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Tips on Successful Foundation Funding

By Mike Cronan, co-publisher

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The strategies that result in funding success from foundations are similar in many ways to those that result in success from federal research agencies. For example, funding success at both foundations and federal agencies requires a nuanced understanding of the specific mission and culture of the funding source. This understanding then forms the basis of the applicant's capacity to make a convincing case about how their proposed project will significantly advance, impact, and bring value-added benefits to the mission of the foundation or the mission of the federal funding agency.

There are numerous other similarities between success at foundations and at federal research agencies, such as the importance of writing well, organizational clarity of the narrative, writing to one's audience, offering details and specifics about the significance of the proposed project, etc. However, there are also important dissimilarities between these two types of funders, such as the role of the program officer at foundations and in the actual process leading to a proposal submission to a foundation. Making these distinctions will be important to funding success.

Faculty often seek advice from research offices to understand these distinctions, usually in the guise of the question, "Should I consider seeking foundation support for my project?" While that question has no clear answer, and must ultimately be decided by the faculty member, research offices can help by explaining the parameters typical of seeking funding from foundations, particularly as they relate to identifying possible foundations, and researching the foundation's mission,, funding history, and application process, including the common first step--submitting a letter of inquiry.

This preliminary information can be gleaned in several ways from an appropriately worded Google search ("*Foundations funding research in…YOUR RESEARCH TOPIC*") to URL listings of the largest 100 foundations or Top 100 U.S. Foundations by Asset Size, any of which should yield a list of likely foundations of interest at the national, regional, state, and local levels. Once an appropriately small subset of foundations of possible interest has been identified, the next step is to visit the foundation website to research its annual reports, its giving mission, and its application process, etc.

In addition, it's wise to explore the websites and annual reports of several foundations to get a clear understanding of the best practices for seeking foundation support. Of course, thousands of foundations exist of all sizes and missions that serve areas from the neighborhood to the global level, but foundations of all types and missions share processes and protocols for submitting funding applications.

It's worthwhile to explore the Sloan Foundation to get a better understanding of the process and protocols of foundation funding. Moreover, the mission of the Sloan Foundation closely matches the goals of university applicants because the foundation's mission and grants—based on total assets of over $2 billion—support cutting-edge research and comprehensive educational initiatives in science, technology, and economics.

The application process at the Sloan Foundation is largely generic to many foundations and offers research offices a good example for explaining foundation funding to faculty unfamiliar with the process. In brief, the recommended steps for an applicant to follow at the Sloan Foundation are:

"**STEP 1: Read the Foundation's Website:** Interested applicants should read through the Foundation's program descriptions in the Programs section of the website. Each program page includes a statement of the program's goals, a description of the strategies employed, a list of recent grants, and a section with information about how to apply. Interested applicants are encouraged to browse through some of the grants made in the program to get a feeling for the kind of projects the program supports.

"**STEP 2: Submit a Letter of Inquiry:** Once a relevant program has been identified, an interested grantseeker should submit a **Letter of Inquiry** (up to 2 pages but **1 page preferred**) by email to the appropriate program director. See our Letters of Inquiry section for more information about Letters of Inquiry.

"**STEP 3: Submit a Formal Grant Proposal:** The Alfred P. Sloan Foundation ***does not accept or review unsolicited grant proposals***. Grantseekers that submit promising letters of inquiry will be invited to submit a formal grant proposal. Visit our Grant Proposal Guidelines section for more information about composing and submitting a grant proposal. The Tips for Writing a Successful Grant Proposal section gives useful advice on how to write a successful proposal.

"Once a proposal has been submitted, the Foundation will evaluate the proposal. The Foundation's grant review and approval process is ***extremely rigorous and designed to mimic the peer review process at high quality academic journals***. Depending on the funds requested and the complexity of the work to be performed, the Foundation may seek independent expert review of the proposal. If so, grantseekers are given the opportunity to respond in writing to reviewer comments. It is not unusual for a grantseeker to be asked to revise, amend, or supplement the original proposal (sometimes significantly) as a result of the proposal review process."

One of the most important takeaways here is the significance of the Letter of Inquiry. Applicants often need help from university research offices to write an effective one or two-page Letter of Inquiry and to provide an editorial review of the drafted Letter of Inquiry to ensure that it adequately addresses the significance of the proposed project to the funder's mission. Writing the Letter of Inquiry resembles writing a brief concept paper for a federal agency in response to an unsolicited funding opportunity or to a federal agency BAA for which a research abstract or white paper comprises the initial step in a multistep application process. Subsequent steps might include an invitation to submit a full proposal and a subsequent peer-review process.

Also, a **Letter of Inquiry** shouldn't be confused with a **Letter of Intent**, the latter used by many federal agencies to estimate the number of proposals that will be submitted under a specific solicitation and to configure review panels with the appropriate disciplinary members. By contrast, the Letter of Inquiry serves as the first gate to pass through on the road to obtaining funding. The successful Letter of Inquiry results in an agency's invitation submit a full proposal..

Given the above, research offices are well positioned to inform faculty about the generic requirements to apply for funding from a foundation. This is particularly important since many faculty lack experience with foundations. The assistance of research offices in this area of funding can make the difference between funding success or failure.

Finally, the Sloan Foundation references the below article that is quoted here verbatim in its entirety. It is an excellent introduction to foundation grant funding. Distribution of this article may be freely made by research offices contingent on using the following **Citation:** Bourne PE, Chalupa LM (2006) Ten Simple Rules for Getting Grants. PLoS Comput Biol 2(2): e12. https://doi.org/10.1371/journal.pcbi.0020012.

Ten Simple Rules for Getting Grants

"Rule 1: Be Novel, but Not Too Novel

Good science begins with new and fresh ideas. The grant writing process should be a pleasure (no, we are not kidding), for it allows you to articulate those ideas to peers who have to read your grants but not necessarily your papers. Look at grant writing as an opportunity to have an impact. Feel passionate about what you are writing—if you are not passionate about the work, it is probably not a good grant and is unlikely to get funded. "Me-too" science will not get funded when funding levels are low. On the other hand, science that is too speculative will not be supported either, particularly when funds are tight—sad but true.

"Rule 2: Include the Appropriate Background and Preliminary Data as Required

You need to convince reviewers that the work you propose needs to be done and that you are the best person to do it. Different granting programs require differing amounts of preliminary data. For certain programs, it can be said that the work must be essentially done before the grant is awarded, and that the funds are then used for the next phase of the research program. There is some truth in this. So where appropriate, do provide some tantalizing preliminary result, making sure to tell the reviewers what these results imply with respect to the specific aims of your proposal. In formulating the motivation for your proposal, make sure to cite all relevant work—there is nothing worse than not appropriately citing the work of a reviewer! Finally, convince the reviewer that you have the technical and scientific background to perform the work as proposed.

"Rule 3: Find the Appropriate Funding Mechanism, Read the Associated Request for Applications Very Carefully, and Respond Specifically to the Request

Most funding organizations have specific staff to assist in finding funding opportunities, and most funding agencies have components of their Web sites designed to help investigators find the appropriate programs. Remember, programs want to give away money—the jobs of the program's staff depend on it. The program staff can help you identify the best opportunities. If your grant does not fit a particular program, save your time and energy, and apply elsewhere, where there is a better programmatic fit.

"Rule 4: Follow the Guidelines for Submission Very Carefully and Comply

Many funding bodies will immediately triage grants that do not comply with the guidelines—it saves the program time and money. This extends to all the onerous supporting material—budget justification, bibliographies, etc. Get them right and keep them updated for future applications. Even if it goes to review, an inappropriately formulated application may aggravate the reviewers, and will have a negative impact even if the science is sound. Length and format are the most frequent offenders.

"Rule 5: Obey the Three Cs—Concise, Clear, and Complete
The grant does not have to fill the allotted page count. Your goal should be to provide a complete reckoning of what is to be done, as briefly as possible. Do not rely on supplements (which may not be allowed) or on Web sites (review may be actively discouraged since it has the potential to compromise anonymity). Specify the scope up-front and make sure it is realistic with respect to the funds requested. A common temptation for inexperienced grant writers is to propose to do too much. Such applications are usually judged as overly ambitious and consequently poorly rated.

"Rule 6: Remember, Reviewers Are People, Too
Typically, reviewers will have a large number of grants to review in a short period. They will easily lose concentration and miss key points of your proposal if these are buried in an overly lengthy or difficult-to-read document. Also, more than likely, not all the reviewers will be experts in your discipline. It is a skill to capture the interest of experts and nonexperts alike. Develop that skill. Unlike a paper, a grant provides more opportunity to apply literary skills. Historical perspectives, human interest, and humor can all be used judiciously in grants to good effect. Use formatting tricks (without disobeying rule 4), for example, underlining, bolding, etc., and restate your key points as appropriate. Each section can start with a summary of the key points.

"Rule 7: Timing and Internal Review Are Important
Give yourself the appropriate lead time. We all have different approaches to deadlines. Ideally, you should complete a draft, leave sufficient time to get feedback from colleagues, and then look at the grant again yourself with a fresh eye. Having a spectrum of scientific colleagues who are similar to the likely reviewer pool critique your grant is very valuable.

"Rule 8: Know Your Grant Administrator at the Institution Funding Your Grant
At the end of the day, this person is your best advocate. How well you understand each other can make a difference. Many grant administrators have some measure (limited to complete) discretionary control over what they fund. The more they know and understand you and your work, the better your chances of success. Do not rely just on E-mail to get to know the grant administrator. Do not be intimidated. Talk to them on the telephone and at meetings where possible—they want to help.

"Rule 9: Become a Grant Reviewer Early in Your Career
Being on review panels will help you write better grants. Understanding why grants get triaged before complete review, how a panel reacts to a grant, what the discretionary role of program

officers is, and what the role of oversight councils is provide valuable lessons for writing successful grants of your own and for giving others advice about this process.

"Rule 10: Accept Rejection and Deal with It Appropriately

Rejection is inevitable, even for very good grants when funding levels are low. Learn to live with rejection and to respond appropriately. Do not be defensive; address each criticism head on and respond with facts and not emotional arguments. When resubmission is necessary, make it very clear to the reviewer that you understand what was wrong the first time. Indicate precisely how you have fixed the problems. In the resubmitted application, never argue with the validity of the prior review. If the grant was close to being funded the first time around, remind the reviewers of that fact by including the previous score if appropriate, and make it crystal clear why this version is much improved.

