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Engineers: Beware the downselect proposal

Faculty in engineering who are pursuing grants to support research often experience a common problem: their proposals are declined, with reviewers commenting that the proposed project is “too applied.” Other comments from reviewers along this vein are that the proposed research “lacks a theoretical framework,” “does not address fundamental mechanisms,” or is “unlikely to advance the discipline.” These types of reviews are most common for agencies and programs that fund “basic” research conducted mostly by researchers academia, such as NSF, NIH, and the Office of Science at DOE. Remember that if you propose research that seems to benefit only a narrow application, reviewers are likely to view the impact and significance of your work as limited. Even professional societies and private foundations agencies may balk at funding projects that are too closely tied to a specific application unless that application is central to their mission. This is especially true for career development grants specifically for early career researchers such as the NSF CAREER, ONR YIP, etc.

Receiving critiques that a project is too applied can be both frustrating and puzzling to PIs who, after all, are engineers and usually conduct research grounded in practical applications. Often, the problem is not so much in the project proposed by the PI as in how the project is framed in the proposal. In a previous article (in the Nov. 2015 issue), we discussed what a “theoretical framework” is and how to make sure you have one. Today, we’ll discuss the downselect proposal as one specific example of a proposal that is likely to be criticized by reviewers as being “too applied.”

We’re inspired to discuss this problem now because many engineering faculty are starting to prepare their NSF CAREER proposals, and we often see this issue in CAREER proposal drafts. Don’t let this happen to your CAREER proposal!

What is a Downselect Proposal?

It’s very common in applied engineering research conducted in industry to be presented with the problem of how best to design a product. Perhaps there are a number of potential materials you might use, and you need to determine which one is best. You may also need to determine what processing parameters (temperature, pressure, etc.). Or, more fundamentally, you might be formulating your own materials and there are a wide array of possible compositions you need to choose from, or you may have a number of options for design features, and you need to select the best design.

In this situation, the engineer will often develop a testing program that involves a number of stages of testing. At each stage, the candidates (e.g., possible materials, processing parameters, designs, etc.) will be judged based on specific performance metrics. There will then be a “downselect” to the best 3, 5, 16, or other predetermined number of candidates. These downselected candidates will then graduate to the next level of testing, after which another downselect will happen until, at the end, the best candidate material, design, process, etc. will be selected for use in the application.
While this approach will help engineers find the best candidate from those that are available, it will not necessarily shed any light on the underlying mechanisms or properties that make that candidate the best. As a result, it does not provide new information that would allow the engineer to develop a novel candidate that is better than those under consideration. At the end of the testing program, the best candidate may not perform very well, but the information generated likely will not provide guidance on where to go from there. Another drawback is that the results are often application-specific, so the new knowledge generated will not have much impact beyond the specific application under consideration. These limitations make this kind of project a very tough sell for research funding from agencies and foundations.

**Converting a Downselect Project to a Basic Research Project**

It’s often necessary to determine which among multiple options/parameters best meet specific criteria, and some sort of downselect experimental design may be the best way to do that. This, in itself, is not a problem. The important thing is to place this experimental design in the context of a larger conceptual framework in which you have research questions and/or hypotheses related to why some conditions or parameters might perform better than others. Then, you should ensure that the data you will gather as part of this testing will allow you to answer those questions and/or test those hypotheses. As part of this discussion, you should discuss in detail how you will analyze the data. If you are looking for statistical correlations, it’s especially important that you discuss in detail the number of conditions you’ll be testing, the number of specimens per condition, the expected variability, and how you will determine statistical significance.

So, to take a highly metaphorical example, let’s say that you are working on a way to make an invisibility cloak by embedding Unobtainium nanoparticles in spiderweb fabric. You may need to determine the effect of Unobtainium impurities, nanoparticle size, and embedding pattern on light scattering, absorption, and reflection. You may also need to determine which weave pattern for the spiderweb best holds the Unobtainium nanoparticles in place in the preferred orientation. To do this, you might design an experimental design that involves a number of downselects. For example, you might test the optical properties of Unobtainium compositions with various amounts and types of impurities to determine which have the most desirable properties, then you might take the Unobtainium with the best properties and test various orientations to determine light scattering behavior, and so on. This project, as described above, is unlikely to do well in the review process.

However, if you first advance some hypotheses or research questions related to the mechanisms that might, for example, affect the optical properties of Unobtainium with different types of impurities, this is a step in the right direction. Your hypotheses may, in turn, inspire you to conduct additional testing to test those hypotheses (for example, your hypothesis may relate to the how impurities affect the electronic structure of the Unobtainium, and thus the optical properties, so you may need to add electrical testing). In fact, you may find that this question, in itself, is enough for an entire basic research project. What you learn may be relevant not just to the impurities you plan to test, but they might point to other impurities that might further improve the optical performance of the Unobtainium.
By following this process, you may find that your project is becoming more fundamental and more focused. Instead of taking on the entire design of an invisibility cloak, you may find that it will be more productive to discuss the design of the invisibility cloak as your long-term goal, but for the proposed 3 or 5-year project to focus on the basic mechanisms by which Unobtainium particles absorb and scatter light, allowing you to improve those properties. Of course, whether this more focused approach is appropriate will depend on what is already known and the priorities of the specific grant program to which you’re applying. In any case, you should be sure that you go beyond simply downselecting to the cloak design that is the best among those tested.

