information on dietary practices for optimal nutrition, the Dietary Guidelines for Americans (DGA) have the promise to empower Americans to make informed decisions about what and how much they eat to improve health and reduce the risk of chronic disease. The adoption and widespread translation of the DGA requires that they be universally viewed as valid, evidence-based, and free of bias and conflicts of interest to the extent possible. However, this has not routinely been the case.

A first short report meant to inform the 2020 review cycle explored how the advisory committee selection process can be improved to provide more transparency, eliminate bias, and include committee members with a range of viewpoints. This second and final report recommends changes to the DGA process to reduce and manage sources of bias and conflicts of interest, improve timely opportunities for engagement by all interested parties, enhance transparency, and strengthen the science base of the process.
New Funding Opportunities

Content Order
New Funding Posted Since November 15 Newsletter
URL Links to New & Open Funding Solicitations
Solicitations Remaining Open from Prior Issues of the Newsletter
Open Solicitations and BAAs

[User Note: URL links are active on date of publication, but if a URL link breaks or changes a Google search on the key words will typically take you to a working link. Also, entering a grant title and/or solicitation number in the Grants.gov search box will work as well.]

New Funding Solicitations Posted Since November 15 Newsletter

Systems Biology of Bioenergy-Relevant Microbes to Enable Production of Next-Generation Biofuels and Bioproducts
Biological and Environmental Research (BER) of the Office of Science (SC), U.S. Department of Energy (DOE), hereby announces its interest in receiving applications for research that supports the Genomic Science research program (http://genomicscience.energy.gov). In this FOA, applications are requested for: i) research to advance the development of promising new model organisms relevant to Biofuels and/or Bioproducts production; and ii) research to develop an understanding of novel microbial functional capabilities and biosynthetic pathways relevant to the production of advanced Biofuels and Bioproducts. This FOA specifically targets the production of advanced biofuels (biologically synthesized compounds with the potential to serve as energy dense transportation fuels such as gasoline, diesel, and aviation fuel) compatible with existing engines and fuel distribution infrastructure, and for the production of bioproducts. The biological synthesis of advanced biofuels and bioproducts requires significant advances in our basic understanding of microbial physiology and metabolism as well as the conversion of photosynthetically derived carbon compounds and how products can be efficiently shunted from central metabolism into complex products while rebalancing organismal carbon allocations and redox potential. Applications are solicited for fundamental systems biology-driven basic research to enable advanced biofuels and bioproducts production in the following areas: (1) **Research to advance the development of emerging model microorganisms and/or microbial communities relevant to biofuels and/or bioproducts production.** Proposed studies could include but are not limited to: advancing systems biology understanding and predictive modeling of specialist microbes or microbial consortia, elucidation of relevant regulatory and metabolic networks or environmental signal processing related to product synthesis, improvement of fundamental understanding of integrated function and compatibility of novel enzyme systems with direct applicability to lignocellulose breakdown or advanced biofuels and/or bioproducts production, and further development of
genetic tools to facilitate study and manipulation of microbial species for which genomic information is available and a genetic system is at least in its initial stages of development; and (2) **Understanding novel microbial functional capabilities and biosynthetic pathways** relevant to the production of advanced biofuels and bioproducts. Proposed studies could include but are not limited to: the development of robust and efficient pathways for advanced biofuels and bioproducts synthesis, functional processes involved in deconstruction of lignocellulosic plant material, elucidation and modification of phenotypes involved in tolerance to stresses relevant to biofuel and bioproduct production, and development of methods to overcome problems with recombinant expression of vital enzymes and pathways. Proposed research should include the development of strategies to identify and overcome metabolic impacts resulting from pathway modification that limit production of target molecules. **Required preapplication due January 8; full March 23.**

**Training-based Workforce Development for Advanced Cyberinfrastructure (CyberTraining)**

The overarching goals of this program are to (i) prepare, nurture, and grow the national scientific research workforce for creating, utilizing, and supporting advanced cyberinfrastructure (CI) that enables potentially transformative fundamental science and engineering research and contributes to the Nation's overall economic competitiveness and security; (ii) ensure broad adoption of CI tools, methods, and resources by the fundamental science and engineering research community to enable new modes of discovery; and (iii) integrate core literacy and discipline-appropriate advanced skills in advanced CI as well as computational and data science and engineering into the Nation's educational curriculum/instructional material fabric spanning undergraduate and graduate courses. For the purpose of this solicitation, advanced CI is broadly defined as the set of resources, tools, and services for advanced computation, data handling, networking, and security that collectively enable potentially transformative fundamental research.

This solicitation calls for developing innovative, scalable training and education programs to address the emerging needs and unresolved bottlenecks in scientific and engineering research workforce development, from the postsecondary level to active researchers. The resultant training and education programs, spanning targeted, multidisciplinary communities, will lead to transformative changes in the state of workforce preparedness for advanced CI-enabled research in the short and long terms. As part of this investment, this solicitation seeks to broaden CI access and adoption by (i) increasing or deepening accessibility of methods and resources of advanced CI and of computational and data science and engineering by a wide range of scientific disciplines and institutions with lower levels of CI adoption to date; and (ii) harnessing the capabilities of larger segments of diverse underrepresented groups. Proposals from, and in partnership with, the aforementioned communities are especially encouraged.