Underlying Strategies for STEM Partnerships with Minority Serving Institutions

By Mike Cronan, co-publisher
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The National Academies Press has recently released as a free pdf download a 231-page report, Minority Serving Institutions: *America's Underutilized Resource for Strengthening the STEM Workforce* (December, 2018). This report was not commissioned as a strategy guide to writing STEM partnership proposals with Minority Serving Institutions (MSI), but faculty and research offices can certainly use it as one. Research and/or educational partnership proposals to federal agencies, particularly NSF, between and among MSIs and non-MSIs, are common and go back thirty years, beginning with what is now known as the Louis Stokes Alliances for Minority Participation program developed and implemented at NSF by Drs. Luther Williams, Albert Bridgewater, and William McHenry in 1990. This report cites the LSAMP as one of six illustrative examples of successful programs representing best practices and evidence-based activities.

The sponsors of this study, the Alfred P. Sloan Foundation, the ECMC Foundation, the Helmsley Charitable Trust, the Wallace Foundation, and the W.K. Kellogg Foundation, charged the committee to "review the goals, successes, and challenges of MSIs and to identify the most promising programs and effective strategies that they use to increase the quantity and quality of their STEM graduates." While it is likely that the strategic insights and competitive proposal practices gained from perusing this report will be most relevant to those seeking funding in areas related to underrepresentation in the STEM workforce, it is nonetheless prudent to assume that the sponsoring foundations of this report, or foundations with similar missions, will likely be interested in funding projects that align with the report's conclusions.

This report's information and examples provide useful resources for university research offices at non-MSI institutions who work with faculty on a range of proposals involving research and/or educational partnerships with MSIs, including community college MSIs. Moreover, MSI partnerships, while most common and widespread at NSF, are relevant to other agencies as well, including NIH, DoD, NOAA, DoED, DOE, etc. NSF sponsors many major research and educational programs in which a successful partnership with MSIs plays a key role in proposal success, including many of the NSF major center-level proposals (e.g., current Gen-4 ERC) and other programs, such as ADVANCE and AGEP, and numerous crosscutting programs.

For example, the currently open GEN-4 ERC (full due July 12) requires the proposal narrative to contain "A strong **strategic plan** that outlines the interplay between the four foundational components of the ERC, including the convergent research project, ***engineering workforce development***, ***the development of a culture of diversity and inclusion***, and a focus on value creation within the innovation ecosystem"(emphases added). Addressing this requirement, particularly as it relates to an ERC strategic plan for workforce development and diversity and inclusion in a way that is **informed by this report** (subtitled "*America's Underutilized Resource for Strengthening the STEM Workforce*,") will very likely result in

strategic plans made more competitive by the report's inclusion of examples of best practices and evidence-based models (emphasis added).

This report's value also stems from the committee's charge "to review the goals, successes, and challenges of MSIs and to ***identify the most promising programs and effective strategies that they use to increase the quantity and quality of their STEM graduates***" (emphases added). This gets to the heart of what must be presented in every proposal narrative involving a partnership with an MSI. Being informed by and understanding these strategies ensures that the proposed partnership is based on substance rather than transitory convenience. It can too often be the case that a non-MSI partners with an MSI only when a funding opportunity presents itself, but is otherwise lacking in a history of collaboration and an informed understanding of what is required to make a true partnership that is also convincing to reviewers.

This report also offers a clear understanding of the "seven federally recognized types of MSIs, MSIs' student populations, the nation's current investments in MSIs, ***and what works at MSIs***, particularly the under-resourced MSIs, to overcome long-standing challenges and expand educational opportunities for their students." Moreover, this report also examines "***the evidence base behind effective strategies and practices used by many MSIs to overcome those challenges and, by doing so, expand educational opportunities for their students***" (emphases added). This is important information for research offices assisting faculty develop the most competitive configurations of non-MSI/MSI partnerships possible.

Granted, this is a long report containing a lot of information. At the very least, it should be used by research offices as a reference document and validator of proposed partnership projects with MSIs to make sure they benefit from a consensus understanding of best practices and evidence-based activities. Such an understanding will make for an effective non-MSI/MSI partnership on proposals to federal funding agencies, particularly NSF.

Scheduling the Production of Your NSF CAREER Proposal

By Lucy Deckard, co-publisher
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Proposals to the NSF Faculty Early Career Development Program (CAREER) are due this year on July 19th (for proposals to the BIO, CISE, and EHR directorates), July 20th (for proposals to ENG), and July 21st (for proposals to GEO, MPS, and SBE). If you're planning to submit this year, it's time to get serious!

Lured by the promise of uninterrupted time with no teaching responsibilities, many PIs make the mistake of waiting until the spring semester is over to start writing their CAREER proposals, but that's much too late. CAREER proposals are challenging to write. You need to describe in a compelling way a 5-year research plan that will set the stage for years of future research, as well as a 5-year integrated education and outreach plan, all in 15 pages. Therefore, even if you're an experienced proposal writer, writing a strong CAREER proposal requires many drafts as well as getting others to read and comment on your drafts. Adding to the challenge, since the CAREER program is specifically for early-career (untenured) faculty, many PIs do not have extensive proposal writing experience.

Starting early will allow you to use your CAREER draft as a "thinking document." PIs often find that project plans that seem well thought-out in their minds are actually riddled with gaps when they commit that plan to paper. By starting the writing process early, you'll have time to identify and address those gaps.

Many PIs ask when they should start writing their CAREER proposal. We provide one below based on our observations of how successful CAREER PIs who avoided panic near the due date approached the process. That said, this schedule is aspirational. While many PIs do get funded even if they aren't able to stick to the schedule below, PIs who do start early and work steadily on their proposals tend to find the process much less stressful, and they're much more likely to feel satisfied with the proposal they submit.

Proposal Production Schedule

January: By this point, you should have already chosen your research topic, or you may be trying to choose between two possible topics. You should have already published on the topic, and you should have generated the preliminary data you feel you need to make a strong argument in your proposal.

- **Identify which NSF program** to which you plan to apply (or candidate programs if you're unsure or are considering more than one topic), and program officer(s). If you're not sure how to do that, see this video.)
- **Write a short summary** of your proposed research project, including: 1) your project goal; 2) research questions/hypotheses/challenges; 3) main objectives and short summary of your approach (and how it's innovative, if applicable); 4) expected outcome and impact.
- **Write an email to the program officer,** asking if you can schedule a time to talk to her/him (either on the phone or in person), and including your short

summary, included in the body of your email. [Note: This step will have to wait until the Federal government shutdown is resolved.]

February:

- **Work on your Education component.** Talk to potential collaborators. Research the literature related to your Education component topics. Work on logistics. (If you're not sure what you want to do for your Education component, this is the time to decide! Talk to others at your campus who are doing education and outreach for ideas.)
- **Let your grants office and your department head or chair know that you plan to submit a CAREER proposal.** Not only will this help them plan, but they may also have suggestions for resources and support that may be available.
- **Talk to your Program Officer.** Choose the NSF program (or possible programs, if you plan to apply for co-funding) to which you will apply and be sure you understand the priorities of the program and the likely range of backgrounds of reviewers.

March:

- **Outline your Project Description.** Think about what arguments you need to make in each section. You may identify literature you need to find and additional preliminary data you need to generate.
- **Decide on your Education component activities.** Seek advice on logistics and evaluation, if needed.
- **Recruit internal reviewers**. Ask colleagues and mentors with backgrounds that range the spectrum of what you expect in your panel if they would be willing to review your proposal draft in June.

April:

- **Start writing the first draft of your Project Description.** This draft may be pretty rough, but it will allow you to put your ideas on paper and identify gaps.
- **Work on addressing gaps and questions.** This may require thought, research on the literature, more experiments or discussions with mentors.
- **Develop a first draft of your budget.** Work with your Sponsored Projects (or equivalent) Office. This first budget draft will allow you to determine if you've scoped your project appropriately. Don't forget to include funding to support your education and outreach activities.

May:

- **Finish writing the first draft of your Project Description.** Focus especially on refining the first section of the Project Description, which provides an overview of your project, including intellectual merit (typically 1.5 – 2 pages). Ask for feedback from mentors and colleagues.

- **Meet with your department head/chair regarding the departmental letter.** Provide them with a summary of your research and education plans so that those details can be included in the letter.
- **Ask collaborators to provide a letter of collaboration, if applicable.** For NSF CAREER, the letter of collaboration is a very short form letter saying they will do what is described in the Project Description. For this reason, it's a good idea to also provide your collaborators with a draft of the text describing their activities that will go in the Project Description.
- **Finalize other required documents.** These include your biosketch, current & pending form, list of collaborators and other affiliations, and postdoctoral mentoring plan (if applicable). Be sure to follow PAPPG directions!

June:

- **Write your second draft of the Project Description.** This draft should include all required information.
- **Send your second draft to your internal reviewers.** These are the colleagues and mentors you recruited in March. Give them a week to provide feedback.
- **Finalize your budget.** Be sure to make sure your budget aligns with your Project Description. If you include an activity, be sure you include funding to support that activity.
- **Write your budget justification.** The budget justification should provide enough detail to demonstrate to reviewers that you have thought out your project thoroughly. Note that you are now allowed five pages for this component.
- **Obtain the final version of the departmental letter.**
- **Write your Project Summary.** Look for the best sentences in your Project Description to include in your Summary.

July:

- **Finalize the Project Description.**
- **Collect all required documents.**
- **Work with your Sponsored Programs (or equivalent) office to obtain required approvals and check and upload all documents.** When uploading through Fastlane, Grants.gov, or Research.gov, be sure to check that all figures and tables look good after uploading.
- **Give your Sponsored Programs office the OK to submit.**
- **Submit at least 1 day before your deadline.** If you find some problem with the proposal after submission, you can retract and change it as long as it's still before the deadline.
- **Celebrate and sleep!** Now you can enjoy the rest of your summer!

