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**Katherine E. Kelly, PhD**: Editing in the Humanities & Humanities Related Social Sciences; Presentations on Grant Writing and Funding in the Humanities and Humanistic Social Sciences

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Topics of Interest URLs

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 or titles, as below, will typically take you to a working link.

- How NIH Can Support Your Career Path
- Case Study in NIH Review Integrity: Asking for Favorable Treatment
- New “All About Grants” Podcast on Certificates of Confidentiality
- HQ0034-20-S-FO01 National Defense Education Program (NDEP) for Science, Technology, Engineering, and Mathematics (STEM) Education, Outreach, and Workforce Initiative Programs, Fiscal Year 2020
- 2020 NIAID Omnibus Broad Agency Announcement
- Data are Available on NIH Funding Plans
- Final FY20 Appropriations: National Science Foundation
- Final FY20 Appropriations: DOE Office of Science
- 2 Continues its Reign as the Smallest Known Prime Number
- 20-538 Linguistics Program - Doctoral Dissertation Research Improvement Awards National Science Foundation
- Summer Seminars and Institutes for K-12 Educators NEH
- Trump Picks Sethuraman Panchanathan as Next NSF Director
- U.S. R&D Increased by $32 Billion in 2017, to $548 billion; Estimate for 2018 Indicates a Further Rise to $580 billion
- National Patterns of R&D Resources: 2017–18 Data Update
- Spending Deal Buoys Science Agency Budgets
- Basic Research in the Chemical Sciences - Marion Milligan Mason Award for Women
- ARPA-E Announces $20 Million in Funding to Develop Feedstock Monitoring and Carbon Storage Technology
- Dear Colleague Letter: Stimulating Participation from Institutions New to the Improving Undergraduate STEM Education: Education and Human Resources Program
- S-STEM 2020 Webinars
- A close look at thin ice
- Need Help Determining If Your Research Involves Human Subjects?
- What Do I Do When Due Dates Fall on Holidays/Weekends/NIH Office Closures?
- Important Reminders for Fellowship and Career Development Applicants
- Celebrating 20 Years of ClinicalTrials.gov and Looking to the Future
- FY2020 Budget Passes with Average Marks for Science Publications Output: U.S. Trends and International Comparisons
- Division of Mathematical Sciences (DMS) Newsletter – NSF Fall 2019
- NEH Division of Research Programs
- The Science of Effective Mentorship in STEMM
- Price of College for Full-Time Undergraduates in U.S. Postsecondary Institutions in 2015-16
- Reproducibility and Replicability in Science
- Science and Engineering for Grades 6-12: Investigation and Design at the Center
- A Roadmap to Reducing Child Poverty
- Quantum Computing: Progress and Prospects
- Environmental Engineering for the 21st Century: Addressing Grand Challenges
- Minority Serving Institutions: America's Underutilized Resource for Strengthening the STEM Workforce
- Monitoring Educational Equity
- An Astrobiology Strategy for the Search for Life in the Universe
- Frontiers of Materials Research: A Decadal Survey

MORE URLS ON FOLLOWING PAGE
New NIH "FORMS-F" Grant Application Forms and Instructions Coming for Due Dates on or after May 25, 2020

(NOT-OD-20-026)

Is Biology Best?

Forest Health and Biotechnology: Possibilities and Considerations

Final Report of the Committee on a Strategic Plan for U.S. Burning Plasma Research

Management of Legionella in Water Systems

Framing the Challenge of Urban Flooding in the United States

Dancing chimpanzees may reveal how humans started to boogie

Scientific Publishers Unite to Oppose Potential Open Access Executive Order

The science stories likely to make headlines in 2020

ED-GRANTS-122719-001 Office of Postsecondary Education (OPE): Developing Hispanic-Serving Institutions Program

DE-FOA-0002218 NOI to issue DE-FOA-0002193, entitled: University Training and Research for Fossil Energy Applications

DE-FOA-0002193 University Training and Research in Fossil Energy - UCR/HBCU

NIFA Partnership Award webpage

NIFA Partnership Awards Nomination Form

NIFA Hall of Fame Nomination Form

Congress Perpetuates Dedicated Funding Stream for Minority Serving Institutions

EPA science advisers slammed the agency for ignoring science. Here is what they said

Dear Colleague Letter: Developing and Supporting the National Ecological Observatory Network (NEON) User Community

From service to science: NIH shifts focus of mentoring network aimed at boosting grantee diversity

Frequently Asked Questions (FAQs) for Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Phase I Programs

Spectrum and Wireless Innovation enabled by Future Technologies

DWFP-20-S-01 FY 20 Opportunity Announcement Department of Defense ACC-APG-Detrick

Trump’s NSF pick reflects close links between agency and White House

Certificates of (NIH) Confidentiality

Florida joins U.S. government in probing foreign ties of researchers

Division of Integrative Organismal Systems Core Programs

International Research and education Network Connections (IRNC)

Animal life thriving around Fukushima

A New Year’s Update from the Director of IES

How universities may help bridge social divide between international, domestic students

Spectrum and Wireless Innovation enabled by Future Technologies (SWIFT)

A Team of Engineers Invented a Brick-Laying Robot. This Is Their Story
Consider Foundations as Potential Funders

Katherine E. Kelly is a retired English professor from Texas A&M University. She is the author of several books and numerous articles supported by research grants and served as a contributing editor for an academic journal for five years. She provides editorial services to ARFS clients on proposals, journal articles, and manuscripts and presents seminars on grant writing and funding in the humanities and humanistic social sciences.

Government or public funding for humanities research originates in agencies and programs at the federal, state, and local levels. Private funding is distributed by thousands of foundations and other not-for-profit organizations. Private funding may include both grants and gifts, depending upon the organization’s mission. Most faculty and graduate students are familiar with public funding agencies, such as the National Endowment for the Humanities, but scholars are less likely to be aware of private funding opportunities such as foundations. When you consider that foundations gave $402 million for humanities-related activities in 2012, it only makes sense to invest some time to locate potential foundation funders and learn their funding criteria.

The following is a partial list of private foundations that offer fellowships and research awards in the humanities and fine arts. Be sure to visit their websites for complete information:

--The American Association of University Women
https://www.aauw.org/what-we-do/educational-funding-and-awards/
Funds wide range of academic research by women
Offers 4 types of fellowships and research grants
Pre-tenure faculty only

--American Council of Learned Societies
https://www.acls.org/programs/comps/
Offers research fellowships, residencies, international study, etc.
Humanities and related social sciences include but not limited to: American Studies, Anthropology, Archaeology, Art History, Architectural History, Classics, Economics, Ethnic Studies, Film, etc.
Tenure and pre-tenure

--The Blakemore Foundation
https://www.blakemorefoundation.org
Funds advanced study of Asian language and projects that promote understanding of Asian fine art in the US
Funds exhibitions and internships
Annual deadline of 1 October
--Borchard Foundation Center on International Education  
https://borchardcenter.org/  
Funds scholar-in-residence ($30,000) and international colloquia in France ($35,000) for any discipline  
Annual deadline of 15 October

--Borchard Foundation Center on Law and Aging  
https://borchardcla.org  
Academic Research Grant Program to fund scholarship about new or improved public policies, laws, and/or programs that will enhance the quality of life for the elderly ($20,000)  
Annual deadline 15 October

--The Ford Foundation  
https://www.fordfoundation.org/work/our-grants/individuals-seeking-fellowships  
Hallie Ford Fellowships in the Visual Arts: each of the 3 awards is made for $35,000. Designated for Oregon visual artists who have demonstrated a depth of sophisticated practice and potential for significant future accomplishment. Applications now open.  
Good Neighbor Grants, Technical Assistance Grants, Successful Citizens, etc.. Applications now open.  
The Ford Foundation focuses on increasing diversity of our nation’s college and university faculties by increasing their ethnic and racial diversity, maximizing the educational benefits of diversity, and increasing the numbers of professors who will use diversity as a resource for enriching student education.

--The Getty Foundation  
https://www.getty.edu  
Offers grants supporting a diverse range of projects all over the world that strengthen the understanding and preservation of visual arts.  
Provides research grants and fellowships for scholars. Also provides conservation grants for museums and buildings, as well as for the education and training of conservators.  
Annual deadline of 3 October

--The John Simon Guggenheim Memorial Foundation  
https://www.gf.org  
Provides fellowships for advanced professionals in all fields (natural and social sciences, humanities, creative arts) except the performing arts.  
Members of the teaching profession receiving sabbatical leave on full or part salary are eligible for appointments, as are holders of other fellowships or appointments at research centers.

--The John Randolph Haynes and Dora Haynes Foundation  
https://www.haynesfoundation.org  
Fellowships to faculty in the social sciences ($12,000)
Original social science research into policy issues of the Los Angeles region, research into the history of Southern California, archival and cataloging projects important to Los Angeles, dissertation fellowships at research universities in the five-county Southern California region. Awards may be used as faculty summer research stipend, to buy course release, or to cover other incidental research assistance and expenses (excluding hardware and equipment). Cannot use the award to augment salary during the regular academic year except as an addition to a sabbatical leave. Fellowships can be used as seed money to begin a research project, or as full or partial support for an ongoing project.

--The Samuel H. Kress Foundation
https://www.kressfoundation.org
Grants are concentrated on projects and programs that promote the understanding and enjoyment of European art and architecture, especially in relation to its historical context. Supports advanced training in conservation of art works and development of scholarly resources in the fields of art history and conservation. Provides funding for conferences/seminars, fellowships, professorships, and research.

--The Newberry Library Fellowships in the Humanities
https://www.newberry.org/research/felshp/fellowshome.html
Long-Term Fellowships for 4 to 9 months; applications must be submitted by 11:59 PM CST on November 1. These fellowships are generally available without regard to an applicant’s place of residence and are intended to support significant works of scholarship that draw on the strengths of the Newberry’s collection. Long-term fellowship residencies must take place September through May. Short-Term Fellowships provide opportunities for a one-month stipend of $2,500 for those with a specific need for the Newberry’s collection. Postdoctoral scholars, PhD candidates, and scholars with terminal degrees who live and work outside of the Chicago metropolitan area are eligible. For exceptions to these restrictions, please read the individual fellowship descriptions. Most fellowships are available for one month with a stipend of $2,500 per month. Applications now closed.

--Russell Sage Foundation
https://www.russellsage.org/research/categories/requests-proposals
Funds social science research, visiting researchers, and visiting scholarships. Visiting Scholar positions begin Sept. 1 and typically run through June 30. Scholars are provided with an office, research assistance, computer and library facilities, and supplemental salary support of up to 50% of academic year salary to a maximum of $125,000, when unavailable from other sources. Scholars who reside outside of the greater New York City area are also provided with a partially-subsidized apartment near Foundation offices.

--Woodrow Wilson National Fellowship Foundation
https://www.woodrow.org/fellowships
Provided for junior faculty with “a demonstrated commitment to eradicating racial disparities, breaking down stereotypes, and promoting cross-racial understanding in their university communities.”
Seeks to increase the presence of minority junior faculty and those underrepresented in the field of higher education.