Prospective principal investigators (PIs) are strongly encouraged to engage all relevant stakeholders, to the extent possible within the budget, by forging alliances and forming backbones for collective impact; this is particularly necessary in order to inform forward-looking curriculum/instructional material development for the Nation's science and engineering workforce. At a minimum, each project shall have a board of expert advisors or a network of funded/unfunded collaborators representative of stakeholder communities to periodically
scrutinize and help refine the curriculum/instructional material and project methods, and to inform professional associations and non-governmental organizations responsible for curriculum, accreditation, and professional examination.

The CyberTraining program is led by the Office of Advanced Cyberinfrastructure (OAC) in the Directorate for Computer and Information Science and Engineering (CISE) and has participation from several directorates and divisions as described in Section II — Program Description, Programmatic Areas of Interest. Not all directorates/divisions are participating at the same level and some have specific research and education priorities. The appropriate contact for the CyberTraining program in any directorate/division is the Cognizant Program Officer (PO) for the respective directorate/division/office/program listed.

All projects must advance CI training and education goals for CI-enabled fundamental research as described in the full text of this solicitation, in addition to addressing specific domain needs. Prospective PIs are strongly encouraged to contact the Cognizant Program Officers in CISE/OAC and in the participating directorate/division(s) relevant to the proposal to ascertain whether the focus and budget of the proposed activities are appropriate for this solicitation. Such consultations should be completed at least one month in advance of the submission deadline. PIs should include the names of the Cognizant Program Officers consulted in their Project Summaries as described in Section V.A — Proposal Preparation Instructions. The intent of the CyberTraining program is to stimulate co-funding between OAC and one or more domain directorates/divisions. (For this purpose, divisions of CISE other than OAC are considered "domain divisions.") To ensure relevance to community needs and to facilitate adoption, those proposals of interest to one or more domain divisions must include at least one PI/co-PI with expertise relevant to the targeted research discipline. All proposals shall include at least one PI/co-PI with expertise relevant to OAC.

Prospective PIs contemplating submissions that primarily target communities relevant to those directorates/divisions that are not participating in this solicitation are directed to instead explore the education and workforce development programs of the respective directorates/divisions. Due February 14.

**National Robotics Initiative 2.0: Ubiquitous Collaborative Robots**

The NRI-2.0 program builds upon the original National Robotics Initiative (NRI) program to support fundamental research in the United States that will accelerate the development and use of collaborative robots (co-robots) that work beside or cooperatively with people. The focus of the NRI-2.0 program is on **ubiquity**, which in this context means seamless integration of co-robots to assist humans in every aspect of life.

The program supports four main research thrusts that are envisioned to advance the goal of ubiquitous co-robots: **scalability**, **customizability**, **lowering barriers to entry**, and **societal impact**. Topics addressing **scalability** include how robots can collaborate effectively with multiple humans or other robots; how robots can perceive, plan, act, and learn in uncertain, real-world environments, especially in a distributed fashion; and how to facilitate large-scale, safe, robust and reliable operation of robots in complex environments.

**Customizability** includes how to enable co-robots to adapt to specific tasks, environments, or people, with minimal modification to hardware and software; how robots can personalize their interactions with people; and how robots can communicate naturally with humans, both
verbally and non-verbally. Topics in lowering barriers to entry include development of open-source co-robot hardware and software, as well as widely-accessible testbeds. Topics in societal impact include fundamental research to establish and infuse robotics into educational curricula, advance the robotics workforce through education pathways, and explore the social, economic, ethical, and legal implications of our future with ubiquitous collaborative robots. Collaboration between academic, industry, non-profit, and other organizations is encouraged to establish better linkages between fundamental science and engineering and technology development, deployment, and use.

The NRI-2.0 program is supported by multiple agencies of the federal government including the National Science Foundation (NSF), the U.S. Department of Agriculture (USDA), the U.S. Department of Energy (DOE), and the U.S. Department of Defense (DOD). Questions concerning a particular project's focus, direction and relevance to a participating funding organization should be addressed to that agency's point of contact, listed in section VIII of this solicitation. Due February 20.

Resource Implementations for Data Intensive Research in the Social, Behavioral and Economic Sciences (RIDIR)

As part of NSF’s Harnessing the Data Revolution (HDR), the Directorate for Social, Behavioral and Economic Sciences (SBE) seeks to develop user-friendly large-scale next-generation data resources and relevant analytic techniques to advance fundamental research in SBE areas of study. Successful proposals will, within the financial resources provided by the award, construct such databases and/or relevant analytic techniques and produce a finished product that will enable new types of data-intensive research. The databases or techniques should have significant impacts, either across multiple fields or within broad disciplinary areas, by enabling new types of data-intensive research in the SBE sciences. Due February 28.