Mark Twain's Advice on Grant Writing

By Mike Cronan, co-publisher
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Much scholarly work on Mark Twain focuses on his novel, *Adventures of Huckleberry Finn*, often referred to as the "*Great American Novel*." However, there is no known scholarly work on Twain's contribution to the craft of grant writing, even though his iconic observation to a friend, "*If I had had more time I would have written you a shorter letter,*" is one of the most important pieces of advice that can be given to anyone writing a proposal narrative.

Keep in mind that the grant writer, unlike the novelist, is under very specific constraints by the funding agency on such things as page limits, word limits, character limits, font sizes, margin sizes, etc. This is true not only of the proposal narrative but is often the case with page limits that apply to specific sections of the project description, or word or character limits for the project summary, research abstracts, and white papers.

These limits in turn impose several significant constraints on the author of the narrative text, principal among them the necessity for an organizational structure of sections and subsections of the narrative that are ***organized in the order of the relative importance of the information provided reviewers***. This holds for the project summary limited to one page, a management plan limited to three pages, or a research narrative limited to 15 pages. Narrative text that is disorganized in terms of the relative importance and sequence of the information provided, or narrative text that belabors the less important and provides insufficient detail on the more important, or bloated narrative text crying out for a ruthless edit are all examples of the more common characteristics of failed narratives.

Keep in mind that Twain's observation has two parts: "*If I had had more **time** I would have written you a **shorter** letter,*" the operative words being "**time**" and "**shorter**." The former is another shortcoming related to a failed proposal narrative. For example, the ***most valuable time in grant writing is the period between the funding announcement and the proposal due date***. This time is often lost in proposal development because the research team learned of the funding opportunity days or weeks after the published announcement, or the team delayed the decision to submit or not to submit, or the team postponed deciding on its configuration, or the process for planning and writing the proposal was poorly organized, and so on. While all of these are common reasons for time expenditures, if they are not accomplished expeditiously, the competitiveness of the proposal will suffer.

Perhaps the most common flaw in a failed narrative is writing team's failure to fully appreciate how intertwined both "time" and "short" are in proposal development. That is, ***to achieve the narrative virtue of brevity requires more time***, i.e., numerous iterations of draft narratives in order to converge on the desired outcome of shorter, which, in this context, means a proposal narrative that succinctly and concisely provides all the most important information reviewers will need to make a funding decision within the page limit. ***It cannot be overemphasized how important convergence is to the successful research narrative***. Successful convergence requires writing and rewriting, reviewing and editing, commenting and rewriting, as a continuous process finally bounded by the due date. And this all takes time.

Furthermore, in Twain's observation, the opposite of a short letter is a long letter. And while a long, rambling letter may be painful reading for the recipient, hence Train's apology for the long letter, it is not common for recipients of letters to set page limits on communications they are willing to read. But this may not be a bad idea. Those who, over the holidays, received relatives' and friends' mass-produced copies of long yearend activity reports that likely would set Twain's hair on fire may well consider suggesting page limits for Holiday letters.

And consider how these long holiday letters are treated. We usually quickly skim the contents and then discarded the letter which, unfortunately, ***is what happens when reviewers start to read a proposal narrative that may observe the page limit but is nonetheless long, rambling, and unedited***. The most important point to keep in mind here is that ***word inflation. Just as with monetary inflation, word inflation devalues the currency of a well written proposal narrative***.

It's worth noting in conclusion that the opposite of "short" points to a multitude of grant-writing sins—long-winded narrative text reminiscent of H. L. Mencken's review, of an essay as "an army of words marching across the page in search of an idea." Poor focus, poor organization, overly general description lacking details, and the absence of a continuous process of editing and rewriting will all doom a proposal to rejection.

After all, regardless of funding agency or program solicitation or discipline, all authors of a funded research and/or educational narrative must always succinctly answer a set of predetermined questions that should never take any author by surprise, specifically: what do you propose to do, why do you propose to do it, how do you propose to do it, what is your rationale for doing it, why is it significant to the agency mission, what is its impact on the field, what are the value-added benefits of doing it, what are your likely outcomes, and what does success look like?

To Revise, Re-Write, or Begin Anew?

By Mike Cronan, co-publisher
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The first big decision to be made after reading the reviews of a declined proposal is the one Shakespeare examined in his iconic character Hamlet: "*To Resubmit or Not to Resubmit, that is the question*." If this question is answered in the affirmative, the next big question centers on the project narrative: *Should it be revised, should it be deeply rewritten, or should it be set aside and an entirely new proposal written*? Some may assume that in cases where the reviews were sufficiently favorable to put the proposal on the margin or funding bubble the resubmission need only include limited revisions, or perhaps some rewriting in response to the reviews. However, as the old engineering design caveat goes, "Do not assume (ass-u-me), or you will likely make an 'ass' of 'u' and 'me.'" ***A more thoughtful approach to resubmission is required.***

For instance, a revised proposal, particularly at NSF, will likely not be reviewed by the same panel that declined the original proposal. Therefore, it's a mistake to assume that addressing the concerns of the first submission review panel will thereby address the concerns of a future but different review panel. Such a belief resembles the old adage of the general who's always prepared to fight the last war. This subtle but important distinction is too often overlooked in the resubmission process. Or, to paraphrase the disclaimer on every mutual fund warning, "*Past performance is no guarantee of future performance*."

Likewise, ***prior reviews are no guarantee of future reviews***. There are several reasons for this. First and most obviously, a new panel may or may not agree with a prior panel, or it may address new concerns not raised by the original panel, or the mix of reviewers may be disciplinarily similar but have slightly different perspectives about what is a fundable project under the program guidelines. Moreover, apart from the end-run option described below, a resubmission typically takes place in a timeframe of six months or a year in the future. Time and research significant to the field are not static but dynamic and evolving, particularly as it ***relates to the advances made in the research*** from the time the original proposal was submitted and the revised proposal is reviewed. ***To think otherwise may in fact introduce sufficient complacency into the process to make a resubmittal less competitive than the original submission***.

As noted in a December article in this newsletter, "*NSF PPAPG Webinar Overview*," the Directorates of Geosciences, Biological Sciences, and Engineering now have **no deadlines for core programs**. However, PPAPG resubmission guidelines have been revised to establish that NSF programs that accept proposals at any time **may** set guidelines stating that a declined proposal is deemed ***ineligible for resubmission for a specified period of time***. This came about from cases wherein NSF declined a "no deadline" core proposal **only to have it resubmitted several days after it was declined**, something the agency felt was an end run around the spirit of the process.

While NSF obviously frowned upon this several-day turnaround, the applicant's response also points to a common larger problem that can plague a resubmittal, rendering it noncompetitive for funding. As noted in prior newsletter articles, a declined proposal requires

a very detailed autopsy to determine the specifics and nuances informing the reviewers' negative decision.. Keep in mind that many comments made when declining a proposal, for example, "the research plan lacked specifics," or "it is not clear how this research will be accomplished," or "the goals and objectives were confusing and siloed," or "the proposed research strands are not well integrated," etc., are in essence surrogates for "this proposal was poorly written and organized."

While reviewers may comment that a proposal is well written, that compliment is usually accompanied by a recommendation for funding, whereas reviewer comments on declined proposals typically reflect observations that result from a ***poorly written or poorly organized proposal***. A narrow response to reviewer comments might overlook the possibility that such critical comments likely resulted from underlying organizational and writing problems with the proposal narrative itself. It's wise to evaluate critical comments for implications larger than the comments might narrowly describe.

To avoid doing so is to tempt fate and result in a resubmission again declined for funding.

So what to do? Well for one thing, ***recognize that a slightly revised or partially rewritten proposal is still locked into an existing narrative organization, logic structure, and wording that was declined for funding in the first place***, something that will make revision difficult and less than optimum for a successful resubmission. For example, rejections of research proposals frequently cite poor integration, noting that sections appear siloed individually and in relation to each other. No simple fix will resolve this problem, which calls for starting anew and writing a resubmission as if it were a new proposal benefiting from reviewer suggestions.

But unfortunately, "Hope springs eternal," meaning that ***declined proposals are too often resubmitted in hopes that a minimal effort composed of minor revisions and/or rewrites will guarantee a successful resubmission.*** While it is true that many proposals written by persistent PIs are funded on a second or third resubmittal, it is also the case that those PIs who successfully resubmit often do so by setting aside the failed narrative and creating a new proposal organization, argument logic structure, research rationale, narrative integration, etc.

The sad fact of life is that ***a declined proposal is a flawed document*** in many ways, and while it takes more time, effort, and thought first, to perform an in-depth autopsy on the declined proposal, and second, to come up with a new plan for a new successful proposal, ***it is the path best taken for long-term funding success.***

Win Your Grant on Page 1

By Mike Cronan, co-publisher
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Grants are won on page one. This is where you set the stage for the all subsequent narrative text. This is where you win over reviewers to your great idea. This is where you begin explaining not only what you will do but ***how you will do it***. By the end of page one, the reviewers will need to know *what you will do, why you will do it (rationale), how you will do it, your capacity to do it, and why it is significant and innovative in the context of the state of the field or agency mission*. Moreover, as NSF notes, page one is where you start to "*build trust in the reviewers that what you can't fit in the page limit is within your grasp*."

That reviewer trust will rest on how well you answer the foregoing questions with clarity and specificity and detail rather than vague generalities. Generalities on page one invariably metastasize into the rest of the narrative. Reviewers are left with only two logical interpretations for generalities rather than specifics, neither good for establishing reviewer confidence in your capacity to perform—either you are sufficiently uncertain yourself about the proposed research objectives or you are woefully unable to explain them to others, in either case, it does not bode well for a funding recommendation.

If reviewers get to page two still searching for convincing answers to the foregoing questions you will be at a serious competitive disadvantage. Page one must offer reviewers clarity and not present them with an ambiguous puzzle to solve going forward in reviewing the research narrative. If fact, if you don't convincingly respond to the foregoing questions on page one, you will leave reviewers with little interest or enthusiasm for reading the rest of your narrative, and some reviewers, by all accounts, will not.

Of course, answering the foregoing questions in a convincing and compelling way is not an easy task, and, unfortunately, one done inadequately in the majority of proposals submitted, something evident in the very low success rate of grant applications where often 80% of applicants fail. If you read reviews of declined proposals, you will soon see that a common denominator of the reviewers' decision to recommend against funding is that these questions were not adequately addressed in the proposal. This is the case regardless of disciplinary area or funding agency. In most cases, the foundation of funding failure can be traced back to how well or how poorly these questions were addressed on page one of the proposal. After all, if you can't get this right on page one, there is no reason to believe you will get it right in the rest of your project narrative.