--The Smithsonian Institution Fellowship Program
https://www.smithsonianofi.com/fellowship-opportunities/
Offers 3 to 12-month fellowships to both postdoctoral scholars (holding a doctoral degree for fewer than 7 years) and senior scholars (holding a doctoral degree for more than 7 years)
Up to $48,000 award, plus $4,000 research stipend
Applicant must propose to conduct research in a discipline pursued at the Smithsonian; interdisciplinary scholarship is encouraged.
Deadline Nov. 1
Humanities, Social Sciences, and Arts Funding Opportunities and News*
*Potential applicants should visit agency websites to confirm deadlines, requirements, etc. A listing of funding opportunities by due date extending through May 1, 2020 is included in the 15 December 2019 issue of the Research and Development & Grant Writing News. Opportunities are listed by application due date.

<table>
<thead>
<tr>
<th>Due Date</th>
<th>Award Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/1/2020</td>
<td>American Schools of Oriental Research. Multiple fellowships for excavation participants, study of collections ($2,000 each), annual meeting scholarships (for students). <a href="http://www.asor.org/fellowships/">http://www.asor.org/fellowships/</a></td>
</tr>
<tr>
<td>2/13/2020</td>
<td>NEH Public Scholars Awarded to: Individuals Output: Book <a href="https://www.neh.gov/grants">https://www.neh.gov/grants</a></td>
</tr>
<tr>
<td>2/25/2020</td>
<td>NEH Summer Seminars and Institutes for K-12 Educators Awarded to: Organizations <a href="https://www.neh.gov/grants/education/summer-seminars-and-institutes-k-12-educators">https://www.neh.gov/grants/education/summer-seminars-and-institutes-k-12-educators</a></td>
</tr>
<tr>
<td>3/5/2020</td>
<td>NEH Summer Seminars and Institutes for Higher Education Faculty Awarded to: Organizations Output: Conference/Institute/Seminar</td>
</tr>
</tbody>
</table>
3/5/20  NEH Institutes for Advanced Topics in the Digital Humanities
Awarded to: Organizations
Output: Conference/Institute/Seminar

3/16/20  NEH Fellowships for Open Book Programs
Awarded to: Organizations (publishers)
Output: Digital Material and Publications

4/1/20  American Musicological Society. Various research grants.
https://www.amsmusicology.org/page/grants

4/8/20  NEH Fellowships Open Book Program
Awarded to: Organizations
Output: Digital Material and Publications
https://www.neh.gov/grants/odh/FOBP

4/8/20  NEH-Mellon Fellowships for Digital Publication
Awarded to: Individuals
Output: Digital Material and Publications

4/8/20  NEH Fellowships
Awarded to: Individuals
https://www.neh.gov/grants/research/fellowships

4/8/20  NEH Awards for Faculty at Hispanic-Serving Institutions
Awarded to: Individuals
Output: Book, Article, Digital Material and Publications, Archaeological Report, Translation, Edition, Other Scholarly Resource, Basic research leading to improvement of existing course, Basic research related to goals and interests of the institution or community.
https://www.neh.gov/grants/research/awards-faculty-hispanic-serving-institutions

4/8/20  NEH Awards for Faculty at Historically Black Colleges and Universities
Awarded to: Individuals
Output: Book, Article, Digital Material and Publications, Archaeological Report, Translation, Edition, Other Scholarly Resource, Basic research leading to improvement of existing course, Basic research related to goals and interests of the institution or community.
https://www.neh.gov/grants/research/awards-faculty-historically-black-colleges-and-universities

4/22/20  NEH Fellowship Awards for Faculty at Tribal Colleges and Universities
Awarded to: Individuals
Output: Book, Article, Digital Material and Publications, Archaeological Report, Translation, Edition, Other Scholarly Resource, Basic research leading to improvement of existing course, Basic research related to goals and interests of the institution or community.
https://www.neh.gov/grants/research/awards-faculty-tribal-colleges-and-universities

5/1/20  NEH Fellowships for Advanced Social Science Research on Japan
Awarded to: Individuals
https://www.neh.gov/grants/research/fellowships-advanced-social-science-research-japan

5/15/20  NEH State Humanities Councils General Operating Support Grants
Awarded to: Organizations
https://www.neh.gov/grants/fedstate/state-humanities-councils-general-operating-support-grants

5/15/20  NEH Infrastructure and Capacity Building Challenge Grants
Awarded to: Organizations
Output: Buildings, Equipment, Digital Infrastructure

5/15/20  NEH Research and Development
Awarded to: Organizations
Output: Web Resources, Report, Computer Program
https://www.neh.gov/grants/preservation/research-and-development

6/19/20  NEH Preservation and Access Education and Training
Awarded to: Organizations
Output: Preservation Courses or Curricular Materials, Conservation Graduate Programs, Preservation Workshops, Fellow Positions in Conservation
https://www.neh.gov/grants/preservation/preservation-and-access-education-and-training

6/19/20  NEH Digital Projects for the Public
Awarded to: Organizations
Output: Game/Simulation, Mobile App, Virtual/Augmented Reality, Website

6/25/20  NEH Humanities Initiatives at Historically Black Colleges and Universities
Awarded to: Organizations
Output: Curriculum, Community Partnerships, Faculty Development, Teaching Resources

6/25/20  NEH Humanities Initiatives at Hispanic-Serving Institutions
Awarded to: Organizations
Output: Curriculum, Community Partnerships, Faculty Development, Teaching Resources
https://www.neh.gov/grants/education/humanities-initiatives-hispanic-serving-institutions

6/25/20  NEH Humanities Initiatives at Community Colleges
Organizations
Output: Curriculum, Community Partnerships, Faculty Development, Teaching Resources
https://www.neh.gov/grants/education/humanities-initiatives-community-colleges

https://www.amsmusicology.org/page/grants

8/15/20 American Musicological Society. Research and publication grants.
https://www.amsmusicology.org/page/grants

9/15/2020  NSF Dynamic Language Infrastructure & NEH Documenting Endangered Languages (DLI-DEL) National Science Foundation. A funding partnership between NSF and NEH supports projects to advance knowledge about dynamic language infrastructure in the context of endangered human languages. Funding for one- to three-year senior research grants, fellowships from 6 to 12 months, and conference proposals.

12/16/20 American Musicological Society. Various grants.
https://www.amsmusicology.org/page/fellowships
One universal tenet of grant writing is to never annoy the reviewers. Unfortunately, authors can accomplish this in a number of ways, so that few proposals get through the review process without one or more annoyed reviewers calling out its flaws. Moreover, whether you are a proposal author or a pre-submission proposal editor or reviewer, it is always good to keep in mind a checklist of “reviewer annoyances” gained either the hard way, i.e., by reviewing reviews of your declined proposals, or the easy way, by attending grant-writing workshops and seminars, or in consultations with experienced PIs or research office staff prior to writing the proposal.

Regardless, any such checklist of reviewer annoyances would certainly include the “if you name it explain it” admonition. This occurs when the research narrative names, calls out, or in some way identifies something relevant to the review process without offering additional explanation, detail, or insight as to its relevance to the proposed project. For example, a research plan may state that “stakeholder input will help guide project planning.” A reviewer will need to know precisely how and when this will happen in order to judge the merits and relevance of the stakeholders’ involvement.

Or perhaps a research dissemination plan identifies a project website, research conference, technical workshop, and journal publications as the four mechanisms for transmitting project outcomes to the research community and stakeholders. A reviewer needs to know more exactly what kind of website, conference, workshop, and publications will appear, when they will appear, and how each of these mechanisms will carry the results of the project to the public. Withholding such description frustrates reviewers’ attempts to judge the merits of their potential effectiveness and relevance.

Or perhaps the educational outreach section of a research proposal states that the research results will inform both undergraduate and K-12 science curricula, but never defines the expected research results, impacted curricula, or the capacity and experience of the principal investigators to effectively engage other educational domains.

Or perhaps soil health is identified as critical to research on a specific crop, but it is never characterized, e.g., by amount of organics, porosity, microbial activity, etc. Instead, the research narrative defaults to requiring reviewers to self-define the term, always a dangerous default in any situation. Authors always need to think for the reviewers, and never expect the reviewers to think for them.

On the above examples, as savvy trial lawyers say, never ask a question you can’t answer. A best practice corollary in grant writing would be to never raise or plant a question in the reviewer’s mind you have not anticipated and adequately addressed with an explanation. Your skill at doing this in the project description will play a significant role in how well, or how poorly, your proposal will be reviewed.

In many cases, the naming but not explaining flaw in a narrative occurs when its authors ignore or forget another tenet of grant writing: “always write to the reviewers,” or, “write with your readers in mind.” This means that the author’s job is to inform the reviewers
rather than making them guess at what is meant when terms remain undefined. It is dangerous to assume that readers will somehow define terms as the author defines them. These instances are fertile ground for the introduction of ambiguity into the review process, something that must be avoided at all costs. *Ambiguity in the project narrative is a scourge that is always punished in the form of a declined proposal.*
When we discuss how to write a strong proposal, we usually focus on what to include in your proposal; however, it’s also important to understand what not to include, and why. PIs often strive to include as much information as possible in their proposals, worrying about leaving out some key citation, fact, or argument that might make the difference between a recommendation to fund and a recommendation to decline. However, it can be useful to consider the reviewer’s experience.

Consider a reviewer, making their way through a stack of proposals for a range of projects related to a funding opportunity. When that reviewer starts reading your proposal, they are trying to quickly understand the line of logic that connects what you’re proposing to do, why it’s important, how you’ll do it, and what the outcomes and impacts will be. Superfluous or irrelevant information can obscure that line of logic.

A speaker at a recent NIH conference put it this way. Think of your topic area as a forest, with the trees representing various bits of information. Your job as a PI is to guide your reviewer along the path in that forest that represents your project, pointing out the relevant trees, not to describe the entire forest. Thinking of your proposal in this way emphasizes the importance of knowing what to leave out so that the path is clear.

Here are some common ways that PIs often obscure that path, or even lead reviewers off in the wrong direction.

Discussing challenges and gaps that the project will not address. In discussing the problem, motivation or state of the art, in an effort to be thorough, many PIs will describe several current challenges or gaps in detail, and then they will state that this project will address only one of those gaps. This can be confusing to the reviewer. Including a paragraph (and sometimes an entire subsection) on a problem or challenge that is, in effect, irrelevant to the project being proposed is tantamount to leading your reviewer onto a side trail and then announcing that you expect them to fly back to the main trail in the next paragraph.

If you need to mention challenges that may be relevant to the topic but are irrelevant to the project you are currently proposing in order to put your project in context, do so briefly, and then quickly explain which challenge this proposal will address. If you’re concerned that reviewers will question why your project isn’t addressing a challenge, state early in the paragraph that you will not address that challenge in this project, and explain why.