Improving Undergraduate STEM Education: Hispanic-Serving Institutions (HSI Program)

To enhance the quality of undergraduate STEM education at Hispanic-serving institutions (HSIs), the National Science Foundation (NSF) established the Improving Undergraduate STEM Education: Hispanic-Serving Institutions (HSI Program), in response to the Consolidated Appropriations Act, 2017 (P.L. 115-31) and the American Innovation and Competitiveness Act (P.L. 114-329). The HSI Program seeks to increase the retention and graduation rates of students pursuing associate or baccalaureate degrees in science, technology, engineering, and mathematics (STEM). In designing the HSI Program, NSF has sought community input in a variety of ways that included releasing a Dear Colleague Letter (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf17092), awarding conference grants to seek stakeholder input, establishing and holding a meeting of the Building Capacity at Hispanic-Serving Institutions Subcommittee (HSI Subcommittee) of the Education and Human Resources (EHR) Advisory Committee, and conducting three virtual listening sessions that invited commentary from members of the HSI community (https://nsf.gov/ehr/HSIProgramPlan.jsp). To focus the comments from the three virtual meetings, five priority areas earlier identified in a listening session conducted in 2009 by the Quality Education for Minorities (QEM) Network were used: (1) Student support; (2) Faculty support; (3) STEM curricula enhancement and alignment; (4) Integration of research and
education; and (5) Partnerships. Based on the feedback from these listening sessions and from the HSI Subcommittee report (https://www.nsf.gov/ehr/Materials/HSISubcommitteeReport.pdf), NSF developed a program solicitation to guide the initial focus of the HSI Program. NSF will continue to gather community input from funded HSI conferences to inform future components of, or modifications to, the HSI Program. The HSI Program seeks to enhance the quality of undergraduate STEM education at HSIs and to increase retention and graduation rates of undergraduate students pursuing degrees in STEM fields at HSIs. In addition, the HSI Program seeks to build capacity at HSIs that typically do not receive high levels of NSF grant funding. **Due March 6.**

**NOAA-OAR-CPO-2018-2005445 Climate and Societal Interactions**

The mission of the NOAA Climate and Societal Interactions (CSI) research portfolio is to inform improvements in planning and preparedness in diverse socio-economic regions and sectors throughout the U.S. and abroad via the integration of knowledge and information about extreme weather and climate. Our research advances the nation’s understanding of climate-related risks and vulnerabilities across sectors and regions - within and beyond our borders - and the development of tools to foster more informed decision making. These efforts support NOAA’s vision to create and sustain enhanced resilience in ecosystems, communities, and economies. The overall objectives of the CSI portfolio are the following: 1. Support innovative, applicable, and transferable approaches for decision making, especially for risk characterization in the context of a variable and changing climate; 2. Establishment of a network of regionally scoped, long-term efforts to inform climate risk management and decision making; and 3. Promotion of the transfer of climate knowledge, tools, products, and services within NOAA, across the federal government, nationally, and internationally. These objectives are pursued through four complementary, interdisciplinary research programs: the Regional Integrated Sciences and Assessment (RISA) Program; the International Research and Applications Project (IRAP); the Sectoral Applications Research Program (SARP); and the Coastal and Ocean Climate Applications program (COCA). RISA supports research teams that conduct innovative, interdisciplinary, user-inspired, and regionally relevant research that informs resource management, planning, and public policy. IRAP supports activities to link science and assessments to practical risk management challenges in regions where weather and climate affect U.S. interests at home and abroad. COCA supports interdisciplinary applications research on the impacts of climate variability and change on coastal communities and coastal and marine ecosystems to inform decision making. SARP addresses the needs of a specific stakeholder or set of stakeholders within key socioeconomic sectors (e.g., water resources, agriculture, health, etc.) grappling with pressing climate-related issues. **Due March 16.**

**DE-FOA-0001767 U.S. Offshore Wind Research and Development Consortium FOA**

Complete information can be found under Funding Opportunity Announcement DE-FOA-0001767 on the EERE Exchange website: eere-exchange.energy.gov The U.S. Offshore Wind Research and Development Consortium FOA solicits an administrator to establish and lead a voluntary consortium of members committed to shared public/private investment in collaborative R&D focused on realizing technology improvements for the offshore wind industry in the U.S. The U.S. offshore wind industry has unique technological challenges that have yet to
be overcome in the global offshore wind market. In order to establish a consortium to undertake mutually beneficial research and development (R&D) addressing these challenges, a competitive award of $18.5M will be made under this Wind Energy Technologies Office (WETO) FOA. An additional $2.0M will be allocated directly from DOE to DOE/NNSA Federally Funded Research (FFRDC) and Development Centers to carry out R&D activities, either in direct partnership with the applicant, or prioritized by the consortium. Complete information can be found under Funding Opportunity Announcement DE-FOA-0001767 on the EERE Exchange website: eere-exchange.energy.gov. Due March 26.

URL Links to New & Open Funding Solicitations
Links verified Tuesday, May 23, 2017

- SAMHSA FY 2017 Grant Announcements and Awards
- Open Solicitations from IARPA (Intelligence Advanced Research Projects Activity)
- Bureau of Educational and Cultural Affairs, Open Solicitations, DOS
- ARPA-E Funding Opportunity Exchange
- DOE Funding Opportunity Exchange
- NPS Broad Agency Announcements (BAAs)
- NIJ Current Funding Opportunities
- NIJ Forthcoming Funding Opportunities
- Engineering Information Foundation Grant Program
- Comprehensive List of Collaborative Funding Mechanisms, NORDP
- ARL Funding Opportunities — Open Broad Agency Announcements (BAA)
- HHS Grants Forecast
- American Psychological Association, Scholarships, Grants and Awards
- EPA 2017 Science To Achieve Results (STAR) Research Grants
- NASA Open Solicitations
- CDMRP FY 2017 Funding Announcements
- Office of Minority Health
- DOE/EERE Funding Opportunity Exchange
- New Funding Opportunities at NIEHS (NIH)
- National Human Genome Research Institute Funding Opportunities
- Army Research Laboratory Open Broad Agency Announcements (BAA)
- Office of Naval Research Currently Active BAAs
- HRSA Health Professions Open Opportunities
- National Institute of Justice Current Funding Opportunities
- Foundation Center RFP Weekly Funding Bulletin