The main reason these questions are poorly answered is that they are poorly planned for during proposal development discussions among principal investigators. A lot of groundwork has to be in place to begin to answer these questions in a convincing way. A well crafted page one of your proposal requires a lot of planning, going back to the earliest stages of proposal development. Every question that needs to be answered on page one of the proposal should be answered in a preliminary way before the writing begins. Moreover, these questions should guide the research development discussions among the proposal team, including the key initial decision every applicant must make of whether or not a submission is warranted

based on an assessment of proposal competitiveness determined in large part on how well these core questions can be answered.

Most principal investigators struggle with answering these questions clearly and concisely in the initial stages of proposal development and writing. The successful ones are persistent, going through iteration after iteration, both in team discussions that address these questions and in the narrative drafts that come out of these discussions. This is important because page one needs to be concise and succinct. It cannot be inflated in any way in hopes that if you throw a tangled mass of verbal spaghetti at the reviewers they will hopefully find something in it that they like. To quote Dr. Seuss, "***The writer who breeds more words than he needs, is making a chore for the reader who reads***."

Research Grant Writing Web Resources

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NSF: A Guide for Proposal Writing

DE-FOA-0002058 Notice of Intent to Issue Front-End Engineering and Design Studies for Carbon Capture Systems on Coal and Natural Gas Power Plants Funding Opportunity Announcement

The purpose of this Notice is to provide potential applicants advance notice that the Department of Energy plans to issue Funding Opportunity Announcement number DE-FOA-0002058 titled Front-End Engineering and Design Studies for Carbon Capture Systems on Coal and Natural Gas Power Plants. PLEASE NOTE NO APPLICATIONS WILL BE ACCEPTED THROUGH THIS NOTICE. Please do not submit questions or respond to this Notice of Intent. Prospective applicants to the Funding Opportunity Announcement should begin developing partnerships, formulating ideas, and gathering data in anticipation of the issuance of this announcement. It is anticipated that this Funding Opportunity Announcement will be posted to grants.gov and fedconnect.net in the **first quarter of Calendar Year 2019**.

Request for input on research priorities in Earth sciences

The National Academies of Sciences, Engineering, and Medicine is conducting a study on Catalyzing Opportunities for Research in the Earth Sciences (CORES), sponsored by the National Science Foundation's Division of Earth Sciences. The purpose of the CORES study is to (1) identify a concise set of high-priority scientific questions for the next decade, (2) assess infrastructure needed to address these questions, and (3) determine opportunities for greater collaboration with other NSF divisions and directorates, federal agencies, and domestic and international partners. The CORES committee strongly feels that this study must be informed by vigorous community input from across the entire spectrum of Earth sciences. Provide input on research priorities in Earth sciences for the coming decade **here.**

Register to Attend the NIH Regional Seminar on Program Funding and Grants Administration - Baltimore, MD - May 2019

Are you a research administrator, investigator, grant writer, or have another role at your institution which involves working with the NIH grants process?
Are you new or feel that a better understanding of the NIH grants process and related policies could be a benefit in your job?
If so, then it's time to register for the Spring 2019 NIH Regional Seminar in Baltimore, Maryland !

- Location: Renaissance Baltimore Harborplace Hotel
- Wednesday, May 15: Optional Pre-Seminar Workshops
- Thursday & Friday, May 16-17: 2-Day Seminar

What have some recent attendees shared with us about their experience?

- *Fantastic conference, thank you! As a post-doc and NIH-trainee, the seminar was very informative and helped me to navigate the NIH, as well as feel more prepared for my future.*
- *Meet the Experts was great! Presenters were outstanding – very knowledgeable.*
- *I found the pre-seminar workshops to be very helpful and informative.*
- *My first time here… it was great! Many/all [of my] questions were answered.*

Now that we have your interest…here's even more!

- 65 NIH & HHS presenters: Review, program, grants management and policy officials are looking forward to sharing their expertise and guidance.
- 1:1 Meet the Experts: In addition to presenters, there will be additional NIH Institute & Center experts available for 15-minute conversations to help provide more personal guidance.
- HHS experts: Hear from and talk to experts from the Office of Human Research Protections (OHRP), Office of Inspector General (OIG) & Office of Research Integrity (ORI).
- 3 Tracks and over 45 different topics: Within the seminar's 3 tracks for Administrators, New Investigators and All Interests, you'll find topics that cover the fundamentals, Peer Review Process, budgets, grant writing, research integrity, compliance, humans and animals in research, pre-award and post award issues, contracts, and so much more! Review the draft agenda and list of session descriptions today!

Optional Pre-Seminar Workshops offered:

A variety of optional workshops are offered on the day prior to the 2-day seminar for attendees wanting a more in-depth look at various grants policies and processes. These include ½ day and full day options on Wednesday, May 15.

Half Day:

- NIH electronic Research Administration (eRA) experts provide workshops on application preparation and submission, as well as topic issues related to the eRA Commons;
- "NIH Boot Camp: Getting Started with NIH" is designed for research administrators with no or very little experience working with NIH; and
- Intellectual Property experts will provide two workshop options depending on your knowledge level.

Full Day:

- Workshop on Human Research Protections: OHRP & NIH collaborate to provide this workshop on how to get research protocols through human subjects review.

Who should attend?

The NIH Regional Seminar is intended for those new to the grants process, including sponsored project officers and departmental administrators, investigators, faculty, graduate students, and others involved in the NIH grants process. The presentations during the 2-day seminar are considered basic fundamentals. However, there are a few sessions designed for those with slightly more experience. Approximately 650-850 participants are expected, providing extended opportunities for sharing and learning from peers, as well as the NIH & HHS experts.

What's the goal of the Seminar?

The goal of the NIH Regional Seminar on Program Funding and Grants Administration is to offer participants an unparalleled opportunity to gain a better perspective of NIH policies and

programs, network with their peers, gather helpful NIH contacts, so that they may return to their offices and/or labs with useful information, resources, and tools to assist in obtaining and managing NIH awards.

When can you register?

Now - registration is open! These seminars often reach capacity before the seminar dates so start making plans soon. A $50 "Trainee Discount" is offered and information is available on the Registration Page https://regionalseminars.od.nih.gov/baltimore2019/registration/.

Is there a special hotel room rate for seminar participants?

Yes - but make your reservation today and don't miss this limited time opportunity to receive a discounted seminar rate at the venue hotel.

Are there other dates and locations?

Plans for a Fall 2019 NIH Regional Seminar are tentative for early November in Phoenix, AZ. Please check the general NIH Regional Seminar Home Page . (ListServ info also available.)

Inquiries

Please direct all inquiries to:

Spring 2019 NIH Regional Seminar in Baltimore, MD - May 15-17, 2019: https://regionalseminars.od.nih.gov/baltimore2019/

General NIH Regional Seminar Home Page: https://grants.nih.gov/news/contact-in-person/seminars.htm

Educational Grant Writing Web Resources

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A Look at 3-Year Postsecondary Persistence and Attainment

A Look at Parent and Student Expectations of Highest Education Level

Trends in High School Dropout and Completion Rates

Gates Foundation to Support Implementation of High-Quality Curricula

Report of the 2018 NSSME+

The Report of 2018 NSSME+ details the results of a nationally representative survey of 7,600 science, mathematics, and computer science teachers in schools across the United States. Areas addressed include: teacher backgrounds and beliefs; science, mathematics, and computer science professional development; science, mathematics, and computer science courses; instructional objectives and activities; instructional resources; and factors affecting instruction. The Report may be downloaded as one large, 8.18 megabyte document or one chapter at a time.

NSF Science Zone

Whether you're a teacher, student, or just fascinated by science, the NSF Science Zone app will ignite your imagination. Featuring hundreds of exciting videos and high-resolution photos from a dozen areas of science, you can spend hours absorbed in discoveries that take you from the depths of space, to the wonders of the unimaginably small, to the far corners of our own planet.

Formerly Science 360, the new NSF Science Zone has been reimagined from the ground up to allow you more ways to investigate and share the ideas that spark curiosity. NSF Science Zone is available now on the Apple App Store for all iOS mobile devices. Soon to be available on Google Play for all Android mobile devices. Features:

- Spin through the carousel browser to learn about hundreds of discoveries that are shaping your world
- Dive deeper into the latest scientific innovations with hours of captivating videos and fascinating photos
- Easy access from iPhone and iPad devices
- Apply filters to explore the items that match your areas of interest
- Do a text search for specific items when you know exactly what you're looking for
- Return again and again to the items that interest you most by saving them to your favorites list
- Download images to your device or share the content with your friends via social media
- Learn about the latest findings from NSF research partners around the globe

English Learners in STEM Subjects: Transforming Classrooms, Schools, and Lives

The imperative that all students, including English learners (ELs), achieve high academic standards and have opportunities to participate in science, technology, engineering, and mathematics (STEM) learning has become even more urgent and complex given shifts in science and mathematics standards. As a group, these students are underrepresented in STEM fields in college and in the workforce at a time when the demand for workers and professionals in STEM fields is unmet and increasing. However, English learners bring a wealth of resources to STEM learning, including knowledge and interest in STEM-related content that is born out of their experiences in their homes and communities, home languages, variation in discourse practices, and, in some cases, experiences with schooling in other countries.

English Learners in STEM Subjects: Transforming Classrooms, Schools, and Lives examines the research on ELs' learning, teaching, and assessment in STEM subjects and provides guidance on how to improve learning outcomes in STEM for these students. This report considers the complex social and academic use of language delineated in the new mathematics and science standards, the diversity of the population of ELs, and the integration of English as a second language instruction with core instructional programs in STEM.

Learning Through Citizen Science: Enhancing Opportunities by Design

In the last twenty years, citizen science has blossomed as a way to engage a broad range of individuals in doing science. Citizen science projects focus on, but are not limited to, nonscientists participating in the processes of scientific research, with the intended goal of advancing and using scientific knowledge. A rich range of projects extend this focus in myriad directions, and the boundaries of citizen science as a field are not clearly delineated. Citizen science involves a growing community of professional practitioners, participants, and stakeholders, and a thriving collection of projects. While citizen science is often recognized for its potential to engage the public in science, it is also uniquely positioned to support and extend participants' learning in science.