Making the background section a tutorial on the topic. It may be tempting to provide an educational discussion of the broad topic of the proposal, particularly if you suspect that reviewers may not be experts in the field. However, remember that, especially in cases where reviewers are not experts in your topic, it is very easy for them to become confused by too much information. You may need to educate your reviewers, but that education should be carefully curated. Give them only the information they need to understand your project and its importance. Don’t go into “professor mode” and provide the equivalent of a class lecture on the topic. By very carefully focusing on the background that’s relevant to your project, you’ll help your reviewers stay on the logical path.
Making the background section a literature review. Similarly, it can be tempting to discuss all literature related to the broad topic of your proposal. This is especially common in the phenomenon that we call “defensive citing,” where a PI worries that the reviewer will criticize them for leaving out a citation (often for a paper written by the reviewer), even if it’s only tangentially related to the project proposed. While it’s extremely important to demonstrate that you know the relevant literature, and it’s a good idea to cite publications by likely reviewers if they are relevant, discussing irrelevant literature can distract the reviewer from your message.

You can avoid this mistake by focusing specifically on literature that is relevant to your project’s motivation, research questions, hypotheses, methods, and the gaps you’ll address. Avoid providing a literature review of everything that’s been done on the topic of your proposal. This will bore reviewers who are experts in the topic, confuse reviewers who are not, take up too much space, and obscure the line of logic of your project.

Discussing preliminary results that are not directly relevant to the proposed project. While it’s a good idea to establish your expertise, if you discuss details of your prior work that aren’t directly relevant to the project, you can confuse and distract your reviewer. If you feel it’s important to discuss your track record, state explicitly why you’re mentioning it, and don’t call that work “preliminary results.” Instead, you can briefly mention and cite previous work in a few sentences; for example, “The PI has conducted considerable research on A, B, and C [12–17]. In this work, she used X methods to understand Y phenomena.”

Burying the research questions, challenges, or hypotheses. If you don’t state explicitly and early in the proposal what you’re trying to find out or what challenges you’re trying to overcome, it can be difficult for the reviewer to understand what the ultimate purpose of the project is. The new knowledge or capabilities to be generated constitute the core organizing principle of most research proposals; if that’s missing or buried, reviewers can lose the logical path.

Discussing the work plan or experimental methods in unnecessary detail. It’s important to describe what you will actually do in enough detail that reviewers feel confident that you have a strong plan and haven’t overlooked any important issues. However, if you include a lot of unnecessary detail, such as detailed procedures for performing standard tests, the manufacturers and model numbers of your relatively standard lab equipment, and long forays into background material, your reviewer will lose the thread of your work plan. If you need to provide additional commentary or background on a particular task (for example, discussing in some depth why a particular step is not as risky as it might appear), it’s better to include a separate, labeled subsection that makes it clear that you are now taking them off the path for a short while, but you’ll return them to the path shortly.

Finally, consider the first section of your proposal (e.g., your Specific Aims page or your Introduction and Overview section) to be the map showing the entire logical route of your proposal. This will help your reviewer to situate him/herself before diving into your proposal. By providing the reviewer with an easy-to-follow logical route they are more likely to make it to the destination to which you’re trying to guide them: the conclusion that the proposed project is important, likely to succeed, and worthy of funding.
AI’s Future Impact on STEM Education

By Mike Cronan, co-publisher

Last November we addressed research offices’ strategic planning for funding opportunities in Artificial Intelligence in the article, “AI’s Really Big Footprint Across Disciplines.” One example of future AI funding at federal agencies mentioned in that article was the newly posted solicitation (due January 28) National Artificial Intelligence (AI) Research Institutes: Accelerating Research, Transforming Society, and Growing the American Workforce, a $124 million AI effort joined by multiple agencies, including NSF, USDA/NIFA, DHS, USDOT, FHWA, and the VA. As noted in that article, “The scale and scope of this announcement likely will not surprise those who read federal research agency strategic plans and see them as a valued harbinger of research funding on the horizon, as in the recent case of The National Artificial Intelligence Research and Development Strategic Plan: 2019 Update and the February 11 Executive Order on Maintaining American Leadership in Artificial Intelligence.”

While the November article focused on strategic planning for future AI research funding opportunities, research offices’ equivalent focus on strategic planning for future funding opportunities in AI education is equally important for several reasons. For example, research proposals, particularly to NSF, a major AI research funder, require a Broader Impacts plan, an element often related to the educational components of the proposed research. Moreover, large center-level proposals often require major educational plans and activities along the K-PhD pathway, and, therefore, the involvement of key project personnel beyond those addressing the core research goals and inclusive of those who bring STEM expertise in education to the project.

In this regard, research offices often play the role of an integrative hub where research faculty and STEM education professionals can form the integrative research and educational partnerships needed to compete successfully for funding. Moreover, on smaller research proposals, providing AI education expertise within research offices can play a significant role in helping faculty write more compelling and successful educational sections to their proposals. This is particularly the case when advising faculty about successful educational models that meet NSF expectations for evidence-based models and proven best practices. Research offices knowledgeable about AI educational directions are equipped to inform faculty about how this impacts AI research.

An excellent starting point for a strategic understanding of the AI educational landscape and NSF’s expectations for successful proposals in the AI educational ecosystem can be gleaned from a close reading of how NSF-funded AI Research Institutes (above solicitation) will be expected to actively build the next generation of talent for a diverse, well-trained workforce, as noted below (emphasis added):

“Specifically, AI Research Institutes should leverage the visionary nature of their research foci to drive new and innovative education and development tailored toward the Nation’s undergraduates, graduate students, and post-doctoral researchers, as well as through community colleges and skilled technical workforce training and other opportunities that advance knowledge and education of AI, including public
understanding of AI. This could include innovative pedagogy and instructional materials, advanced learning technologies, project-driven training, cross-disciplinary and collaborative research, industry partnerships, and new career pathways. Institutes should offer broad, deep, and diverse experiences to build the next generation of the AI workforce, with a focus on broadening participation among the full range of groups traditionally under-represented in science and engineering. AI Research Institutes should maximize their unique position to grow the next generation of talent that will provide new discoveries and leadership.”

Granted, NSF is often guilty of using gushy and aspirational descriptions, such as the above, but if you can overlook the linguistic excess, you will find valuable information in the above statement. After all, it describes what NSF expects to see in future funding proposals that require or reward addressing AI education. In effect, this statement addresses universities’ fundamental mission to integrate research and education. So a close reading and discussion of the above will help research offices entering this new AI funding landscape in a strategic, and hence, more successful way.

Moreover, keep in mind that there are real dollars on the table here (See Dear Colleague Letter: Research Opportunities for the Directorate for Mathematical and Physical Sciences (MPS) in Artificial Intelligence Research Institutes and Department of Energy plans major AI push to speed scientific discoveries, which notes, DOE “is planning a major initiative to use artificial intelligence (AI) to speed up scientific discoveries. At a meeting last week, DOE officials said they will likely ask Congress for between $3 billion and $4 billion over 10 years.”)

Finally, the National Academies have recently published several excellent reports on data science and AI to which faculty and research offices can look for consensus-based models for educational components to AI proposals, including (emphasis added) Data Science for Undergraduates: Opportunities and Options. This document notes that “As our economy, society, and daily life become increasingly dependent on data, work across nearly all fields is becoming more data driven, affecting both the jobs that are available and the skills that are required. At the request of the National Science Foundation, the National Academies of Sciences, Engineering, and Medicine were asked to set forth a vision for the emerging discipline of data science at the undergraduate level. The study committee considered the core principles and skills undergraduates should learn and discussed the pedagogical issues that must be addressed to build effective data science education programs.” This link also includes downloadable webinars on data science education relevant to AI. Keep in mind that massive data feeds AI.

Research offices can use these starting points to begin planning how best to assist faculty on AI-related research and educational proposals. It is not unrealistic to envision the coming decade going from a moderate AI rain today to a torrential downpour in the future. So now is the time to position for that future.
This is the time, early in the new year, when those with retirement plans that hold equities may nervously ask themselves whether they should go long or go short on investments for the upcoming year. A slew of financial prognosticators offer a cascade of differing opinions about where the stock market will close a year from now. As Mark Twain said (or was it Yogi Berra or Niels Bohr), “it is difficult to make predictions, particularly about the future.”

Fortunately, in grant writing, the question is easily resolved and the answer is always the same—never sell the funding solicitation short. Too often the full potential of the funding solicitation goes unrealized or is otherwise diminished by proposal authors who do not advantage themselves of two of its key uses—the first, as an organizational template for the project narrative, and the second, as a template for pre-submittal reviews and edits to ensure the narrative responds fully to the guidelines and review criteria.

In the case of the former, using the funding solicitation as a template will ensure the project description is organized around and fully responsive to the core goals and objectives of the program, thereby making it easy for reviewers to follow. In the latter case, using the solicitation to organize pre-submittal reviews, ensures that those reviewing the proposal do so from the perspective of what is most important to the funding agency and its mission priorities.

All this is certainly simple enough, but for those who often are asked to review and edit proposals prior to submittal, the question arises—why do proposal authors ignore this advice so often? It remains one of life’s little mysteries, admittedly not at the level of importance as grand theological questions, but important nonetheless. After all, it is not a stretch to think of the funding solicitation as a treasure map; however, as all treasure hunters know, from those generations seeking Montezuma’s Treasure, or Blackbeard’s Treasure, or the Lost Dutchman’s Gold Mine, you will always come up empty if you do not follow the instructions and map precisely. And so, too, with the funding solicitation.

This is particularly worrisome when the funding solicitation is understood for what it really is—a treasure map to finding research funding published by an agency that wants you to succeed, knowing that their success resides in yours. Moreover, unlike treasure maps that can be of dubious origins and do not always lead to hidden gold, or even in cases where gold is found, as in The Treasure of the Sierra Madre (1948), the ending is often not a happy one. By contrast, funding solicitations are painstakingly written to help applicants succeed in the search for research dollars.

By comparison, it is highly unlikely that the pirate Blackbeard put on webinars and treasure hunting workshops to help other pirates better interpret treasure maps, but this is something NSF and other funding agencies now do with great regularity.

It is not uncommon among those seeking research funding from federal agencies to believe there is some “secret sauce” or a “secret decoder ring” or “secret insider information” that leads others to be successful when they are not. But in fact, the truth is shockingly mundane and simply stated—success in grant writing comes from putting forth a great idea
clearly stated that wins the support of program officers and reviewers. As it is often claimed in sports or in economics or other fields, the way to correct failure is to “return to the fundamentals.”

This is true in spades in grant writing where a few simple fundamentals have an outsized influence on the success or failure of a proposal. Understanding the key role the funding solicitation plays in the success of proposals is critical to a well funded research career.
Create a Process for Adding Team Members to Proposals

In the early planning stages of proposals, team members must decide whether or not to bring additional partners on board to respond fully to an agency’s goals and objectives. The foundation for any such discussion must be based first on the core team’s self-assessment of its ability to compete for funding with or without an expansion of the core team, particularly on proposals that are broadly interdisciplinary. Determining the most competitive team configuration is not a trivial decision.