Solicitations Remaining Open from Prior Issues of the Newsletter

TAT Grant Program FY18 Department of Agriculture Utilities Programs
The Technical Assistance and Training (TAT) Grant Program has been established to assist communities with water or wastewater systems through free technical assistance and/or training provided by the grant recipients. Qualified private non-profit organizations will receive TAT grant funds to identify and evaluate solutions to water and waste disposal problems in rural areas, assist applicants in preparing applications for water and waste grants made at the State level offices, and improve operation and maintenance of existing water and waste disposal facilities in rural areas. Due January 2.

SWMFY2018 Solid Waste Management Grant Program Department of Agriculture
The Solid Waste Management (SWM) Grant Program has been established to assist communities through free technical assistance and/or training provided by the grant recipients. Qualified organizations will receive SWM grant funds to reduce or eliminate pollution of water resources in rural areas, and improve planning and management of solid waste sites in rural areas. Due January 2.

Partnerships for Research and Education in Materials (PREM)
The DMR Partnerships for Research and Education in Materials Research (PREM) program aims to enable, build, and grow partnerships between minority-serving institutions and DMR-supported centers and/or facilities to increase recruitment, retention and degree attainment (which defines the PREM pathway) by members of those groups most underrepresented in materials research, and at the same time support excellent research and education endeavors that strengthen such partnerships. Due January 29.

Research Coordination Networks in Undergraduate Biology Education (RCN-UBE)
The goal of the RCN program is to advance a field or create new directions in research or education by supporting groups of investigators to communicate and coordinate their research, training, and educational activities across disciplinary, organizational, geographic, and international boundaries. The RCN-UBE program originated as a unique RCN track to “catalyze positive changes in biology undergraduate education” (NSF 08-035) and is now supported by the collaborative efforts of the Directorate for Biological Sciences (BIO) and the Directorate for Education and Human Resources (EHR). It has been responsive to the national movement to revolutionize undergraduate learning and teaching in the biological sciences as described in the “Vision and Change in Undergraduate Biology Education” report. The RCN-UBE program seeks to improve undergraduate biology in different areas by leveraging the power of a collaborative network. The theme or focus of an RCN-UBE proposal can be on any topic likely to advance the goal of enhancing undergraduate biology education. Collectively, the program has contributed to developing and disseminating educational research resources and modules, to forging of new collaborations, and to sharing of best practices and ideas for scalability and sustainability of activities. These efforts have involved a large cadre of faculty, students, and other stakeholders. Proposed networking activities directed to the RCN-UBE program should focus on a theme to give coherence to the collaboration.

In accord with other RCNs, the RCN-UBE provides opportunities to foster new collaborations (including international partnerships), to address interdisciplinary topics, to explore innovative ideas for implementing novel networking strategies, to explore collaborative
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technologies, and to develop community standards. RCN-UBE awards do not support existing networks or the activities of established collaborations. RCN awards do not support primary research. Due January 30.

USDA-NIFA-ICGP-006409 Methyl Bromide Transition Program
The methyl bromide transition program (MBT) addresses the immediate needs and the costs of transition that have resulted from the scheduled phase-out of the pesticide methyl bromide. Methyl bromide has been a pest and disease control tactic critical to pest management systems for decades for soilborne and postharvest pests. The program focuses on integrated commercial-scale research on methyl bromide alternatives and associated extension activity that will foster the adoption of these solutions. Projects should cover a broad range of new methodologies, technologies, systems, and strategies for controlling economically important pests for which methyl bromide has been the only effective pest control option. Research projects must address commodities with critical issues and include a focused economic analysis of the cost of implementing the transition on a commercial scale. Due January 30.