Contemporary understandings of science learning continue to advance. Indeed, modern theories of learning recognize that science learning is complex and multifaceted. Learning is affected by factors that are individual, social, cultural, and institutional, and learning occurs in virtually any context and at every age. Current understandings of science learning also suggest that science learning extends well beyond content knowledge in a domain to include understanding of the nature and methods of science.

Agency Research News

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Dear Colleague Letter: Research to Improve STEM Teaching and Learning, and Workforce Development for Persons with Disabilities

The National Science Foundation's (NSF's) Directorate for Education and Human Resources (EHR) wishes to notify the community of its intention to support fundamental research on science, technology, engineering and mathematics (STEM) learning for persons with disabilities, such as dyslexia or autism. NSF intends to foster the development of fundamental knowledge in STEM teaching and learning for persons with disabilities, in both formal and informal contexts, from the earliest developmental stages of life through participation in the workforce. This notification identifies opportunities for such research and development through the following programs:

- EHR Core Research (ECR): STEM Learning and Learning Environments, Broadening Participation, and Workforce Development (NSF 19-508)
- Discovery Research preK-12 (NSF 17-584)
- Improving Undergraduate STEM Education: Education and Human Resources (NSF 17-590)
- Faculty Early Career Development Program (CAREER) (NSF 17-537)

NSF invites proposals focused explicitly on advancing knowledge about STEM teaching, learning, and workforce development for individuals with disabilities. Research in disabilities education includes fundamental research about learners (of all ages) with disabilities, with a particular focus on efforts to understand and address disability-based differences in STEM teaching and learning and workforce preparation and participation. Proposers are encouraged to explore a wide range of fundamental and applied research and development projects that may address, but are not limited to, such areas as:

- The cognitive and neurological underpinnings of learning disabilities (such as attention, working memory, spatial reasoning, or executive function) in the context of STEM education and/or employment;
- Theoretical constructs about self-regulated learning (such as metacognition, strategic action, learning motivation, and self-efficacy) in the STEM disciplines involving students with disabilities;
- Computer and on-line training programs for improving mathematics learning and performance for students with dyslexia and other specific learning disabilities;
- Developmental trajectories of persons with specific learning disabilities, or other types of specific learning disabilities, in STEM education and professional disciplines over time;
- The development and efficacy of STEM instructional strategies for persons with disabilities at early ages through undergraduates;
- Instructional practices for young students with disabilities who are not responsive to typical mathematics and/or science classroom instruction;
- The auditory processing and learning mechanisms employed by students with visual impairments, and/or visual processing and learning mechanisms by students who are deaf or hard of hearing, in the context of learning in the STEM disciplines;

- The development of measures in the STEM disciplines that support valid and reliable observations (e.g., progress monitoring tools or dynamic assessments) for students with disabilities;
- Effective professional development for teachers of students with disabilities;
- The stereotype and identity threat that persons with disabilities experience in STEM classrooms, research settings, and workplaces
- The societal and organizational characteristics that influence STEM learning, educational, and career pathways for students with specific types of disabilities;
- How to improve STEM outcomes for individuals with specific learning disabilities, including dyslexia.

As described in the above-referenced NSF programs, a wide range of research activities may be supported, including work on specific learning disabilities such as dyslexia, as identified by Public Law (P.L.) 114-124, the Research Excellence and Advancements for Dyslexia Act. Fundamental research may involve the collection of new data and/or secondary analyses that leverage extant state, national, international or other databases.

In addition, NSF is interested in supporting proposals focused on building capacity for research on STEM education for persons with disabilities through synthesis projects and conferences related to advancing research and understanding of individuals with disabilities.

- **Synthesis** proposals seek support for the synthesis and/or meta-analysis of existing knowledge on a topic of critical importance to STEM learning and/or education, or for the diffusion of research-based knowledge. Examples of syntheses in this area could include the clarification of the current status of research relative to cognition and mathematics learning disabilities or clarifying identification and screening procedures for mathematics learning disabilities.
- **Conference** proposals seek support to conduct well-focused conferences related to the research goals of the program. Investigators are strongly encouraged to contact a program officer prior to submission to discuss their ideas.

Proposals responding to this DCL should be submitted by the due date (if any) of the relevant NSF program. When responding to this DCL, please begin your proposal title with "Disability DCL: ". Submissions should follow the *NSF Proposal & Award Policies & Procedures Guide (PAPPG)* and the guidelines in the relevant solicitation.

NSF strongly encourages early career faculty to submit proposals.

Dear Colleague Letter: Research Coordination Networks (RCNs) for driving convergent science with the National Ecological Observatory Network (NEON)

With this Dear Colleague Letter (DCL), the National Science Foundation's (NSF) Division of Biological Infrastructure (DBI) and Division of Environmental Biology (DEB) within the Directorate for Biological Sciences (BIO) announce an intent to support Research Coordination Networks (RCNs, NSF 17-594) to coordinate new and existing groups of scientists conducting research enabled by the National Ecological Observatory Network (NEON). Now entering its first year of full operations, NEON is a continental-scale network of standardized field instruments, sensors, and manual biological sampling that will enable reproducible research over the next 30 years.

Solutions for the most persistent challenges facing the ecological sciences today are hindered by our limited understanding of the complex interactions between living and non-living systems operating over large spatial and temporal scales. Because many environmental controls, responses, and feedbacks operate over regional to continental scales, they cannot be investigated mechanistically by disconnected studies of individual ecosystems over short periods of observation. Understanding ecological processes at continental scale has been impeded by a lack of distributed ecological research infrastructure that would enable the research needed to address complex issues at the necessary spatiotemporal scales. NEON is a major facility for studying the biosphere synoptically at regional to continental scales and for supporting ecological forecasts in North America with openly accessible methods and high precision data products.

These RCN awards will provide collaborative opportunities for NEON-enabled science communities to communicate their research and to synthesize investigations of key ecological problems, ideas, and practices. Successful RCNs will conduct inclusive conferences, in-person and/or virtual meetings, and other structured activities to establish new collaborations and enhance cooperation among NEON-enabled science research communities. RCN awards will address most of the following five science priorities: (1) identify and prioritize research topics; (2) enable synthesis activities that establish a basis for new NEON-enabled science; (3) define questions and evaluations of NEON data products that resolve methodological challenges and offer new or improved algorithms; (4) establish mechanisms to coordinate ongoing or planned collaborative research activities; and (5) develop best practices for data management that promote open sharing of information. Proposals that emphasize training and educational activities to build the next generation of scientists involved in NEON-enabled science are also encouraged. All RCN awards must communicate information and ideas to the public and the broader community of scientists and plan to fully include women, underrepresented minority groups, veterans, and persons with disabilities, and promote a respectful, inclusive, and collaborative environment.

Coordination efforts should enable a collaborative enterprise to tackle major, longstanding ecological and environmental problems at regional to continental scales that are addressable with NEON data and infrastructure, but which neither short-term nor single-discipline efforts can solve. The RCN program facilitates networking and knowledge sharing and establishment of the directions for new scientific endeavors. RCN awards do not support new primary data collection but can be used to support synthesis activities where existing data, infrastructure, and collaboration are used to advance knowledge in disciplinary and cross-disciplinary areas of science, engineering, and education. Proposals should offer novel and integrated conceptual frameworks; those strictly for development of tools or algorithms, or those that are only indirectly applicable to NEON, may be more appropriate for core programs within DBI that support informatics research and cyberinfrastructure development: Infrastructure Capacity for Biology and Infrastructure Innovation for Biological Research.

Dear Colleague Letter: Conference Proposals on Concepts for Advancing Sustainable Urban Systems (SUS) Research Networks

In January 2018, NSF's Advisory Committee for Environmental Research and Education (ACERE) completed the report entitled "Sustainable Urban Systems: Articulating a Long-Term

Convergence Research Agenda." This report is accessible at the following link: https://www.nsf.gov/ere/ereweb/ac-ere/sustainable-urban-systems.pdf.

With this DCL, NSF is calling for conference[1] proposals on "Concepts for Advancing Sustainable Urban Systems (SUS) Research Networks." The deadline for submission of these proposals is 5:00 PM submitter's local time, March 22, 2019. These conference proposals may be submitted at any time up to and including the deadline. The conference proposals are to be submitted via FastLane to the Environmental Sustainability program (PD 18-7643) in the Chemical, Bioengineering, Environmental, and Transport System Division (CBET) of NSF's Directorate for Engineering (ENG). Guidance on conference proposal content and the associated budget request is provided below.

NSF has had two earlier competitions on Research Networks. The most recent solicitation on Research Networks is accessible at the following link: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf14534.

The two earlier competitions led to the establishment of five Research Networks, each funded for about $12 million with an original duration of 4 to 5 years.

Preparation of conference proposals on "Concepts for Advancing Sustainable Urban Systems (SUS) Research Networks" should be guided, but not constrained, by the ACERE report and the most recent Research Networks solicitation (links to both are provided above). Conference proposals are expected to present promising ideas and visions for advancing SUS Large-Scale Research Networks beyond what is described in these two documents. In particular, it would be beneficial for conference proposals to include plans to identify activities that could catalyze strong industry-municipality-academia collaborations on use-inspired research that has high potential for significant societal and sustainability impacts. It would also be advantageous for proposals to describe activities that will develop a deeper understanding of urban systems as integrated, social-ecological-technological systems and that will improve education related to SUS themes. As delineated in the ACERE report, "urban systems" include rural regions due to the systems interdependence of urban areas and rural regions. Likewise, for the ACERE SUS report, "sustainable" encompasses "resilient."

Proposers are encouraged to address themes of convergence science and engineering, and should bring together researchers, educators, and practitioners from academia, industry, municipalities, and nonprofit organizations. Conferences should draw participants from diverse sectors, some of which may typically not be represented, such as community members, humanities scholars, and artists. Proposers are also encouraged to consider geographical diversity as appropriate for the topic when describing specific strategies for recruiting conference participants. Proposals that explore innovative approaches to broadening participation and the incorporation of concepts and aspects of NSF Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science initiative (INCLUDES) into conference proceedings and outcome reports are also desired. Information on NSF INCLUDES is accessible at the following link: https://www.nsf.gov/news/special_reports/nsfincludes/index.jsp.