In some cases, a team does not initially recognize the need to expand its size, particularly when the team suffers from disciplinary myopia and only gradually realizes that, as constituted, it is too narrowly focused. In other cases, this realization may come from an evolving understanding of the funding opportunity, evolving discussions on the nature, scope, and scale of the proposed research, and interactions with the funding agency. This might occur either by discussions with a program officer or information from a funding agency’s webinar that clarifies beyond the solicitation the possible research partnerships or consortia the agency is seeking.

For instance, the CDC funding opportunity this past fall related to consortia for vector-borne disease research is one example of a situation where determining the team configuration may be a challenge. The currently open NASA program, Earth Sciences Applications: Food Security and Agriculture, is another instance where the understanding of the nature and scope of a possible research consortia may evolve.

Too often, however, the realization that the core team needs to be expanded to be competitive is followed by a disorderly and ad hoc process for adding team members. The Achilles heel in this process is the core team’s failure to establish consensus criteria for adding team members. In this case, adding team members is given no more thought than picking up additional baseball players for a team because they are standing nearby. Team additions should not be suggested as the first name that pops into the mind of someone on the core team.

The criteria for bringing additional team members onto the proposed project should be firmly grounded on the value-added benefits those considered for the team bring to the proposed research. Keep in mind that it is easy to invite someone on to a project but very difficult to disinvite them once that invitation is made. Moreover, the decision to add someone to the team should be done only after a team discussion clearly identifies and agrees upon the value-added benefits of the additional team member.

Too often potential team members are not sufficiently vetted by the entire team to determine whether the potential member will make the proposal more competitive, how the research expertise of that member complements and enhances the overall research objectives, and how that member compares to other potential team members who might join the group.
Keep in mind that with the recent dramatic emphasis on interdisciplinary partnerships and research consortia across the major federal research agencies it becomes increasingly unlikely that a fully configured team exists to respond to a major funding solicitation. It is more likely that the core of such a team exists and will have to be added to in order to better map to the research goals and objectives of a specific funding solicitation.

It is that adding to the initial team that can be a challenge, and one that benefits greatly from having in place some team criteria for value-added benefits applied to any potential new team member. After all, your success in any proposal is entirely dependent on the value-added research benefits you bring to the funding agency’s mission and research priorities. **No less of a standard for value-added benefits should be used to select a potential addition to your research team.**
Dear Colleagues:

The National Science Foundation is currently working to finalize a revised Proposal and Award Policies and Procedures Guide (PAPPG) for use in 2020. We anticipate that the revised PAPPG will be released in the coming months and, as is standard practice, will be effective 90 days after its release.

We wanted to highlight some important information to assist the community in preparing for this new PAPPG as it relates to the preparation and submission of the Biographical Sketch and Current and Pending Support sections of NSF proposals that fall under this revised PAPPG.

- NSF is partnering with the National Institutes of Health (NIH) to use SciENcv: Science Experts Network Curriculum Vitae as an NSF-approved format for use in preparation of both the Biographical Sketch and Current and Pending Support sections of an NSF proposal.

- Use of an NSF-approved format for the Biographical Sketch and Current and Pending Support documents will be required upon implementation of the PAPPG. NSF is encouraging proposers to begin using SciENcv for preparation of the Biographical Sketch now.

- SciENcv allows proposers to integrate their ORCiD to enable pre-population for the Biographical Sketch. Additional information is available on the ORCiD website.

- SciENcv will produce NSF-compliant PDF versions of these documents. Proposers must save these documents and submit them as part of their proposals via FastLane, Research.gov or Grants.gov.

- Additional resources including video tutorials are available on the SciENcv website.

NSF will continue to communicate with the community regarding the 2020 PAPPG and will provide further notice to the community as soon as the revised PAPPG is released. We encourage you to sign up for notifications about future PAPPG implementation webinars. In the meantime, proposers should continue to follow the guidance in the current PAPPG, (NSF 19-1). Please direct any further questions to policy@nsf.gov.

- Federal Register Notice dated November 18, 2019.
  - Draft PAPPG Comment Table
For-Comment Draft Proposal & Award Policies & Procedures Guide (PAPPG) (NSF 20-1), dated May 2019
A New Year’s Update from the Director of IES

HQ0034-20-S-FO01 National Defense Education Program (NDEP) for Science, Technology, Engineering, and Mathematics (STEM) Education, Outreach, and Workforce Initiative Programs, Fiscal Year 2020

ED-GRANTS-122719-001 Office of Postsecondary Education (OPE): Developing Hispanic-Serving Institutions Program

Tables on Relationship Between Participation in High School Career and Technical Education (CTE) and Transition to College and Work
A new set of web tables looks at 2013 public high school graduates’ education and employment outcomes three years after graduation, focusing on students who had different levels of participation in career and technical education during high school.

New Restricted-Use Data Released on Bachelor's Degree Recipients
Recently released restricted-use data describe outcomes of 2015–16 bachelor’s degree recipients 1 year after graduation. These data include information about student demographics, undergraduate enrollment experiences, and postbaccalaureate enrollment and employment outcomes for approximately 19,500 respondents. Data are part of the 2016/17 Baccalaureate and Beyond Longitudinal Study (B&B:16/17) and individual level data are available to researchers with a restricted-use data license.

The Science of Effective Mentorship in STEMM
Final FY20 Appropriations: National Science Foundation

Final FY20 Appropriations: DOE Office of Science

FY2020 budget a win for federal science programs
Just before the Christmas holiday, Congress approved $1.4 trillion in spending in a pair of bills funding the federal government for the rest of the fiscal year. The bills included all 12 annual appropriations bills for the 2020 fiscal year that started Oct. 1. Overall, it was another good year for science funding. USDA research programs, NSF, and DOE-Office of Science all saw modest single digit funding increases for FY2020. The real success story is the combined growth over the past several years. Since FY17, DOE Science is up over 30%, AFRI is up over 20%, and NSF is up 10%. It’s some of the strongest growth in decades. See the full budget details here.

Managing phosphorus in U.S. streams and rivers still a challenge
Despite decades of efforts to reduce phosphorus loads in streams, phosphorus continues to be a problem in many U.S. streams and rivers, causing explosive growth of aquatic plants and algae, including formation of harmful algal blooms. A potential reason for the limited success of phosphorus reduction efforts is the mobilization of legacy phosphorus accumulated from historical fertilizer applications, according to a new study by the U.S. Geological Survey National Water Quality Program. The study reports the potential contribution of legacy phosphorus to total river phosphorus export for 143 river sites in the continental United States. At more than two-thirds of the sites, phosphorus inputs from fertilizer and manure exceeded crop uptake and harvest removal, resulting in a surplus of phosphorus. Read the full article.

Systems for Monitoring and Analytics for Renewable Transportation Fuels from Agricultural Resources and Management
The objective of the Systems for Monitoring and Analytics for Renewable Transportation Fuels from Agricultural Resources and Management (SMARTFARM) program is to bridge the data gap in the biofuel supply chain by funding the development of technologies that can replace national averages and emissions factors for feedstock-related emissions with field-level estimates. The value of such technologies will be evaluated by their ability to reliably, accurately, and cost-effectively quantify feedstock production lifecycle emissions at the field level. If successful, the technologies funded by this phase of the SMARTFARM program will catalyze new market incentives for efficiency in feedstock production and carbon management, reducing annual U.S. emissions by ~1% and with substantially greater potential emissions reductions implications if expanded to other agricultural products beyond biofuels. Concept paper deadline, February 19. Read the full announcement.

Dear Colleague Letter: Stimulating Participation from Institutions New to the Improving Undergraduate STEM Education: Education and Human Resources Program
With this Dear Colleague Letter (DCL), the National Science Foundation's (NSF's) Division of Undergraduate Education (DUE) in the Directorate for Education and Human Resources (EHR) encourages the submission of proposals to the Improving Undergraduate STEM Education (IUSE: EHR) Program from institutions that have not had prior funding from the IUSE: EHR Program. Proposers are encouraged to consider submission to Level 1 of the Engaged Student Learning track of the IUSE: EHR Program. Information about the objectives and expectations for the Engaged Student Learning and for Level 1 proposals can be found in the IUSE: EHR program solicitation, NSF 19-601.

Proposals in the Engaged Student Learning track of the IUSE: EHR Program focus directly on students or serve students through faculty professional development and related activities. Engaged Student Learning projects can contribute to developing the STEM and STEM-related workforce, advancing a disciplinary STEM field, broadening participation in STEM, educating a STEM-literate public, improving K-12 STEM education through undergraduate preservice STEM teacher preparation, encouraging life-long learning, and/or building STEM capacity in higher education. All projects are expected to increase knowledge about effective STEM education. This may be achieved by proposing one or more knowledge-generating questions and investigating them with thorough project evaluation or more formal research methods. Prospective investigators are encouraged to contact an NSF Program Officer to discuss their ideas.

Proposers are encouraged to reference the Common Guidelines for Education Research and Development (NSF 13-126), a publication designed to help with developing and framing education-related projects. This publication was developed jointly by the NSF and the Institute of Education Sciences in the U.S. Department of Education. It describes several types of studies that can increase knowledge about student learning. The Common Guidelines may be accessed at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf13126. A set of supporting FAQs is also available at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf13127.

Proposals responding to this DCL should be submitted by published due dates for the IUSE: EHR Program. When responding to the DCL, please begin your proposal title with "New to IUSE: EHR DCL". Submissions should follow the NSF Proposal & Award Policies & Procedures Guide (PAPPG) and the guidelines in the IUSE: EHR program solicitation.

Data are Available on NIH Funding Plans
The NIH-Wide Strategic Plan for Fiscal Years (FYs 2016-2020) laid the groundwork for discussing data on our funding strategies—see page 28 for example data on R01 applications across peer review percentiles in FY 2014. The 21st Century Cures Act recognized the value of reporting such information. Building on what we have blogged on before (see here, here, here, and here), let's talk more about how we make funding decisions and show some data as well. Funding decisions rely heavily on peer review scores, but there is more to the story. NIH Institutes and Centers (ICs) weigh those scores together with ensuring their entire research portfolio addresses the wide array of diseases, conditions, or other research areas within its mission. They also account for unmet scientific needs and build on recent unexpected breakthroughs as part of prudent planning. When public health needs emerge, such as for the opioid epidemic or a microbial outbreak, ICs must be nimble enough to respond. Training, work
force, and infrastructure needs are also thrown into the mix. Want more? See our NIH Funding Strategies page and find individual IC strategic plans on NIH RePORT.

Some ICs, though not all, set percentile-based paylines each fiscal year. R01 applications that fall below the payline are likely to be funded, while those above may not. Moreover, not every application scored within the payline, it should be noted, may be selected for funding (see here for some reasons why). ICs can also use a small portion of their discretionary annual budget to support meritiorious applications that did not meet the payline, a process called select pay.