N00014-18-S-F004 Office of Naval Research (ONR) Navy and Marine Corps Department of Defense University Research-to-Adoption (DURA) Initiative
The Defense University Research-to-Adoption (DURA) initiative will address the following technical challenges for defense operations: 1) Lithium-Ion Battery Safety and 2) Electrical Grid Resiliency, Reliability and Security. In addition, the DURA initiative will promote advancing university research from the laboratory to adoption by the defense and commercial sectors. Proposals may address one or both of the technical areas below. Each proposal shall consist of at least two (2) individual research projects and shall provide for the separate annual review of each project to assess its progress and continued viability. Proposed projects should be designed to be self-sustaining beyond the end of the period of performance to support the adoption aspect of the DURA initiative. Accordingly, applicants are encouraged to incorporate into their proposals strategies such as advisors and partners that could augment proposed budgets and provide future funds, such as local and regional companies and investment groups, internal university foundations, local and state government economic development offices, and federal and state small business administration offices. 1. Lithium-Ion Battery Safety. Safety concerns continue to hamper full adoption of lithium-ion batteries for defense systems, despite significant research investments by the government and the private sector. This Defense initiative will advance promising lithium-ion battery safety technologies at university research laboratories into early laboratory prototypes and potentially minimum viable products for adoption by the defense and commercial sectors via early startups, small businesses and non-traditional defense contractors. Specific technical areas of interest include, but are not limited to, the following: improved electrolytes; stable high-energy anodes and cathodes; cell components and structures that enhance safety and reliability (e.g. use of electrode coatings and electrolyte additives); safety optimization through battery and battery module design and packaging; and battery management and state of health techniques that prevent and/or mitigate catastrophic failure. 2. Electrical Grid Reliability, Resiliency and Security. Both the defense and commercial sectors recognize the ever-growing criticality to enhance electrical grid reliability, resiliency and security through innovation at the component and system levels. This
Defense initiative will advance relevant electrical grid innovations at university research laboratories into early laboratory prototypes and potentially minimum viable products for adoption by the defense and commercial sectors via early startups, small businesses and non-traditional defense contractors. Specific technical areas of interest include, but are not limited to, the following: advanced electrical power generation, transmission and distribution hardware and software; physical cyber secured industrial controls hardware and software; effective control of microgrids supporting high-dynamic loads; electrical grid protocols and controls to maintain secured operations of critical infrastructure under adverse conditions; hardening of electrical grid components against kinetic and electromagnetic assaults; and affordable, easy-to-deploy microgrids for expeditionary and Humanitarian Assistance and Disaster Relief (HADR) operations and for remote communities. Proposals should also address the following areas:• Laboratory-to-Market Approaches: To facilitate commercialization, applicants are strongly encouraged to consider inclusion of proven business-oriented activities in their proposals such as business startup training and events, business accelerators and technology incubators. • Workforce/Professional Development: Describe how the program will positively impact workforce development in the applicant’s local and regional area. Applicants are further encouraged to include consideration on how their program will attract and employ veterans and other members of the military community (e.g. reservists). Due January 31.

**Major Research Instrumentation Program**
The Major Research Instrumentation (MRI) Program serves to increase access to multi-user scientific and engineering instrumentation for research and research training in our Nation's institutions of higher education and not-for-profit scientific/engineering research organizations. An MRI award supports the acquisition or development of a multi-user research instrument that is, in general, too costly and/or not appropriate for support through other NSF programs. MRI provides support to acquire critical research instrumentation without which advances in fundamental science and engineering research may not otherwise occur. MRI also provides support to develop next-generation research instruments that open new opportunities to advance the frontiers in science and engineering research. Additionally, an MRI award is expected to enhance research training of students who will become the next generation of instrument users, designers and builders. An MRI proposal may request up to $4 million for either acquisition or development of a research instrument. Beginning with the FY 2018 competition, each performing organization may submit in revised “Tracks” as defined below, with no more than two submissions in Track 1 and no more than one submission in Track 2. Due Feb. 5.

**Dimensions of Biodiversity FY2018**
Despite centuries of discovery, most of our planet's biodiversity remains unknown. The scale of the unknown diversity on Earth is especially troubling given the rapid and permanent loss of biodiversity across the globe. The goal of the Dimensions of Biodiversity campaign is to transform, by 2020, how we describe and understand the scope and role of life on Earth. This campaign promotes novel integrative approaches to fill the most substantial gaps in our understanding of the diversity of life on Earth. It takes a broad view of biodiversity, and focuses on the intersection of genetic, phylogenetic, and functional dimensions of biodiversity.
Successful proposals must integrate these three dimensions to understand interactions and feedbacks among them. While this focus complements several core programs in BIO, it differs by requiring that multiple dimensions of biodiversity be addressed simultaneously, in novel ways, to understand their synergistic roles in critical ecological and evolutionary processes, especially pertaining to the mechanisms driving the origin, maintenance, and functional roles of biodiversity. The Dimensions of Biodiversity program includes partnerships with the National Natural Science Foundation of China (NSFC), the São Paulo Research Foundation (FAPESP) of Brazil, and the National Research Foundation (NRF) of South Africa in fiscal year 2018. Due Feb. 28.

Open Solicitations and BAAs

[BAA’s remain open for one or more years. During the open period, agency research priorities may change or other modifications are made to a published BAA. If you are submitting a proposal in response to an open solicitation, as below, check for modifications to the BAA at Grants.gov or by utilizing Modified Opportunities by Agency to receive a Grants.gov notification of recently modified opportunities by agency name.]

United States Army Research Institute for the Behavioral and Social Sciences Broad Agency Announcement for Basic, Applied, and Advanced Scientific Research (FY13-18)

Announcement for Basic, Applied, and Advanced Scientific Research. This Broad Agency Announcement (BAA), which sets forth research areas of interest to the United States Army Research Institute for the Behavioral and Social Sciences, is issued under the provisions of paragraph 6.102(d)(2) of the Federal Acquisition Regulation (FAR), which provides for the competitive selection of proposals. Proposals submitted in response to this BAA and selected for award are considered to be the result of full and open competition and in full compliance with the provisions of Public Law 98-369 (The Competition in Contracting Act of 1984) and subsequent amendments. The US Army Research Institute for the Behavioral and Social Sciences is the Army’s lead agency for the conduct of research, development, and analyses for the improvement of Army readiness and performance via research advances and applications of the behavioral and social sciences that address personnel, organization, training, and leader development issues. Programs funded under this BAA include basic research, applied research, and advanced technology development that can improve human performance and Army readiness. The funding opportunity is divided into two sections - (1) Basic Research and (2) Applied Research and Advanced Technology Development. The four major topic areas of research interest include the following: (1) Training; (2) Leader Development; (3) Team and Inter-Organizational Performance in Complex Environments; and (4) Soldier/Personnel Issues. Funding of research and development (R&D) within ARI areas of interest will be determined by funding constraints and priorities set during each budget cycle. Open to February 5, 2018.