Conferences must be interdisciplinary. Conference proposals are to identify a Conference Organizing Committee composed of members drawn from multiple disciplines and organizations, and possibly including practitioners and stakeholders. An individual may appear on a maximum of 2 conference proposals in a senior role (PI, co-PI, or Senior Personnel). The

Organizing Committee is to be engaged in formulating, executing, and reporting on the conference. Conferences may touch on themes of an international nature where potential benefits for the U.S. are made clear. Engagement of international researchers in conferences is welcome but NSF support is limited to U.S. participants. All conferences should be held in the U.S. unless explicit written authorization in advance is obtained from an NSF program officer. Conference budget requests are not to exceed $50,000. Up to 20 conferences may be supported by this DCL, contingent on proposal quality and availability of funds. Conference proposals are to follow guidance posted in NSF's *Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter II.E.7, as provided at the following link: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

Proposals are to include a tentative conference location and agenda. Conferences are to be held during the summer of 2019, and conference outcome reports should be made available to the research community no later than September 30, 2019. The Project Description of a given conference proposal should articulate the desired outcomes of the conference in terms of visions for large-scale research networks as articulated in the ACERE report. In addition to listing the confirmed Organizing Committee, PIs should articulate how attendees will be selected — including strategies for recruiting a diverse set of participants. PIs are advised to consider the proposed conference date(s) in the context of the foreseeable calendar of potentially conflicting events (e.t., other conferences in the field) and the out-of-office challenges of the summer season. Proposals should go beyond a full schedule of talks in describing activities that clearly tie into the expected outcomes of the conference; typically, this would mean including interactive breakout sessions in the conference design.
Review of conference proposals will be competitive, evaluated internally at NSF by members of the NSF SUS Working Group.

For reference, NSF's efforts on SUS, S&CC (Smart & Connected Communities), CoPe (Coastlines and People), and LTER (Long Term Ecological Research) â€“ Urban Ecology are compared and contrasted at the following link: https://www.nsf.gov/ere/ereweb/urbansystems.

Agency Reports, Workshops & Research Roadmaps

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Understanding the Educational and Career Pathways of Engineers

Engineering skills and knowledge are foundational to technological innovation and development that drive long-term economic growth and help solve societal challenges. Therefore, to ensure national competitiveness and quality of life it is important to understand and to continuously adapt and improve the educational and career pathways of engineers in the United States. To gather this understanding it is necessary to study the people with the engineering skills and knowledge as well as the evolving system of institutions, policies, markets, people, and other resources that together prepare, deploy, and replenish the nation's engineering workforce.

This report explores the characteristics and career choices of engineering graduates, particularly those with a BS or MS degree, who constitute the vast majority of degreed engineers, as well as the characteristics of those with non-engineering degrees who are employed as engineers in the United States. It provides insight into their educational and career pathways and related decision making, the forces that influence their decisions, and the implications for major elements of engineering education-to-workforce pathways.

Minority Serving Institutions: America's Underutilized Resource for Strengthening the STEM Workforce

There are over 20 million young people of color in the United States whose representation in STEM education pathways and in the STEM workforce is still far below their numbers in the general population. Their participation could help re-establish the United States' preeminence in STEM innovation and productivity, while also increasing the number of well-educated STEM workers.

There are nearly 700 minority-serving institutions (MSIs) that provide pathways to STEM educational success and workforce readiness for millions of students of color—and do so in a mission-driven and intentional manner. They vary substantially in their origins, missions, student demographics, and levels of institutional selectivity. But in general, their service to the nation provides a gateway to higher education and the workforce, particularly for underrepresented students of color and those from low-income and first-generation to college backgrounds. The challenge for the nation is how to capitalize on the unique strengths and attributes of these institutions and to equip them with the resources, exceptional faculty talent, and vital infrastructure needed to educate and train an increasingly critical portion of current and future generations of scientists, engineers, and health professionals.

Minority Serving Institutions examines the nation's MSIs and identifies promising programs and effective strategies that have the highest potential return on investment for the nation by increasing the quantity and quality MSI STEM graduates. This study also provides critical information and perspective about the importance of MSIs to other stakeholders in the nation's system of higher education and the organizations that support them.

Thriving on Our Changing Planet: A Decadal Strategy for Earth Observation from Space

We live on a dynamic Earth shaped by both natural processes and the impacts of humans on their environment. It is in our collective interest to observe and understand our planet, and to predict future behavior to the extent possible, in order to effectively manage resources, successfully respond to threats from natural and human-induced environmental change, and capitalize on the opportunities – social, economic, security, and more – that such knowledge can bring.

By continuously monitoring and exploring Earth, developing a deep understanding of its evolving behavior, and characterizing the processes that shape and reshape the environment in which we live, we not only advance knowledge and basic discovery about our planet, but we further develop the foundation upon which benefits to society are built. *Thriving on Our Changing Planet* presents prioritized science, applications, and observations, along with related strategic and programmatic guidance, to support the U.S. civil space Earth observation program over the coming decade.

Advancing Sustainability of U.S.-Mexico Transboundary Drylands: Proceedings of a Workshop

The drylands region shared by the United States and Mexico currently faces multiple sustainability challenges at the intersection of the human and natural systems. Warming and drying conditions threaten surface water and groundwater availability, disrupt land- and marine-based livelihood systems, and challenge the sustainability of human settlements. These biophysical challenges are exacerbated by a highly mobile and dynamic population, volatile economic and policy conditions, increased exposure to extreme events, and urbanization on marginal, vulnerable lands.

The U.S. National Academies of Sciences, Engineering, and Medicine collaborated with the Mexican Academy of Sciences, Academy of Engineering, and the National Academy of Medicine to plan a 2-day binational workshop, Advancing Sustainability of U.S.-Mexico Transboundary Drylands. The workshop goals were to highlight the challenges facing the region, assess the scientific and technical capacity that each nation can bring to bear in addressing these challenges, and identify new opportunities for binational research collaboration and coordinated management approaches in the advancement of sustainability science and development. This publication summarizes the presentations and discussions from the workshop.

New Funding Opportunities

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New Funding Posted Since December 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 December 15 Newsletter

FY 2019 Continuation of Solicitation for the Office of Science Financial Assistance Program
Open to September 30.

DOE to Provide $16 Million for New Research into Atmospheric and Terrestrial Processes
the **U.S. Department of Energy (DOE)** announced a plan to provide $16 million for new observational research aimed at improving the accuracy of today's climate and earth system models. The funds will be made available under two separate initiatives, with $11 million targeted at atmospheric research focused on better understanding the role of clouds and aerosols, and $5 million devoted to the study of terrestrial processes. Applications are open to universities and nonprofits, both individually and in teams, with (non-DOE) federal laboratories invited to participate as possible partners. Awards will be chosen on a competitive basis using peer review. Grants are expected to be two to three years in duration. Total funding, provided by DOE's Office of Science, will be $16 million in Fiscal Year 2019 dollars. **Details can be found in the two Funding Opportunity Announcements posted here.**

Department of Energy Announces $18 Million for Transformative Energy Technologies
WASHINGTON, D.C. – The U.S. Department of Energy's (DOE's) Advanced Research Projects Agency-Energy (ARPA-E) today announced its latest funding opportunity designed to support early stage, transformative energy technologies. The "Solicitation on Topics Informing New Program Areas" funding opportunity enables ARPA-E to investigate potential new program areas while highlighting energy challenges of critical interest to American competitiveness and security.

"By design, ARPA-E is an agency that adapts quickly to the changing energy landscape, and this new program will allow us to better capitalize on emerging energy trends," said U.S. Secretary of Energy Rick Perry. "This program will enable the Department to target technologies at the project level, driving innovation and creating new opportunities."

This Funding Opportunity will remain open for an extended period, and new topics will be released periodically to target emerging technologies and potential new program

areas. This first round calls for innovative technologies supporting next generation nuclear energy, high temperature sensors for downhole geothermal exploration, and ultra-durable, lower-energy concrete for infrastructure. ARPA-E will award up to $18 million to project teams spread across standard and small business (SBIR/STTR) solicitations.

DOE believes these funded projects could encourage the development of cross-disciplinary communities around these topic areas, potentially leading to the creation of new projects and programs. To learn more about the Solicitation on Topics Informing New Program Areas and to apply for funding, visit ARPA-E eXCHANGE.

DOE Terrestrial Ecosystem Science

The Terrestrial Ecosystem Science (TES) program in the Climate and Environmental Sciences Division (CESD), Biological and Environmental Research (BER) program of the Office of Science (SC), U.S. Department of Energy (DOE), announces its interest in receiving research applications seeking to improve the understanding and representation of terrestrial ecosystems in ways that advance Earth system model parameterizations and capabilities. This FOA will consider applications that utilize and couple measurements, experiments, modeling and/or synthesis of terrestrial ecosystems across a continuum from the subsurface to the top of the vegetated canopy and from molecular to global scales. TES hereby announces its interest in grant applications that advance the understanding and predictive representation of terrestrial ecosystem in the following areas: 1) Interactions and feedbacks between aboveground and belowground processes; and, 2) The role of disturbance at the terrestrial-aquatic interface. Applicants are required to pose their research applications in the context of representing terrestrial ecosystem processes in ways that improve the predictability of Earth system models. **Preapplications January 24.**

DOE Atmospheric System Research (ASR)

The goal of ASR is to quantify the interactions among aerosols, clouds, precipitation, and radiation to improve understanding of key cloud, aerosol, precipitation, and radiation processes that affect the Earth's radiative balance and hydrological cycle, especially processes that limit the predictive ability of regional and global models. For the most part, ASR investments use ARM's measurements of radiation, aerosols, clouds, precipitation, thermodynamics, turbulence, and state variables. ARM's continuous observational datasets are supplemented with process models, laboratory studies, and shorter-duration ground-based and airborne field campaigns to target specific atmospheric processes in different locations and across a range of spatial and temporal scales. ASR's four priority research areas correspond to atmospheric regimes with large uncertainties in earth system prediction: aerosol processes, warm boundary-layer processes, convective processes, and high-latitude processes. Specific topics solicited in ASR funding opportunity announcements vary from year to year to take advantage of new ARM data, respond to ASR-relevant workshop reports, and maintain a balanced research portfolio. Not all ASR priority research areas will be solicited every year. **Preapplications due January 28.**