Expanding on what was provided in the NIH Strategic Plan, we present FY 2018 data here on R01-equivalent applications (which include R37-MERIT), and R56-Bridge awards. These data (available here in the NIH Data Book) are restricted to those investigator-initiated R01 applications or awards reviewed by a study section and which received a percentile score. In FY 2018, NIH issued 5,710 R01-equivalent grant awards, while 9,309 applications were not funded. As shown in Figure 1, these R01-equivalent awards were generally within the 1st–36th percentiles of all applications (light blue bars). Unfunded applications fell in the higher percentiles (yellow bars).

Dear Colleague Letter: Research Opportunities for the Directorate for Engineering in Artificial Intelligence

Recent advances in artificial intelligence (AI) and its emerging uses in various knowledge and technology fields have been enabled by accelerating advances in fields such as deep learning, computer vision and natural language processing, in parallel with increased computing power and availability of large data sets. Such advances, combined with the development of new logic algorithms and hardware suitable for AI, are expected to generate profound commercial and societal impacts in areas ranging from autonomous vehicles to manufacturing, robotics, agriculture, construction, building management and vehicle safety, highlighting the convergence of engineering and data sciences.

Synergy between research frontiers in AI and the projects sponsored by the Directorate for Engineering have the potential to stimulate further transformative progress and continued advancement in engineering processes and systems, addressing issues of national importance with potential for economic impact and quality-of-life improvements. The National Artificial Intelligence Research and Development Strategic Plan (National Science and Technology Council, June 2019) provides a framework for the visioning activities and strategic objectives of investments in AI research in the United States.

This Dear Colleague Letter (DCL) highlights existing programs and other potential opportunities for ENG researchers to participate in the submission of proposals and supplemental funding requests for AI projects:

- ENG core research, education and innovation programs (described in https://www.nsf.gov/dir/index.jsp?org=ENG)
- ENG centers and networks
- Collaborative projects with other directorates and agencies
- Conferences and workshops
- Start-ups and small businesses focused on commercializing AI-enabled devices, systems and platforms
AI dedicated programs, including the National Artificial Intelligence Research Institutes program (described in NSF 20-503; with FAQs in NSF 20-021). There are two tracks described in this program: A Planning Grant track (deadline January 30, 2020) and an Institute Track (January 28, 2020) that has six specific thematic areas. Four of the Institutes Tracks may be of special interest to ENG researchers working in the fields of: Foundations of Machine Learning; AI-Driven Innovation in Agriculture and the Food System; AI-Augmented Learning; AI for Accelerating Molecular Synthesis and Manufacturing.

Dear Colleague Letter: SBE Perspectives on Graduate Education

Graduate students are an integral part of the U.S. research enterprise. Our nation's ability to strengthen its health, prosperity, and security depends on keeping graduate programs rigorous and effective. The National Science Foundation (NSF) is committed to continually improving the value of graduate education to our nation. In 2017, NSF's Social, Behavioral & Economic Sciences Directorate (SBE) supported a workshop on the future of graduate training. The National Academies of Sciences, Engineering and Medicine's (NASEM) Board on Science Education hosted the workshop. Following the workshop, and with support from NSF's Division of Graduate Education (DGE), NASEM issued a report entitled Graduate STEM Education for the 21st Century.

The workshop and report recommend changes to U.S. graduate education that can help STEM students better meet the nation's evolving needs. A strong evidence base will be critical in efforts to evaluate current and proposed new practices. Such an evidence base is only possible through a comprehensive body of research on graduate education. With the objective of improving graduate training, the purpose of this Dear Colleague Letter (DCL) is to draw the attention of the SBE community to the following funding opportunities in the Directorate for Education & Human Resources (EHR) and SBE.

- The Innovations in Graduate Education (IGE) Program (NSF 17-585) encourages the development and implementation of bold, new, and potentially transformative approaches to STEM graduate education training. The program seeks proposals that explore ways for graduate students in research-based master's and doctoral degree programs to develop the skills, knowledge, and competencies needed to pursue a range of STEM careers.
- The NSF Research Traineeship (NRT) Program (19-522) seeks proposals that focus on and demonstrate strong commitment to technical and professional training of STEM graduate students that emphasizes research training and extends well beyond it. In addition to research training, NRT projects are expected to develop trainees' technical skills broadly, including facility and/or familiarity with the techniques, languages, and cultures of fields integral to the interdisciplinary or convergent research theme; foster the development of transferable professional skills; and provide trainees with mentoring and vocational counseling from professionals who have the backgrounds, experience, and skills to advise trainees on how to prepare for a variety of STEM career pathways.
- The EHR Core Research Program (NSF 19-508) of fundamental research in STEM education provides funding for research that will help synthesize, build and/or expand
research foundations in the following focal areas: STEM learning, STEM learning environments, STEM workforce development, and broadening participation in STEM.

- The ECR: Building Capacity in STEM Education Research (BCSER) Program (NSF 20-521) supports projects that build individuals' capacity to carry out high quality STEM education research. Proposals are invited from individuals in all STEM disciplines, particularly among early and mid-career researchers.

- The CyberCorps®: Scholarships for Service (SFS) Program (NSF 19-521) seeks innovative proposals leading to an increase in the ability of the U.S. higher education enterprise to produce cybersecurity professionals by improving research on learning materials, interventions, degree programs and educational pathways for national adoption.

- The Secure and Trustworthy Cyberspace (SaTC) Program (NSF 19-603) includes an education designation which supports projects that leverage research in cybersecurity and research on student learning, both in terms of intellectual merit and broader impacts, to address the challenge of expanding existing educational opportunities and resources in cybersecurity.

- Other SBE programs - including but not limited to Ethical and Responsible Research (NSF 19-609), Research on the Science and Technology Enterprise: Statistics and Surveys (NSF 15-521), Science of Broadening Participation (SBP), Science of Learning and Augmented Intelligence Program (PD 19-127Y), and Sociology (PD 98-1331) - have long-standing interests in education related issues.

It is anticipated that the projects supported in response to this DCL will help address the following types of questions:

- What types of competencies are most critical for graduate students to obtain across all disciplines (e.g. responsible and ethical conduct of research), and how should that training be embedded in graduate programs?
- Are there graduate education training models that could be adapted for use across disciplines?
- How does access to learning resources or interventions impact educational and career outcomes?

As the SBE community responds to such matters, we encourage proposals that build upon SBE's rich interdisciplinary resources. These resources include highly-relevant datasets, such as those developed by the National Center for Science and Engineering Statistics (NCSES). We also encourage collaborations with educational researchers that will help individuals and institutions identify innovative approaches to transform graduate education.
The Science of Effective Mentorship in STEMM

Mentorship is a catalyst capable of unleashing one's potential for discovery, curiosity, and participation in STEMM and subsequently improving the training environment in which that STEMM potential is fostered. Mentoring relationships provide developmental spaces in which students' STEMM skills are honed and pathways into STEMM fields can be discovered. Because mentorship can be so influential in shaping the future STEMM workforce, its occurrence should not be left to chance or idiosyncratic implementation. There is a gap between what we know about effective mentoring and how it is practiced in higher education.

The Science of Effective Mentorship in STEMM studies mentoring programs and practices at the undergraduate and graduate levels. It explores the importance of mentorship, the science of mentoring relationships, mentorship of underrepresented students in STEMM, mentorship structures and behaviors, and institutional cultures that support mentorship. This report and its complementary interactive guide present insights on effective programs and practices that can be adopted and adapted by institutions, departments, and individual faculty members.

A Decadal Survey of the Social and Behavioral Sciences: A Research Agenda for Advancing Intelligence Analysis: Digest Version

The Digest Version of A Decadal Survey of the Social and Behavioral Sciences: A Research Agenda for Advancing Intelligence Analysis summarizes the most important ideas from the full report for the Intelligence Community to consider in the coming decade. This volume provides an overview of the primary opportunities that research in the social and behavioral sciences offers for strengthening national security, specifically the work of the intelligence analyst, and the conclusions and recommendations of the Committee on a Decadal Survey of Social and Behavioral Sciences for Applications to National Survey. This digest version is a succinct roadmap to the critical contribution researchers from these fields make to national security.

Academies' Climate Communications Initiative Releases Strategic Plan

In 2018, the National Academies launched the Climate Communications Initiative (CCI) to better leverage and unlock the storehouse of climate-related work from across the institution to more effectively meet and anticipate the needs of decision makers at all levels of society. An external Advisory Committee, together with a large internal staff team, have developed a strategic plan for the CCI to guide the National Academies' efforts moving forward.
New Funding Solicitations Posted Since December 15 Newsletter

Division of Integrative Organismal Systems Core Programs
The Division of Integrative Organismal Systems (IOS) Core Programs Track supports research aimed at understanding why organisms are structured the way they are and function as they do. Proposals are welcomed in all of the core scientific program areas supported by the Division of Integrative Organismal Systems (IOS). Areas of inquiry include, but are not limited to, developmental biology and the evolution of developmental processes, nervous system development, structure, modification, function, and evolution; biomechanics and functional morphology, physiological processes, symbioses and microbial interactions, interactions of organisms with biotic and abiotic environments, plant and animal genomics, and animal behavior. Proposals should focus on organisms as a fundamental unit of biological organization. Principal Investigators (PIs) are encouraged to apply systems approaches that will lead to conceptual and theoretical insights and predictions about emergent organismal properties.

The Rules of Life Track supports integrative proposals that span the subcellular and cellular scales normally funded by MCB to the organ, tissue, organismal, and group scale typically funded by IOS, to population, species, community and ecosystem scales typically funded by DEB. Rules of Life proposals may also include enabling infrastructure through joint submission with DBI. Discovery of fundamental principles and enabling infrastructure will advance understanding and further predict how key properties of living systems emerge from the interaction of genomes, phenotypes, and developmental, social and environmental context across space and time. This track provides opportunities to advance understanding of the Rules of Life by new mechanisms for review and funding of proposals that span two or more divisions in the Biological Sciences Directorate. Proposals accepted anytime.

Enabling Discovery through GEnomic Tools (EDGE)
The Enabling Discovery through GEnomic Tools (EDGE) program supports genomic research that addresses the mechanistic basis of complex traits in diverse organisms within the context
(environmental, developmental, social, and/or genomic) in which they function. The EDGE program also continues to support the development of innovative tools, technologies, resources, and infrastructure that advance biological research focused on the identification of the causal mechanisms connecting genes and phenotypes. EDGE is designed to provide support for (1) the development of tools, approaches, and infrastructure aimed at testing cause and effect hypotheses between gene function and phenotypes in diverse plants, animals, microbes, viruses, or fungi for which these methods are presently unavailable, and (2) hypothesis-driven research that tests cause and effect relations between genotype(s) and phenotypes in non-model plants, animals, microbes, viruses, or fungi. These goals are essential to uncovering the rules that underlie genomes-to-phenomes relationships, an area relevant to Understanding the Rules of Life: Predicting Phenotype, one of the 10 Big Ideas for future NSF investment.

Proposals accepted anytime.