BAA-HPW-RHX-2014-0001 Human-Centered Intelligence, Surveillance Air Force Research Lab

This effort is an open-ended BAA soliciting innovative research concepts for the overall mission of the Human-Centered Intelligence, Surveillance, & Reconnaissance (ISR) Division (711
It is intended to generate research concepts not already defined and planned by RHX as part of its core S&T portfolio. The core RHX mission is to develop human-centered S&T that (1) enables the Air Force to better identify, locate and track humans within the ISR environment and (2) enhance the performance of ISR analysts. To accomplish this mission, the RHX core S&T portfolio is structured into three major research areas: (1) Human Signatures – develop technologies to sense and exploit human bio-signatures at the molecular and macro (anthropometric) level, (2) Human Trust and Interaction – develop technologies to improve human-to-human interactions as well as human-to-machine interactions, and (3) Human Analyst Augmentation – develop technologies to enhance ISR analyst performance and to test the efficacy of newly developed ISR technologies within a simulated operational environment. The RHX mission also includes research carried over from the Airman Biosciences and Performance Program. While not directly linked to the core S&T strategic plan, there exists a unique capability resident within RHX to address critical Air Force operational and sustainment needs resulting from chemical and biological hazards. Research areas include contamination detection, hazard assessment and management, individual and collective protection, and restoration and reconstitution of operational capability. **Open to Feb. 12, 2018.**

**Strategic Technologies Department of Defense DARPA - Strategic Technology Office**

Current Closing Date for Applications: Mar 21, 2018

**Air Force BAA - Innovative Techniques and Tools for the Automated Processing and Exploitation (APEX) Center**

The AFRL/RIEA branch performs Research and Development (R&D) across a broad area of Air Force Command, Control, Communications, Computers/Cyber, and Intelligence (C4I). All applicable "INTs" are investigated with emphasis on Ground Moving Target Indication (GMTI), Electronic Intelligence (ELINT), Signals Intelligence (SIGINT), Image Intelligence (IMINT), Non Traditional Intelligence, Surveillance and Reconnaissance (NTISR), and Measurement and Signature Intelligence (MASINT). The APEX Center is used to perform analysis for seedling efforts, provide baseline tool development for major programs, and to provide realistic operational systems/networks/databases for integration efforts. The APEX Center resources will be used by the Government to perform the necessary research, development, experimentation, demonstration, and conduct objective evaluations in support of emerging capabilities within the Processing and Exploitation (PEX) area. Software tools, data sets, metrics (Measures of Performance/Measures of Effectiveness), and analysis are needed for the Government to perform the vetting, maturing, and analysis of efforts related to PEX, e.g. Automatic Tracking, Activity Based Intelligence, Entity, Event & Relationship (EER) Extraction, Association & Resolution (A&R), Analysis & Visualization (A&V), Social Network Analysis, Network Analytics, Pattern Discovery, Scalable Algorithms, and Novelty Detection. The AFRL APEX Center is the AFRL/RI gateway into the cross-directorate PCPAD-X (Planning & Direction, Collection, Processing & Exploitation, Analysis & Production, and Dissemination eXperimentation) initiative. **Open to FY 2018.**

**DARPA Biological Technologies Office Open BAA, Department of Defense**

The Defense Advanced Research Projects Agency (DARPA) is soliciting innovative research proposals of interest to the Biological Technologies Office (BTO). Proposed research should
investigate leading edge approaches that enable revolutionary advances in science, technologies, or systems at the intersection of biology with engineering and the physical and computer sciences. Specifically excluded is research that primarily results in evolutionary improvements to the existing state of the art. BTO seeks unconventional approaches that are outside the mainstream, challenge assumptions, and have the potential to radically change established practice, lead to extraordinary outcomes, and create entirely new fields. The mission of BTO is to foster, demonstrate, and transition breakthrough fundamental research, discoveries, and applications that integrate biology, engineering, computer science, mathematics, and the physical sciences. BTO’s investment portfolio goes far beyond life sciences applications in medicine to include areas of research such as human-machine interfaces, microbes as production platforms, and deep exploration of the impact of evolving ecologies and environments on U.S. readiness and capabilities. BTO’s programs operate across a wide range of scales, from individual cells to the warfighter to global ecosystems. BTO responds to the urgent and long-term needs of the Department of Defense (DoD) and addresses national security priorities. A listing of priority areas includes but is not limited to below:

- Developing and leveraging new technologies that can be applied to agricultural ecosystems for production stabilization, by improving quality or reducing losses from pathogens or pests.
- Developing and leveraging new insights into non-human biology across and between populations of microbes, insects, plants, marine life, and other non-human biologic entities.
- Developing new technologies and approaches that ensure biosafety, biosecurity, and protection of the bioeconomy.
- Understanding emerging threats to global food and water supplies and developing countermeasures that could be implemented on regional or global scales.
- Developing new technologies to treat, prevent, and predict the emergence and spread of infectious diseases that have the potential to cause significant health, economic, and social burden.