DE-FOA-0001991 University Training and Research for Fossil Energy Applications

This Funding Opportunity Announcement (FOA) is for the solicitation of applications from United States Colleges and Universities for Fossil Energy Research. It encompasses two distinct

programs with their own dedicated funding, requirements, and restricted eligibility: the University Coal Research (UCR) Program; and the Historically Black Colleges & Universities and Other Minority Institutions (HBCU/OMI) Program. Both programs seek to educate the next generation of scientists and engineers while advancing the frontiers of fossil energy science and technology. The HBCU/OMI program has the additional goal of increasing the participation of under-represented populations of students in such research. **Due February 25.**

New Bioimaging Approaches For Bioenergy

The DOE SC Biological Systems Science Division (BSSD) in Biological and Environmental Research (BER) hereby announces its interest in receiving applications to support fundamental research towards enabling new bioimaging approaches to achieve an **advanced understanding of plant and microbial systems relevant to bioenergy research**. New quantum dot (QD)-based-imaging approaches including quantum probes and sensors, and complementary optical imaging instrumentation, are needed to allow the observation and characterization of multiple complex biological processes occurring within living plant and microbial systems, including rhizosphere and soil microbiomes. Processes of interest include, but are not limited to measuring enzyme function within cells, tracking metabolic pathways in vivo, monitoring the transport of materials within cells or across cellular membranes, monitoring signaling processes between cells within plant-microbe and microbe-microbe interactions. Development of probes and sensors with desirable optical properties functionalized with specific biologically active molecules to interact and bind with specific cellular targets of interest are encouraged. Proposed approaches should enable dynamic localization and imaging to facilitate testing and validation of hypothesized cellular processes. It is expected that applications will make use of quantum-dot enabled approaches for imaging of biological targets non-destructively and in real time, to dramatically enhance our ability to measure biological processes in and among living cells. **Pre-Application due April 4; full May 20.**

URL Links to New & Open Funding Solicitations

Links verified June 8, 2018

- 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)
- NASA Open Solicitations
- CDMRP FY 2018 Funding Announcements
- DOE/EERE Funding Opportunity Exchange

- New Funding Opportunities at NIEHS (NIH)
- National Human Genome Research Institute Funding Opportunities
- Office of Naval Research Currently Active BAAs
- HRSA Health Professions Open Opportunities
- Foundation Center RFP Weekly Funding Bulletin

Solicitations Remaining Open from Prior Issues of the Newsletter

DE-FOA-0001905: Energy-Water Desalination Hub

https://www.grants.gov/web/grants/search-grants.html?keywords=DE-FOA-0001905%20%20

The Office of Energy Efficiency and Renewable Energy (EERE), within the U.S. Department of Energy (DOE), invests in cutting-edge research, development, and demonstration activities focused on sustainable transportation, renewable power, and energy efficiency. Through EERE's Advanced Manufacturing Office (AMO) public-private R&D consortia, manufacturers, small businesses, universities, national laboratories, and state and local governments are brought together to pursue coordinated early-stage R&D in high-priority areas essential to energy in manufacturing. Federal funding is the catalyst to bring stakeholders into shared spaces and to address process and technological challenges that present a significant degree of scientific or technical uncertainty.

The purpose of this funding opportunity announcement (FOA) is to establish an Energy Innovation Hub (referred to hereafter as the Energy-Water Desalination Hub, or the Hub) to address water security issues in the U.S. For the purpose of this FOA, "desalination" more broadly includes technologies that primarily remove salts. The Hub is a critical component of the Department of Energy's (DOE) broader Water Security Grand Challenge which will use a coordinated suite of prizes, competitions, early stage research and development (R&D), and other programs to help address the nation's water security needs.

The Energy-Water Desalination Hub will be organized around four topic areas: 1) Materials Research and Development, 2) New Process Research and Development, 3) Modeling and Simulation Tools, and 4) Integrated Data and Analysis. DOE intends to select and fund one application with the greatest likelihood of achieving the goals of all four topics of this FOA. **Please carefully review the complete Funding Opportunity Announcement, which can be accessed under the "DOCUMENTS" heading below.**

Please click "FOA FAQs" under the "DOCUMENTS" heading below for Questions and Answers specific to this FOA.

Applicants that experience issues with submissions PRIOR to the FOA Deadline: The Exchange system is currently designed to enforce hard deadlines for Full Application submissions. The APPLY and SUBMIT buttons automatically disable at the defined submission deadlines. The intention of this design is to consistently enforce a standard deadline for all applications. In the event that an Applicant experiences technical difficulties with a submission, the Applicant should contact the Exchange helpdesk for assistance (EERE-ExchangeSupport@hq.doe.gov).

Informational Webinar: The Informational Webinar mentioned in the FOA will be held on January 7, 2019 at 3:00 PM Eastern Standard Time. Attendance is not mandatory and will not

positively or negatively impact the overall review of any Applicant submissions. Standard application questions regarding the EERE Office and FOA procedures will be discussed. No new information will be presented during the webinar and EERE will not answer any attendee questions during the webinar.
After the webinar is complete, a link will be provided to access the audio recording of the webinar. Also, a copy of the Webinar Slides and Webinar Transcript will be available to download in the "DOCUMENTS" section below.
Please click here to register for the webinar.
Documents

- FOA FAQs (Last Updated: 9/4/2018 05:02 PM ET)
- DE-FOA-0001905 Energy-Water Desalination Hub FOA (Last Updated: 12/12/2018 05:52 PM ET)

Concept Paper Submission Deadline: 2/7/2019 5:00 PM ET
Full Application Submission Deadline: 5/7/2019 5:00 AM ET

NSF Campus Cyberinfrastructure
The Campus Cyberinfrastructure (CC*) program invests in coordinated campus-level networking and cyberinfrastructure improvements, innovation, integration, and engineering for science applications and distributed research projects. Learning and workforce development (LWD) in cyberinfrastructure is explicitly addressed in the program. Science-driven requirements are the primary motivation for any proposed activity. **Due February 20**.

Biotechnology Risk Assessment Research Grants Program (BRAG)
The purpose of the BRAG program is to support the generation of new information that will assist Federal regulatory agencies in making science-based decisions about the effects of introducing into the environment genetically engineered organisms (GE), including plants, microorganisms — such as fungi, bacteria, and viruses — arthropods, fish, birds, mammals and other animals excluding humans. Investigations of effects on both managed and natural environments are relevant. The BRAG program accomplishes its purpose by providing federal regulatory agencies with scientific information relevant to regulatory issues. See the Request for Applications (RFA) for details. View the Centers of Excellence (COE) webpage to access a factsheet on the COE designation process, including COE criteria, and a list of programs offering COE opportunities. **Due February 20**.

NSF Dimensions of Biodiversity
The 2019 Dimensions of Biodiversity program is restricted to projects supported by international 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. Proposals are to be submitted jointly, with the US PIs submitting to NSF and the collaborating Chinese, Brazilian, or South African PIs submitting to their appropriate national funding agencies. **Due February 28**.

Future of Work at the Human-Technology Frontier: Core Research (FW-HTF)

The specific objectives of the Future of Work at the Human-Technology Frontier program are (1) to facilitate convergent research that employs the joint perspectives, methods, and knowledge of computer science, engineering, learning sciences, research on education and workforce training, and social, behavioral, and economic sciences; (2) to encourage the development of a research community dedicated to designing intelligent technologies and work organization and modes inspired by their positive impact on individual workers, the work at hand, the way people learn and adapt to technological change, creative and supportive workplaces (including remote locations, homes, classrooms, or virtual spaces), and benefits for social, economic, and environmental systems at different scales; (3) to promote deeper basic understanding of the interdependent human-technology partnership to advance societal needs by advancing design of intelligent work technologies that operate in harmony with human workers, including consideration of how adults learn the new skills needed to interact with these technologies in the workplace, and by enabling broad workforce participation, including improving accessibility for those challenged by physical or cognitive impairment; and (4) to understand, anticipate, and explore ways of mitigating potential risks arising from future work at the human-technology frontier. **Due March 6.**

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

The Improving Undergraduate STEM Education: Hispanic-Serving Institutions (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 science, technology, engineering, and mathematics (STEM) at HSIs. In addition, the HSI Program seeks to build capacity in undergraduate STEM education at HSIs that typically do not receive high levels of NSF grant funding. The National Science Foundation (NSF) established the 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 is aligned with NSF's commitment to increase access for underrepresented groups to the Nation's STEM enterprise. In designing the HSI Program, NSF sought community input by several mechanisms (https://nsf.gov/ehr/HSIProgramPlan.jsp) and has continued to gather community input to inform future components of, or modifications to, the HSI Program. **Webinar.** The HSI Program team, in collaboration with the NSF Division of Grants and Agreement (DGA), will host webinars after the release of this solicitation. Key features and expectations of the HSI Program as well as guidance on proposal preparation and submission will be discussed with potential PIs and their authorized organizational representatives responsible for submitting proposals to the HSI Program. Information regarding the webinar will be posted to the HSI Program webpage: https://nsf.gov/ehr/HSIProgramPlan.jsp. **Due March 6.**

NOAA-OAR-OWAQ-2019-2005820 FY2019 Office of Weather and Air Quality Research Programs

There will be eight grant competitions from this notification valued at approximately $16,200,000 as follows: 1) High Impact Weather Testbeds, 2) Joint Technology Transfer Initiative (JTTI), 3) Air Quality Research and Forecasting, 4) Verification of the Origins of Rotation in Tornadoes Experiment - Southeast U.S. (VORTEX-SE), 5) Infrasound Detection of Tornadoes and High Impact Weather, 6) Next Generation of Mesoscale Weather Observing

Platforms, 7) Snowpack and Soil Moisture Observations and Data Assimilation to Improve the National Water Model (NWM), and 8) Subseasonal to Seasonal (S2S).

These eight competitions in this notification of funding opportunity reflect multiple science objectives spanning time scales from the very short-term (hours) to seasonal and from weather and water observations and modeling to social and behavioral science. It is focused on improving NOAA's understanding and ultimately its weather and water forecasting services through engagement with the external scientific community on key science gaps of mutual interest through funded grant opportunities.