ED-GRANTS-122719-001 Office of Postsecondary Education (OPE): Developing Hispanic-Serving Institutions Program
Each funding opportunity description is a synopsis of information in the Federal Register application notice. For specific information about eligibility, please see the official application notice. The official version of this document is the document published in the Federal Register. Free Internet access to the official edition of the Federal Register and the Code of Federal Regulations is available on GPO Access at: http://www.access.gpo.gov/nara/index.html . Please review the official application notice for pre-application and application requirements, application submission information, performance measures, priorities and program contact information. For the addresses for obtaining and submitting an application, please refer to our Common Instructions for Applicants to Department of Education Discretionary Grant Programs, published in the Federal Register on February 13, 2019 (84 FR 3768), or at www.govinfo.gov/content/pkg/FR-2019-02-13/pdf/2019-02206.pdf . The DHSI Program provides grants to assist Hispanic-Serving Institutions (HSIs) to expand educational opportunities for, and improve the academic attainment of, Hispanic students. DHSI Program grants enable HSIs to expand and enhance the academic offerings, program quality, faculty quality, and institutional stability of colleges and universities that are educating the majority of Hispanic college students and help large numbers of Hispanic students and other low-income individuals complete post secondary degrees.

Fulbright-Hays DDRA Fellowship Program
The Fulbright-Hays DDRA Fellowship Program provides opportunities to doctoral candidates to engage in dissertation research abroad in modern foreign languages and area studies. The program is designed to contribute to the development and improvement of the study of modern foreign languages and area studies in the United States. Due February 18.

Fulbright-Hays Group Projects Abroad
Purpose of Program: The purpose of the Fulbright-Hays GPA Program is to promote, improve, and develop the study of modern foreign languages and area studies at varying levels of education. The program provides opportunities for faculty, teachers, and undergraduate and graduate students to conduct individual and group projects overseas to carry out research and
study in the fields of modern foreign languages and area studies. This competition invites applicants to submit an application to request support for either a Fulbright-Hays GPA short-term project (GPA short-term projects 84.021A) or a Fulbright-Hays GPA long-term project (GPA long-term projects 84.021B). Applicants must clearly indicate on the SF 424, the Application for Federal Assistance cover sheet whether they are applying for support for a GPA short-term project (84.021A) or a GPA long-term project (84.021B). Additional submission details are included in the application package. There are three types of GPA short-term projects: (1) Short-term seminar projects of four to six weeks in length designed to help integrate international studies into an institution's or school system's general curriculum by focusing on a particular aspect of area study, such as the culture of an area or country of study (34 CFR 664.11); (2) curriculum development projects of four to eight weeks in length that provide participants an opportunity to acquire resource materials for curriculum development in modern foreign language and area studies for use and dissemination in the United States (34 CFR 664.12); and (3) group research or study projects of three to twelve months in duration designed to give participants the opportunity to undertake research or study in a foreign country (34 CFR 664.13). GPA long-term projects are advanced overseas intensive language projects that may be carried out during a full year, an academic year, a semester, a trimester, a quarter, or a summer. GPA long-term projects are designed to take advantage of the opportunities that exist in the foreign country for intensive advanced language training and for using the language while experiencing the culture in the foreign country. Participants should have successfully completed at least two academic years of training in the language to be studied to be eligible to participate in a GPA intensive advanced language training program. In addition, the language to be studied must be indigenous to the host country and maximum use must be made of local institutions and personnel (34 CFR 664.14). Due February 18.

**Fulbright-Hays Group Projects Abroad (GPA) Program Long-Term Projects**

Purpose of Program: The purpose of the Fulbright-Hays GPA Program is to promote, improve, and develop the study of modern foreign languages and area studies at varying levels of education. The program provides opportunities for faculty, teachers, and undergraduate and graduate students to conduct individual and group projects overseas to carry out research and study in the fields of modern foreign languages and area studies. This competition invites applicants to submit an application to request support for either a Fulbright-Hays GPA short-term project (GPA short-term projects 84.021A) or a Fulbright-Hays GPA long-term project (GPA long-term projects 84.021B). Applicants must clearly indicate on the SF 424, the Application for Federal Assistance cover sheet whether they are applying for support for a GPA short-term project (84.021A) or a GPA long-term project (84.021B). Additional submission details are included in the application package.

There are three types of GPA short-term projects: (1) Short-term seminar projects of four to six weeks in length designed to help integrate international studies into an institution's or school system's general curriculum by focusing on a particular aspect of area study, such as the culture of an area or country of study (34 CFR 664.11); (2) curriculum development projects of four to eight weeks in length that provide participants an opportunity to acquire resource materials for curriculum development in modern foreign language and area studies for use and dissemination in the United States (34 CFR 664.12); and (3) group research or study projects of
three to twelve months in duration designed to give participants the opportunity to undertake research or study in a foreign country (34 CFR 664.13). GPA long-term projects are advanced overseas intensive language projects that may be carried out during a full year, an academic year, a semester, a trimester, a quarter, or a summer. GPA long-term projects are designed to take advantage of the opportunities that exist in the foreign country for intensive advanced language training and for using the language while experiencing the culture in the foreign country. Participants should have successfully completed at least two academic years of training in the language to be studied to be eligible to participate in a GPA intensive advanced language training program. In addition, the language to be studied must be indigenous to the host country and maximum use must be made of local institutions and personnel (34 CFR 664.14). Due February 18.

**Animal and Biological Material Resource Centers**

This FOA encourages grant applications for national Animal and Biological Material Resource Centers. These Centers provide support for special colonies of laboratory animals, as well as other resources such as informatics tools, reagents, cultures (cells, tissues, and organs) and genetic stocks that serve the biomedical research community in a variety of research areas on a local, regional, and national basis. The important mission of the projects described by this FOA is to provide research resources, which are facilitating the optimization and enhancement of scientific rigor, transparency and experimental reproducibility of biomedical research. Proposed Animal and Biological Material Resource Centers must have broad application to multiple NIH Institutes or Centers (ICs) to align with the ORIP’s trans-NIH mission (https://orip.nih.gov/about-orip). This funding opportunity is designed to support both continuation of existing resources and to develop new ones when appropriate. Prior to preparing an application, all applicants are strongly encouraged to consult with Scientific/Research staff to be advised on appropriateness of the intended resource plans for this program, competitiveness of a potential application, and ORIP's program priorities. Due February 20.

**HQ0034-20-S-FO01 National Defense Education Program (NDEP) for Science, Technology, Engineering, and Mathematics (STEM) Education, Outreach, and Workforce Initiative Programs, Fiscal Year 2020**

The Department of Defense (DoD) seeks innovative applications on mechanisms to implement Science, Technology, Engineering, and Mathematics (STEM) education, outreach, and/or workforce initiative programs, here onto will be referred as STEM activities. The Department intends to award multiple grants, subject to the availability of funds. Each individual award will be up to a maximum of $3,000,000, for a period of up to three (3) years. Applications for larger amounts may be considered on a case-by-case basis. The Federal STEM Strategy states, “The pace of innovation is accelerating globally, and with it the competition for scientific and technical talent. Now more than ever the innovation capacity of the United States—and its prosperity and security—depends on an effective and inclusive STEM education ecosystem”. In addition, the National Defense Strategy has called for the Department of Defense to make significant investments in science and technology modernization priority areas to meet key capability and capacity needs. DoD is the largest employer of scientists and engineers in the
United States. Therefore, the Department must maintain a robust pipeline of STEM talent by investing in pre-kindergarten through undergraduate STEM activities to ensure the DoD has enduring access to the best and brightest talent. The National Defense Education Program (NDEP) enables the DoD to cultivate and access high-quality STEM personnel vital to national defense now and in the future. This solicitation seeks innovative approaches to support DoD STEM education, outreach, and workforce development that aligns with DoD and Federal STEM Strategic Plans. **Due February 24.**

**Algorithms for Threat Detection (ATD)**
The Algorithms for Threat Detection (ATD) program will support research projects to develop the next generation of mathematical and statistical algorithms for analysis of large spatiotemporal datasets with application to quantitative models of human dynamics. The program is a partnership between the Division of Mathematical Sciences (DMS) at the National Science Foundation (NSF) and the National Geospatial Intelligence Agency (NGA). **Due March 18.**

**Principles and Practice of Scalable Systems (PPoSS)**
A key focus of the design of modern computing systems is performance and scalability, particularly in light of the limits of Moore’s Law and Dennard scaling. To this end, systems are increasingly being implemented by composing heterogeneous computing components and continually changing memory systems as novel, performant hardware surfaces. Applications fueled by rapid strides in machine learning, data analysis, and extreme-scale simulation are becoming more domain-specific and highly distributed. In this scenario, traditional boundaries between hardware-oriented and software-oriented disciplines increasingly are blurred.

Achieving scalability of systems and applications will therefore require coordinated progress in multiple disciplines such as computer architecture, high-performance computing (HPC), programming languages and compilers, security and privacy, systems, theory, and algorithms. Cross-cutting concerns such as performance (including, but not limited to, time, space, and communication resource usage and energy efficiency), correctness and accuracy (including, but not limited to, emerging techniques for program analysis, testing, debugging, probabilistic reasoning and inference, and verification), security and privacy, robustness and reliability, domain-specific design, and heterogeneity must be taken into account from the outset in all aspects of systems and application design and implementation.

The aim of the Principles and Practice of Scalable Systems (PPoSS) program is to support a community of researchers who will work symbiotically across the multiple disciplines above to perform basic research on scalability of modern applications, systems, and toolchains. The intent is that these efforts will foster the development of principles that lead to rigorous and reproducible artifacts for the design and implementation of large-scale systems and applications across the full hardware/software stack. These principles and methodologies should simultaneously provide guarantees on correctness and accuracy, robustness, and security and privacy of systems, applications, and toolchains. Importantly, as described below, PPoSS specifically seeks to fund projects that span the entire hardware/software stack and will lay the groundwork for sustainable approaches for engineering highly performant, scalable, and robust computing applications. **Planning grant due March 30.**
International Research and Education Network Connections
The International Research and education Network Connections (IRNC) Base program supports high-performance network connectivity required by international science and engineering research and education collaborations involving the NSF research community. High-performance network connections and infrastructure funded by this program are intended to support science and engineering research and education applications, and preference will be given to solutions that provide the best economy of scale and demonstrate the ability to support the largest communities of interest with the broadest services. Funded projects will assist the U.S. research and education community by enabling state-of-the-art international network services and access to increased collaboration and data services. NSF expects to make 3 to 10 awards in production R&E network infrastructure; 1 to 3 awards in international testbeds; and 1 award in Engagement. Due April 1.

Seeding Critical Advances for Leading Energy Technologies with Untapped Potential 2019
Seeding Critical Advances for Leading Energy technologies with Untapped Potential (SCALEUP) solicitation provides a vital mechanism for the support of innovative energy R&D that complements ARPA-E’s primary R&D focus on early-stage transformational energy technologies that still require proof-of-concept.