Proposal Abstracts and Full Proposals will be submitted on a rolling basis until April 26, 2018, 4:00pm ET

HR001117500040 Defense Sciences Office (DSO) Office-wide DARPA

The mission of the Defense Advanced Research Projects Agency (DARPA) Defense Sciences Office (DSO) is to identify and pursue high-risk, high-payoff research initiatives across a broad spectrum of science and engineering disciplines and to transform these initiatives into disruptive technologies for U.S. national security. In support of this mission, the DSO Office-wide BAA invites proposers to submit innovative basic or applied research concepts that explore Physical and Natural Systems, Human-Machine and Social Systems, and/or Math and Computational Systems through the lens of one or more of the following technical domains: Complexity Engineering, Science of Design, Noosphere, Fundamental Limits, and New Foundations. Proposals must investigate innovative approaches that enable revolutionary advances. DSO is explicitly not interested in approaches or technologies that primarily result in evolutionary improvements to the existing state of practice. Open to July 2018.
PAR-16-242 Bioengineering Research Grants (BRG) (R01) Department of Health and Human Services National Institutes of Health

The purpose of this funding opportunity announcement is to encourage collaborations between the life and physical sciences that: 1) apply a multidisciplinary bioengineering approach to the solution of a biomedical problem; and 2) integrate, optimize, validate, translate or otherwise accelerate the adoption of promising tools, methods and techniques for a specific research or clinical problem in basic, translational, or clinical science and practice. An application may propose design-directed, developmental, discovery-driven, or hypothesis-driven research and is appropriate for small teams applying an integrative approach to increase our understanding of and solve problems in biological, clinical or translational science. **Open to May 9, 2019.**

BAA-RQKD-2014-0001 Open Innovation and Collaboration Department of Defense Air Force -- Research Lab

Open innovation is a methodology to capitalize on diverse, often non-traditional talents and insights, wherever they reside, to solve problems. Commercial industry has proven open innovation to be an effective and efficient mechanism to overcome seemingly impossible technology and/or new product barriers. AFRL has actively and successfully participated in collaborative open innovation efforts. While these experiences have demonstrated the power of open innovation in the research world, existing mechanisms do not allow AFRL to rapidly enter into contractual relationships to further refine or develop solutions that were identified. This BAA will capitalize on commercial industry experience in open innovation and the benefits already achieved by AFRL using this approach. This BAA will provide AFRL an acquisition tool with the flexibility to rapidly solicit proposals through Calls for Proposals and make awards to deliver innovative technical solutions to meet present and future compelling Air Force needs as ever-changing operational issues become known. The requirements, terms and specific deliverables of each Call for Proposals will vary depending on the nature of the challenge being addressed. It is anticipated that Call(s) for Proposals will address challenges in (or the intersection between) such as the following technology areas: Materials: - Exploiting material properties to meet unique needs - Material analysis, concept / prototype development, and scale up Manufacturing Processes that enable affordable design, production and sustainment operations Aerospace systems: - Vehicle design, control, and coordinated autonomous and/or manned operations - Power and propulsion to enable next generation systems Human Effectiveness: - Methods and techniques to enhance human performance and resiliency in challenging environments - Man – Machine teaming and coordinated activities Sensors and Sensing Systems: - Sensor and sensing system concept development, design, integration and prototyping - Data integration and exploitation. **Open to July 12, 2019.**

HDTRA1-14-24-FRCWMD-BAA Fundamental Research to Counter Weapons of Mass Destruction

**Fundamental Research BAA posted on 20 March 2015.** **Potential applicants are strongly encouraged to review the BAA in its entirety.** **Please note that ALL general correspondence for this BAA must be sent to HDTRA1-FRCWMD-A@dtra.mil. Thrust Area-specific correspondence must be sent to the applicable Thrust Area e-mail address listed in Section 7: Agency Contacts.** **Open to Sept. 30, 2019.**
BAA-RQKH-2015-0001 Methods and Technologies for Personalized Learning, Modeling and Assessment  Air Force -- Research Lab
The Air Force Research Laboratories and 711th Human Performance Wing are soliciting white papers (and later technical and cost proposals) on the following research effort. This is an open ended BAA. The closing date for submission of White Papers is 17 Nov 2019. This program deals with science and technology development, experimentation, and demonstration in the areas of improving and personalizing individual, team, and larger group instructional training methods for airmen. The approaches relate to competency definition and requirements analysis, training and rehearsal strategies, and models and environments that support learning and proficiency achievement and sustainment during non-practice of under novel contexts. This effort focuses on measuring, diagnosing, and modeling airman expertise and performance, rapid development of models of airman cognition and specifying and validating, both empirically and practically, new classes of synthetic, computer-generated agents and teammates. An Industry Day was held in November 2014. Presentation materials from the Industry Day and Q&A's are attached. If you would like a list of Industry Day attendees, send an email request to helen.williams@us.af.mil  Open until November 17, 2019.