One of the key themes is supporting applied research and development that leads to the demonstration in NOAA's testbeds during the project period of new high impact weather, water, and air quality observing and forecasting applications, including new data or products, improved analysis techniques, better statistical or dynamic forecast models and techniques, and communication of that information to better inform the public. It is expected that NOAA's support of these new capabilities will speed the transition of this new research into operations in order to improve NOAA weather and water services for the public. **Due March 20**.

Harnessing the Data Revolution (HDR): Institutes for Data-Intensive Research in Science and Engineering - Ideas Labs

In 2016, the National Science Foundation (NSF) unveiled a set of "Big Ideas," 10 bold, long-term research and process ideas that identify areas for future investment at the frontiers of science and engineering (see https://www.nsf.gov/news/special_reports/big_ideas/index.jsp). The Big Ideas represent unique opportunities to position our Nation at the cutting edge of global science and engineering leadership by bringing together diverse disciplinary perspectives to support convergence research. As such, when responding to this solicitation, even though proposals must be submitted to the Directorate for Computer & Information Science & Engineering/Office of Advanced Cyberinfrastructure(CISE/OAC), once received, the proposals will be managed by a cross-disciplinary team of NSF Program Directors. NSF's Harnessing the Data Revolution (HDR) Big Idea is a national-scale activity to enable new modes of data-driven discovery that will allow fundamental questions to be asked and answered at the frontiers of science and engineering. Through this NSF-wide activity, HDR will generate new knowledge and understanding, and accelerate discovery and innovation. The HDR vision is realized through an interrelated set of efforts in:

- Foundations of data science;
- Algorithms and systems for data science;
- Data-intensive science and engineering;
- Data cyberinfrastructure; and
- Education and workforce development.

Each of these efforts is designed to amplify the intrinsically multidisciplinary nature of the emerging field of data science. The HDR Big Idea will establish theoretical, technical, and ethical frameworks that will be applied to tackle data-intensive problems in science and engineering, contributing to data-driven decision-making that impacts society. This solicitation describes one or more Ideas Lab(s) on Data-Intensive Research in Science and Engineering (DIRSE) as part of the HDR Institutes activity. **Due June 19**.

Materials Research Science and Engineering Centers (MRSEC)

There are a few minor differences between this and the previous (NSF 16-545) solicitation. These include:

1. Interdisciplinary Research Groups topics focusing on the NSF Big Ideas are included as suggested research topics;
2. For both preliminary and full proposals, MRSEC participant definitions are clarified and made uniform: it changed from using senior investigator, senior participants and others to clearer definitions for supported and unsupported Participants including Primary and Secondary Participants and more (see text);
3. For Preliminary proposals, only biographical sketches for those individuals listed in the NSF Proposal Cover Sheet (up to five) are required; other biographical sketches will not be accepted;
4. For both Preliminary and Full Proposal, Results from Prior NSF Support can only be reported for individuals, up to five, that appear on the NSF Cover Sheet; results for other participants must not be included;
5. Proposers are encouraged to contact the Program Director(s) prior to submission to ascertain that the Interdisciplinary Research Group (IRG) proposed research fits the Division of Materials Research (DMR) portfolio.

The Materials Research Science and Engineering Centers (MRSECs) program provides sustained support of interdisciplinary materials research and education of the highest quality while addressing fundamental problems in science and engineering. Each MRSEC addresses research of a scope and complexity requiring the scale, synergy, and multidisciplinarity provided by a campus-based research center. The MRSECs support materials research infrastructure in the United States, promote active collaboration between universities and other sectors, including industry and international organizations, and contribute to the development of a national network of university-based centers in materials research, education, and facilities. A MRSEC may be located at a single institution, or may involve multiple institutions in partnership, and is composed of up to three Interdisciplinary Research Groups, IRGs, each addressing a fundamental materials science topic aligned with the Division of Materials Research, DMR.
Preliminary due June 24; full by invitation November 26.

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.]

FA9550-18-S-0003 Research Interests of the Air Force Office of Scientific Research

AFOSR plans, coordinates, and executes the Air Force Research Laboratory's (AFRL) basic research program in response to technical guidance from AFRL and requirements of the Air Force. Additionally, the office fosters, supports, and conducts research within Air Force,

university, and industry laboratories; and ensures transition of research results to support U.S. Air Force needs. The focus of AFOSR is on research areas that offer significant and comprehensive benefits to our national war fighting and peacekeeping capabilities. These areas are organized and managed in two scientific Departments: Engineering and Information Science (RTA) and Physical and Biological Sciences (RTB). The research activities managed within each Department are summarized in this section. **Open Until Superseded**.

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**.

FA9453-17-S-0005 Research Options for Space Enterprise Technologies (ROSET)
The Air Force Research Laboratory (AFRL) Space Vehicle Directorate (RV) is interested in receiving proposals from all offerors to advance state of the art technology and scientific knowledge supporting all aspects of space systems including payload adapters, on-orbit systems, communications links, ground systems, and user equipment. Efforts will include basic and advanced research, advanced component and technology development, prototyping, and system development and demonstration and will span the range from concept and laboratory experimentation to testing/demonstration in a relevant environment. Specific tasks include design, development, analysis, fabrication, integration, characterization, testing/experimentation, and demonstration of hardware and software products. **Open to September 22, 2022.**

Broad Agency Announcement for the Army Rapid Capabilities Office
This Broad Agency Announcement (BAA), W56JSR-18-S-0001, is sponsored by the Army Rapid Capabilities Office (RCO). The RCO serves to expedite critical capabilities to the field to meet Combatant Commanders' needs. The Office enables the Army to experiment, evolve, and deliver technologies in real time to address both urgent and emerging threats while supporting acquisition reform efforts. The RCO executes rapid prototyping and initial equipping of capabilities, particularly in the areas of cyber, electronic warfare, survivability and positioning, navigation and timing (PNT), as well as other priority projects that will enable Soldiers to operate and win in contested environments decisively. This BAA is an expression of interest only and does not commit the Government to make an award or pay proposal preparation costs generated in response to this announcement.
Questions concerning the receipt of your submission should be directed:
http://rapidcapabilitiesoffice.army.mil/eto/

Technical questions will be sent to the appropriate Technical Points of Contact (TPOC), topic authors, and/or Subject Matter Experts (SMEs) to request clarification of their areas of interest. No discussions are to be held with offerors by the technical staff after proposal submission without permission of the Army Contracting Command-Aberdeen Proving Ground (ACC-APG) Contracting Officer. **Open to March 23, 2023.**

W911NF-18-S-0005 U.S. Army Research Institute for the Behavioral and Social Sciences Broad Agency Announcement for Basic, Applied, and Advanced Research (Fiscal Years 2018-2023)
The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) announces the ARI FY18-23 Broad Agency Announcement for Basic, Applied, and Advanced Scientific Research. This Broad Agency Announcement, 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 U.S. 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.

Those contemplating submission of a proposal are encouraged to contact the ARI Technical Point of Contact (TPOC) for the respective topic area cited in the BAA. If the R&D warrants further inquiry and funding is available, submission of a proposal will be entertained. The recommended three-step sequence is (1) telephone call to the ARI TPOC or responsible ARI Manager, (2) white paper submission, (3) full proposal submission. Awards may be made in the form of contracts, grants, or cooperative agreements. Proposals are sought from educational institutions, non-profit/not-for-profit organizations, and commercial organizations, domestic or foreign, for research and development (R&D) in those areas specified in the BAA. The U.S. Army Research Institute for the Behavioral and Social Sciences encourages Historically Black Colleges and Universities/Minority Serving Institutions (HBCU/MSI) and small businesses to submit proposals for consideration. Foreign owned, controlled, or influenced organizations are advised that security restrictions may apply that could preclude their participation in these efforts. Government laboratories, Federal Funded Research and Development Centers (FFRDCs), and US Service Academies are not eligible to participate as prime contractors or recipients. However, they may be able to participate as subcontractors or Subrecipients (eligibility will be determined on a case by case basis). **Open to April 29, 2023.**

FA8650-17-S-6001 Science and Technology for Autonomous Teammates (STAT)

The objective of Science and Technology for Autonomous Teammates (STAT) program is to develop and demonstrate autonomy technologies that will enable various AF mission sets. This research will be part of Experimentation Campaigns in: 1 -Multi-domain Command and Control; 2-Intelligence, Surveillance, Recognizance (ISR) Processing Exploitation and Dissemination (PED); and 3- Manned-Unmanned combat Teaming to demonstrate autonomy capabilities to develop and demonstrate autonomy technologies that will improve Air Force operations through human-machine teaming and autonomous decision-making. The technology demonstrations that result from this BAA will substantially improve the Air Force's capability to conduct missions in a variety of environments while minimizing the risks to Airmen. The overall impact of integration of autonomous systems into the mission space will enable the Air Force to operate inside of the enemy's decision loop.

STAT will develop and apply autonomy technologies to enhance the full mission cycle, including mission planning, mission execution, and post-mission analysis. Particular areas of interest include multi-domain command and control, manned-unmanned teaming, and information analytics. The technology demonstrations that result from this BAA will substantially improve the Air Force's capability to conduct missions in a variety of environments while minimizing the risks to Airmen. The overall impact of integration of autonomous systems into the mission space will enable the Air Force to operate inside of the enemy's decision loop. This effort plans to demonstrate modular, transferable, open system architectures, and deliver

autonomy technologies applicable to a spectrum of multi-domain applications. Development efforts will mature a set of technologies that enable airmen to plan, command, control, and execute missions with manageable workloads. The software algorithms and supporting architectures shall:• Ingest and understand mission taskings and commander's intent• Respond appropriately to human direction and orders• Respond intelligently to dynamic threats and unplanned events Chosen technologies will be open, reusable, adaptable, platform agnostic, secure, credible, affordable, enduring, and able to be integrated into autonomous systems. The program will be comprised of various technologies developed by AFRL and Industry, integrated into technology demonstrations and deliverables with all the necessary software, hardware, and documentation to support AFRL-owned modeling and simulation environments for future capability developments. Thus, all technology development efforts must adhere to interface designs and standards. **Open to July 23, 2023**.

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