ARPA-E’s mission is to develop transformational energy technologies in support of U.S. national security and economic competitiveness. ARPA-E funds the R&D of technologies to build and maintain U.S. technological leadership in highly competitive global energy markets, thus supporting American jobs and economic growth. ARPA-E’s authorizing statute directs the Agency to develop linkages between its sponsored applied research and the marketplace. These linkages are central to realizing the public’s return on technology investments.

An enduring challenge to ARPA-E’s mission is that even technologies that achieve substantial technical advancement under ARPA-E support are at risk of being stranded in their development path once ARPA-E funding ends (averaging $2.5M over three years). ARPA-E-funded technologies typically face significant remaining technical risks upon completion of an award’s funding period. Experience across ARPA-E’s diverse energy portfolios, and with a wide range of investors, indicates that pre-commercial “scaling” projects are critical to establishing that performance and cost parameters can be met in practice for these very early stage technologies. These pre-commercial scaling projects aim to translate the performance achieved at bench scale to commercially scalable versions of the technology, integrate the technology with broader systems, provide extended performance data, and validate the manufacturability and reliability of new energy technologies. (These projects are often termed “pre-pilot” development in different industries.) Success in these scaling projects would enable industry, investors, and partners to justify substantial commitments of financial resources, personnel, production facilities, and materials to develop promising ARPA-E technologies into early commercial products.

The SCALEUP FOA builds upon ARPA-E-funded technologies by scaling the most promising. Stranding promising ARPA-E-funded technologies in their development pathways leaves substantial intellectual property developed with American taxpayer dollars vulnerable to adoption by foreign competitors, who can and do capture it for continued development – and economic benefit – overseas. This harms national competitiveness, as U.S. industries often lose
the lead on the development, scaling, and manufacturing of technologies necessary to compete in rapidly evolving global energy markets. These scaling energy technology projects will meet ARPA-E’s statutory direction to achieve the above goals by “accelerating transformational technological advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty” Due July 20.

Solicitations Remaining Open from Prior Issues of the Newsletter

**Secondary Education, Two-Year Postsecondary Education, and Agriculture in the K-12 Classroom Challenge Grants Program (SPECA)**
The Secondary Education, Two-Year Postsecondary Education, and Agriculture in the K-12 Classroom Challenge Grants (SPECA) program seeks to: (a) promote and strengthen secondary education and two-year postsecondary education in the food, agriculture, natural resources and human (FANH) sciences in order to help ensure the existence of a workforce in the United States that’s qualified to serve the FANH sciences system; and (b) promote complementary and synergistic linkages among secondary, two-year postsecondary, and higher education programs in the FANH sciences in order to advance excellence in education and encourage more young Americans to pursue and complete a baccalaureate or higher degree in the FANH sciences. Due February 6.

**HHMI’s Driving Change initiative**
The goal of the HHMI Driving Change (DC) initiative is to drive genuine and lasting culture change on university campuses so undergraduate students from all backgrounds, particularly those who belong to historically excluded groups, will excel in STEM and graduate from college well prepared to pursue advanced degrees and eventually assume leadership roles in STEM. This initiative encourages a comprehensive approach to culture change with three interlocking elements:

1. **A robust framework to support student success in STEM**
The first element focuses on the development of a coherent set of activities that provides a robust framework to support student success in STEM. Each grantee campus will create its version of the University of Maryland, Baltimore County (UMBC) Meyerhoff Scholars Program (MYSP), committing to achieve the outcomes and honor the underlying values of each of the MYSP components.

2. **A more inclusive STEM learning environment**
The second element focuses on creating a more inclusive STEM learning environment that affects all STEM students at the university. Each campus planning to submit a grant proposal will examine its current environment through a self-study. The findings of the self-study will identify practices and behaviors that should change in order to achieve greater inclusivity in the learning environment for all students, especially those students who are from groups historically excluded from STEM.

3. **A learning community of institutions**
The third element reaches beyond the individual grantee university by convening a learning community of institutions that are engaged in DC. The DC learning community will meet regularly throughout the five years of the initiative to share their aspirations, experiences, and progress.

HHMI expects to award up to six grants to research universities with awards beginning as early as September 2021. Each grant will provide up to $500,000 per year for five years and will be non-renewable. These grants are intended to provide “start-up” funds to assist the grantee institution as it launches its DC program. The grant will not pay for student tuition and fees, nor will it provide indirect costs to the grantee institutions. The grantee university will carefully assess its progress, evaluate its program, and initiate strategies that will sustain progress beyond the duration of the HHMI grant. LOI February 7.

**Environmental Convergence Opportunities in Chemical, Bioengineering, Environmental, and Transport Systems (ECO-CBET)**

Creating solutions to pressing environmental and sustainability challenges will require input and imaginative approaches from various fields, perspectives, and disciplines. The National Academies of Sciences, Engineering and Medicine (NASEM), in their report "Environmental Engineering for the 21st Century: Addressing Grand Challenges," identified five critical challenges we must address as a society:

- Sustainably supply food, water, and energy
- Curb climate change and adapt to its impacts
- Design a future without pollution and waste
- Create efficient, healthy, and resilient cities
- Foster informed decisions and actions

The report further states, "The challenges provide focal points for evolving environmental engineering education, research, and practice toward increased contributions and a greater impact. Implementing this new model will require modifications in educational curriculum and creative approaches to foster interdisciplinary research on complex social and environmental problems." This solicitation aims to address these grand challenges by supporting a collaborative research model that seamlessly integrates sustainability, environmental engineering, and process science and engineering.

Accordingly, the Environmental Convergence Opportunities in Chemical, Bioengineering, Environmental, and Transport Systems (ECO-CBET) solicitation will support activities that confront vexing environmental engineering and sustainability problems by uncovering and incorporating fundamental knowledge to design new processes, materials, and devices from a systems-level perspective. Projects should be compelling and reflect sustained, coordinated efforts from interdisciplinary research teams. A key objective of the solicitation is to encourage conversations and robust collaborations amongst the chemical process, transport phenomena, bioengineering, and environmental and sustainability research communities such that unanticipated solutions may arise. Furthermore, training the future workforce to actively engage and be successful in interdisciplinary research will be necessary to continually innovate given the scope of the environmental problems faced by our global community. Preliminary due February 12; full due April 30.
National Robotics Initiative 2.0: Ubiquitous Collaborative Robots (NRI-2.0)
The program supports four main research themes that are envisioned to advance the goal of ubiquitous co-robots: **scalability**, **customizability**, **lowering barriers to entry**, and **societal impact**, including human safety. Topics addressing **scalability** include how robots can collaborate effectively with orders of magnitude more humans or other robots than is handled by the current state of the art; how robots can perceive, plan, act, and learn in uncertain, real-world environments, especially in a distributed fashion; and how to facilitate large-scale, safe, robust and reliable operation of robots in complex environments. **Customizability** includes how to enable co-robots to adapt to specific different tasks, environments, or people, with minimal modification to hardware and software; how robots can personalize their interactions with people; and how robots can communicate naturally with humans, both verbally and non-verbally. Topics in **lowering barriers to entry** should focus on lowering the barriers for conducting fundamental robotics research and research on integrated robotics application. This may include development of open-source co-robot hardware and software, as well as widely-accessible testbeds. Outreach or using robots in educational programs do not, by themselves, lower the barriers to entry for robotics research. Topics in **societal impact** include fundamental research to establish and infuse robotics into educational curricula, advance the robotics workforce through education pathways, and explore the social, economic, ethical, security, and legal implications of our future with ubiquitous collaborative robots.  **Due February 12-26.**

NSF 20-516 Improving Undergraduate STEM Education: Pathways into the Earth, Ocean, Polar and Atmospheric & Geospace Sciences (IUSE:GEOPAths)
The National Science Foundation's (NSF's) Improving Undergraduate STEM Education (IUSE) Initiative is a Foundation-wide effort to accelerate improvements in the quality and effectiveness of undergraduate education in all STEM fields including the learning, social, behavioral, and economic sciences. Undergraduate STEM education is critical for preparing both a diverse STEM workforce and a STEM-literate public that is ready to support and benefit from the progress of science [Reference 1]. The IUSE initiative provides a Foundation-wide framework of investments to support the agency's commitment to the highest caliber undergraduate STEM education. By improving the quality and effectiveness of undergraduate education in all STEM fields, IUSE investments enable NSF to lead national progress toward a diverse and innovative workforce and a STEM-literate public. Through the IUSE framework, NSF coordinates its investments in undergraduate programs and undergraduate STEM education to maximize impact, and to use shared metrics and appropriate program evaluation approaches. These investments are made across all directorates and address both STEM education in general and specific disciplinary needs. IUSE investments support a variety of activities including the inclusion of inquiry-based and active learning approaches in undergraduate STEM instruction, efforts to increase undergraduate STEM research experiences and courses, and research on the persistence and graduation of students in STEM programs. In addition, specific emerging cross-disciplinary needs include data science preparation for students in all majors, recruitment and retention of women and of students from underrepresented groups in STEM degree programs, incorporation of undergraduate research in STEM fields for STEM majors and non-majors, and re-envisioning of introductory courses in light of new research findings and theories. IUSE also seeks to broaden participation in STEM fields from all sectors and groups in
society and proposers are encouraged to establish linkages, as appropriate, with components of the national network of NSF INCLUDES projects [Reference 2 in the Program Description section]. The Directorate for Geosciences (GEO) contributes to the IUSE initiative through the Improving Undergraduate STEM Education: Pathways into the Geosciences - Earth, Ocean, Polar and Atmospheric Sciences (IUSE:GEOPAths) funding opportunity. IUSE:GEOPAths invites proposals that specifically address the current needs and opportunities related to education within the geosciences community through the formation of STEM Learning Ecosystems that engage students in the study of the Earth, its oceans, polar regions and atmosphere. The primary goal of the IUSE:GEOPAths funding opportunity is to increase the number of students pursuing undergraduate and/or postgraduate degrees through the design and testing of novel approaches that engage students in authentic, career-relevant experiences in geoscience. In order to broaden participation in the geosciences, engaging students from historically excluded groups or from non-geoscience degree programs is a priority. While maintaining elements from the legacy tracks of GEOPATHS, this solicitation features three new funding tracks that focus on Geoscience Learning Ecosystems (GLEs): 1. GEOPAths: Informal Networks (IN). Collaborative projects in this track will support geoscience learning and experiences in informal settings for teachers, pre-college (e.g., upper level high school) students, and early undergraduates in the geosciences. 2. GEOPAths: Undergraduate Preparation (UP). Projects in this track will engage pre-college and undergraduate students in extra-curricular experiences and training in the geosciences with a focus on service learning [Reference 3 in the Program Description section] and workplace skill building. 3. GEOPAths: Graduate Opportunities (GO). Projects in this track will improve research and career-related pathways into the geosciences for undergraduate and graduate students through institutional collaborations with a focus on service learning and workplace skill building. **Due February 14.**

**DE-FOA-0002184, Environmental System Science, Department of Energy - Office of Science**

The DOE SC program in Biological and Environmental Research (BER) hereby announces its interest in receiving applications for research in Environmental Systems Science (ESS), including Terrestrial Ecosystem Science (TES) and Subsurface Biogeochemical Research (SBR). The goal of the Environmental System Science (ESS) activity in BER is to advance a robust, predictive understanding of the set of interdependent physical, biogeochemical, ecological, hydrological, and geomorphological processes for use in Earth system, ecosystem and reactive transport models. Using an iterative approach to model-driven experimentation and observation, and interdisciplinary teams, ESS-supported scientists work to unravel the coupled physical, chemical and biological processes that control the structure and functioning of terrestrial ecosystems and integrated watersheds across critical spatial and temporal scales. This FOA will consider applications that focus on improving the understanding and representation of terrestrial and subsurface environments in ways that advance the sophistication and capabilities of local, regional, and larger scale models. Using new measurements, field experiments, more sophisticated modeling and/or synthesis studies, this FOA will encompass two topic areas: 1) Terrestrial Ecology, specifically linking above and belowground processes, as well as methane biogeochemistry; and 2) Subsurface and Watershed Hydro-biogeochemistry, specifically studying the function and dynamics of hydro-biogeochemical processes within watersheds. All applications are required to clearly delineate an integrative, hypothesis-driven approach and
describe the existing needs/gaps in state-of-the-art models. Applicants should provide details on how the results of the proposed research will be used to improve the predictability and sophistication of integrated watershed systems and/or terrestrial ecosystem models. Due Feb. 20.