BAA-AFRL-RQKMA-2016-0007 Air Force Research Laboratory, Materials & Manufacturing Directorate, Functional Materials and Applications (AFRL/RXA) Two-Step Open BAA
Air Force Research Laboratory, Materials & Manufacturing Directorate is soliciting White Papers and potentially technical and cost proposals under this two-step Broad Agency Announcement (BAA) that is open for a period of five (5) years. Functional Materials technologies that are of interest to the Air Force range from materials and scientific discovery through technology development and transition, and support the needs of the Functional Materials and Applications mission. Descriptors of Materials and Manufacturing Directorate technology interests are presented in the context of functional materials core technical competencies and applications. Applicable NAICS codes are 541711 and 541712.  Open to April 20, 2021.

Army Research Office Broad Agency Announcement for Basic and Applied Scientific Research
This BAA sets forth research areas of interest to the ARO. This BAA is issued under FAR 6.102(d)(2), which provides for the competitive selection of basic and applied research proposals, and 10 U.S.C. 2358, 10 U.S.C. 2371, and 10 U.S.C. 2371b, which provide the authorities for issuing awards under this announcement for basic and applied research. The definitions of basic and applied research may be found at 32 CFR 22.105. Proposals submitted in response to this BAA and selected for award are considered to be the result of full and open competition and in full compliance with the provision of Public Law 98-369, "The Competition in Contracting Act of 1984" and subsequent amendments.  Open to April 30, 2022.
Expanded Editing Services

In response to numerous requests, we are now expanding our editing services to accommodate clients working on manuscripts as well as proposals. We are also offering editing only (as opposed to intensive grantsmanship assistance) at several levels:

- **Technical editing**: Editing for technical clarity as well as grammar, punctuation, etc.
- **Editing**: Editing for grammar, punctuation, etc.
- **Editing Especially for Non-native English Speakers**: Editing for grammar, punctuation, usage, etc. with special attention to mistakes commonly made by non-native English speakers.

These options will provide a more economical option for authors who don’t need our intensive review and editing services. More information will be posted on our website soon.

Former NIH branch chief, Dr. John Williamson, joining ARFS

We are excited to announce that Dr. John Williamson is joining Academic Research Funding Strategies as one of our consultants. He will work with clients applying to NIH, providing one-on-one mentoring as well as reviews of NIH proposal drafts. A short bio is provided below.

Dr. Williamson is an emeritus professor of medicinal chemistry at the University of Mississippi, a former NIH branch chief, and currently a research initiatives coordinator at the University of Dayton. During his tenure as a full professor he garnered millions in extramural funding from: federal agencies including the NIH, NSF, CDC, and DoD; pharmaceutical companies including Merck and Schering-Plough; as well as foundations and societies including the Elsa Pardee Foundation, Sigma Xi, the American Society of Pharmacognosy, and the Bill and Melinda Gates Foundation.

At NIH he served as a Branch Chief of Basic and Mechanistic Research, maintaining a branch grants and contract portfolio of approximately $50M/yr. The portfolio included projects associated with brain neuroscience, bioengineering of opiate pathways, mechanisms associated with chronic pain, brain microbiome connection mechanisms, pharmacodynamics and pharmacokinetics and methodologies associated with bioactive natural products, analgesic cannabinoids, various small business awards, complementary medical approaches, and training programs. While at NIH, Williamson’s portfolio contained a broad array of funding mechanisms including: DP1, DP2, F31, F32, K00, K01, K99, P01, P20, P30, P50, R01, R03, R13, R15, R21, R41, R42, R43, R44, R61, R61, R90, T32, T42, T90, and U01s. In addition, he was the named program contact on more than 75 published funding opportunity announcements (RFAs & PAs).

Williamson also worked on interagency collaborative programs with the NSF, FDA, USDA, and FTC. He is currently associated with the University of Dayton where, as Research Initiatives Coordinator, he helps faculty and staff in developing and submitting competitive research proposals.
What We Do--
We provide consulting for colleges and universities on a wide range of topics related to research development and grant writing, including:

- **Strategic Planning** - Assistance in formulating research development strategies and building institutional infrastructure for research development (including special strategies for Emerging Research Institutions, Predominantly Undergraduate Institutions and Minority Serving Institutions)

- **Training for Faculty** - Workshops, seminars and webinars on how to find and compete for research funding from NSF, NIH, DoE and other government agencies as well as foundations. Proposal development retreats for new faculty.

- **Large proposals** - Assistance in planning, developing and writing institutional and center-level proposals (e.g., NSF ERC, STC, NRT, ADVANCE, IUSE, Dept of Ed GAANN, DoD MURI, etc.)

- **Assistance for new and junior faculty** - help in identifying funding opportunities and developing competitive research proposals, particularly to NSF CAREER, DoD Young Investigator and other junior investigator programs

- **Assistance on your project narrative**: in-depth reviews, rewrites, and edits

- **Editing and proof reading** of journal articles, book manuscripts, proposals, etc.

- **Facilities and Instrumentation** - Assistance in identifying and competing for grants to fund facilities and instrumentation

- **Training for Staff** - Professional Development for research office and sponsored projects staff

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**Workshops by Academic Research Funding Strategies**

We offer workshops on research development and grant writing for faculty and research professionals based on all published articles.

(View Index of Articles)

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