**EHR Core Research (ECR): Building Capacity in STEM Education Research (ECR: BCSER)**

ECR’s Building Capacity for STEM Education Research (ECR: BCSER) solicitation supports projects that build individuals’ capacity to carry out high quality STEM education research that will enhance the nation’s STEM education enterprise and broaden the pool of researchers that can conduct fundamental research in STEM learning and learning environments, broadening participation in STEM fields, and STEM workforce development.

Specifically, ECR: BCSER supports activities that enable early and mid-career researchers to acquire the requisite expertise and skills to conduct rigorous fundamental research in STEM education. ECR: BCSER seeks to fund research career development activities on topics that are relevant to qualitative and quantitative research methods and design, including the collection and analysis of new qualitative or quantitative data, secondary analyses using extant datasets, or meta-analyses.

This career development may be accomplished through investigator-initiated projects or through professional development institutes that enable researchers to integrate methodological strategies with theoretical and practical substantive issues in STEM education. Early and mid-career faculty new to STEM education research, particularly underrepresented minority faculty and faculty at minority-serving and two-year institutions, are encouraged to submit proposals.

ECR: BCSER especially welcomes proposals that pair well with the efforts of NSF INCLUDES (https://www.nsf.gov/news/special_reports/nsfincludes/index.jsp) to develop STEM talent from all sectors and groups in our society. Proposers are encouraged to identify topics that support the thrust of NSF INCLUDES projects. Due February 28.

**NSF 20-515 Future of Work at the Human-Technology Frontier: Core Research**

The specific objectives of the Future of Work at the Human-Technology Frontier program are to (1) facilitate convergent research that employs the joint perspectives, methods, and knowledge of computer science, design, engineering, learning sciences, research on education and workforce training, and social, behavioral, and economic sciences; (2) 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, educational, and environmental systems at different scales; (3) 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) understand, anticipate, and explore ways of mitigating potential risks.
arising from future work at the human-technology frontier. Ultimately, this research will advance understanding of how technology and people interact, distribute tasks, cooperate, and complement each other in different specific work contexts of significant societal importance. It will advance the knowledge base related to worker education and training and formal and informal learning to enable all potential workers to adapt to changing work environments. It will advance our understanding of the links between the future of work at the human-technology frontier and the surrounding society, including the intended potential of new technologies and the unintended consequences for workers and the well-being of society. For the purposes of this solicitation, work is defined as mental or physical activity to achieve tangible benefit such as income, profit, or community welfare. The Future of Work at the Human-Technology Frontier is, in turn, a conceptualization of work in the future that will be enabled or improved by advances in intelligent technology and their synergistic integration with human skill to achieve broad participation in the workforce and improve the social, economic, and environmental well-being of society. To reach this goal, research is sought that is anchored in work. Proposals must clearly define the work and work context addressed by the research. Technological innovations should be integrated with advances in the learning sciences, research on education and workforce training, and social, behavioral, and economic science perspectives. Potential results should contribute to fundamental advances in optimizing the human-technology team, the science and technology of future workforce development and education, work environments, and positive work outcomes for workers and society at large. Proposals are encouraged that are oriented toward the future of work at the human-technology frontier and that are not overly couched in current technology or work practices. A proposal for a research grant in this program must focus on advancing fundamental understanding of future work, and potential improvements to work, workplaces, workforce preparation, or work outcomes for workers and society. **Due March 9.**

**NSF Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM)**

**IMPORTANT INFORMATION AND REVISION NOTES**

1. The S-STEM program team will host webinars after the release of this solicitation. In the webinars, key features and expectations of the S-STEM program will be discussed. Information regarding the webinars will be posted to the S-STEM program webpage: [https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5257](https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5257).

2. The solicitation explicitly notes that not all STEM degrees are eligible for the S-STEM program. Eligible degrees for the S-STEM program have been more clearly defined and can be found in section "SUMMARY OF PROGRAM REQUIREMENTS/General Information/Synopsis of Program."

3. Principal Investigators (PIs) interested in submitting a request for supplemental funding should (a) contact their cognizant program officer before submission to discuss the proposal idea, and (b) follow the guidelines for supplemental funding requests for existing awards in the PAPPG.

4. The requirement that students be enrolled full-time has been eliminated. Students must now be enrolled at least half-time as defined by the institution.

5. All proposals must include specific tabular information described in section V.A.11.

6. The requirement of a third-year review only applies to Track 3 projects.
7. All projects are expected to contribute to the STEM education knowledge base. Any proposal submitted in response to this solicitation should be submitted in accordance with the revised NSF Proposal & Award Policies & Procedures Guide (PAPPG) (NSF 19-1), which is effective for proposals submitted, or due, on or after February 25, 2019. **Due March 25.**

**Dimensions of Biodiversity FY2020**
The 2020 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 March 27.**

**DE-FOA-0002204 Energy Frontier Research Centers**
The Department of Energy’s (DOE) Office of Basic Energy Sciences (BES) announces the call for Energy Frontier Research Centers (EFRC) proposals and encourages both new and renewal applications. Applications will be required to address priority research directions and opportunities identified in recent BES workshop and roundtable reports, the scientific grand challenges identified in the report Directing Matter and Energy: Five Challenges for Science and the Imagination, and the opportunities described in the report Challenges at the Frontiers of Matter and Energy: Transformative Opportunities for Discovery Science. All of these reports are described below. BES is soliciting proposals in four (4) topical areas: 1) Environmental Management (new and renewal proposals); 2) Quantum Information Science (new proposals only); 3) Microelectronics (new proposals only); and 4) Polymer Upcycling (new proposals only). Funding will be competitively awarded to the successful Energy Frontier Research Center applications selected by Federal officials, based on a rigorous merit review process as detailed in Section V of this Funding Opportunity Announcement (FOA). **Due April 7.**

**N00173-19-S-BA01 NRL Long Range Broad Agency Announcement (BAA) for Basic and Applied Research**
The NRL’s Broad Agency Announcement (BAA) issued under the provisions of paragraphs 35.016 and 6.102(d)(2) of the Federal Acquisition Regulations (FAR). Proposals may range from theoretical studies to proof-of-concept to include fabrication and delivery of a prototype. However, this is limited to research procurements for which it would be impossible to draft an adequate RFP in sufficient detail without restraining the technical response and thus hindering competition rather than expanding it. BAA topics include all NRL sites located in the Washington, DC area, the Stennis Space Center, MS, and Monterey, CA. Proposals submitted in response to a BAA announcement that are selected for award are considered to be the result of full and open competition and are in full compliance with the provisions of Public Law 98-369, "The Competition in Contracting Act of 1984."

NRL is interested in receiving proposals for the research efforts described under this BAA. This announcement is an expression of interest only and does not commit the Government to make any award or to pay for any proposal preparation costs. The cost of proposal preparation for response to a BAA is not considered an allowable direct charge to any
resultant contract or any other contract; however, it may be an allowable expense to the normal bid and proposal indirect cost specified in FAR 31.205-18. **Open to Sept. 10, 2020.**

**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.]

**HR00119S0071, DSO Office-wide Broad Agency Announcement, Department of Defense DARPA - Defense Sciences Office 2020 BAA**
The mission of the Defense Advanced Research Projects Agency (DARPA) Defense Sciences Office (DSO) is to identify and create the next generation of scientific discovery by pursuing high-risk, high-payoff research initiatives across a broad spectrum of science and engineering disciplines and transforming these initiatives into disruptive technologies for U.S. national security. In support of this mission, the DSO Office-wide BAA invites proposers to submit innovative basic or applied research concepts that address one or more of the following technical domains: (1) Frontiers in Math, Computation and Design, (2) Limits of Sensing and Sensors, (3) Complex Social Systems, and (4) Anticipating Surprise. Each of these domains is described below and includes a list of example research topics that highlight several (but not all) potential areas of interest. Proposals must investigate innovative approaches that enable revolutionary advances. DSO is explicitly not interested in approaches or technologies that primarily result in evolutionary improvements to the existing state of practice. **Open to June 12, 2020.**

**Access to Historical Records: Major Initiatives FY 2021**
The National Historical Publications and Records Commission seeks projects that will significantly improve public discovery and use of major historical records collections. The Commission is especially interested in collections of America’s early legal records, such as the records of colonial, territorial, county, and early statehood and tribal proceedings that document the evolution of the nation’s legal history. For more information about how to become an invited applicant, please see the Preliminary Proposal announcement.

(https://www.archives.gov/nhprc/announcement/preliminary-proposal/prelim.html) All types of historical records are eligible, including documents, photographs, born-digital records, and analog audio and moving images. Projects may:

- Digitize historical records collections, or related collections, held by a single institution and make them freely available online
- Provide access to born-digital records
- Create new freely-available virtual collections drawn from historical records held by multiple institutions
- Create new tools and methods for users to access records

The NHPRC welcomes collaborative projects, particularly for bringing together related records from multiple institutions. Projects that address significant needs in the field and result in
replicable and scalable approaches will be more competitive. We also encourage organizations to actively engage the public in the work of the project. Applicants should also consult Access to Historical Records: Archival Projects program, which has different requirements and award amounts. For a comprehensive list of Commission limitations on funding, please see: "What we do and do not fund" (http://www.archives.gov/nhprc/apply/eligibility.html). Applications that consist entirely of ineligible activities will not be considered. Due July 9, 2020.

**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.
What We Do--

We provide consulting for colleges and universities on a wide range of topics related to research development and grant writing, including:

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

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

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

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

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

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

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

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

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