In summary, if you’re applying to a basic research agency such as NSF, and you’re considering including a downselect-type experimental plan, ask yourself three questions:

1) Am I examining not just what works better, but why?
2) Even if the performance of my engineered product does not meet expectations, what will I learn that will lead to future research that will allow me to improve performance?
3) Will what I learn from this project help inform other engineering applications?
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 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 \textit{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.
The most common support given by research offices in the planning, development, and writing of proposals is directed to faculty. However, in a fair number of instances, the staff in various university offices, centers, institutes, and the like are given the responsibility to plan, develop, and write proposals specific to advancing their office mission in some way. The more common types of these proposals fall into the broad area of education, training, and outreach. These would include various institutional capacity-building grants such as the currently open Federal TRIO Programs: Ronald E. McNair Postbaccalaureate Achievement, Strengthening Institutions Program, and Developing Hispanic-Serving Institutions Program, as well as various K-16 educational grants from NSF, NASA, DOE, USDA, etc. that target everything from workforce development to encouraging K-12 students in STEM fields.

In most cases, these are not the types of grants that a faculty member needs for promotion and tenure, and so it is often the case that these grants are written by university staff. For example, a department head would likely discourage an assistant professor at a research institution from applying for these types of grants that would come at the cost of time spent on research grants, particularly new faculty research grants, such as the various CAREER and Young Investigator grants.

However, staff in various university offices that administer or run programs in education, training, and outreach come to grant writing with the same disadvantages most new faculty do—lack of prior training and experience in planning and writing a competitive grant. This is not unusual since most grant writing expertise is self taught and comes from a patchwork of on-the-job experiences, research mentoring by senior research office personnel, grant workshops, and self study.

While the types of grants that fall under the umbrella classification of education, training, and outreach are many and diverse, some common characteristics are key to a successful proposal. These would include an understanding of what is meant by evidence-based best practices, preferred models, replicability, scalability, validating data, logic models, etc. in education, training, and outreach proposals. For this specific knowledge, staff charged with writing these grants will often seek advice from research offices on how best to write a competitive proposal and how best to understand the mission and culture of various funding agencies and foundations that fund these grants.

One helpful activity for supporting staff writing these types of grants is an introductory workshop that addresses such topics as finding funding, understanding the mission-agency objectives of the funder, proposal planning, working in teams, competitive grant strategies, and an enumeration of the key core elements of any proposal that seeks funding in this broad area. An example of a PowerPoint presentation that addresses these issues is available for download here: https://lucy-deckard.squarespace.com/s/Education-Training-and-Outreach-Proposals-Overview-for-Staff.pptx.

This presentation for a staff-focused workshop, Proposals for Education, Training and Outreach, can provide the core set of slides for a more institutionally-specific workshop.
supporting those in various university offices who may have the core writing skills needed for a competitive grant but lack the strategic skills needed for a successful grant. In this particular presentation, any word in red indicates that the presenter needs to elaborate on the word by putting it in a specific context, e.g., a term such as evidence-based models is common across most types of education, training, and outreach grants, but it needs extensive elaboration in any presentation since it plays a significant role in validating proposed program activities.

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The gold standard advice to anyone writing proposals to federal research agencies has always been the importance of understanding the mission and culture of the funding agency. This is because funding success is determined largely by the value-added benefits proposed research will bring to the agency mission priorities. If those mission priorities are not well understood, it is difficult to make a case in the research narrative that what is proposed will advance those mission priorities in some important way, i.e., if you don’t understand the agency mission, it is impossible to make claims that your research will bring benefits to it in clear and specific ways.

An understanding of the mission priorities of federal research agencies comes in various forms. The most important among them is experience developing and writing proposals to the particular agency, information sharing among research office peers specific to agency, interactions with agency program officers, reading and analyzing numerous agency funding solicitations, searching through the agency website, reading the agency’s strategic plan(s), reviewing an agency’s annual reports, workshops, grant conferences, reading proposal reviews, etc.

In the past, changes to mission agency research priorities have been fairly gradual. They are implied in an agency’s new research funding opportunities and in its sunsetting of others. However, from the drips and drabs of information coming out about changes to mission agency objectives, it looks like the 2018 federal budget set to be released in mid to late March will result in a major homework assignment for those working in university research offices on the planning, development, writing, and submittal of proposals to federal agencies.

For example, major news stories about deep cuts to the budget at EPA have been carried by various news outlets such as the Washington Post and The Scientist, as well as scientific associations. These stories project a cut in the EPA budget from the current $8.1 billion to $6.1 billion, along with a workforce reduction from the current 15,000 to 12,000, along with speculation on the many EPA programs that might be cut entirely from the 2018 budget, like Environmental Justice, or kept like Brownfield Program. It remains to be seen what this means for numerous university-based EPA programs in STEM education and the development of a future environmental workforce.

For example, the STAR Graduate Fellowship Program and Fellowships, Scholarships and Post-Doctoral Opportunities might expect changes. In other instances, EPA has partnered with NSF to offer internships to eligible NSF Graduate Fellows, offered EPA STEM opportunities, and supported the P3 Student Design Competition program.

Major cuts to NOAA have also been written about extensively over the past several weeks. The Washington Post, for example, noted that one proposed cut would eliminate the $73 million Sea Grant which currently supports coastal research conducted through 33 university programs across the country.
The flip side of all this is a proposed increase in defense funding of $54 billion that would come in large part by reducing the budgets of other federal agencies, but it is uncertain how that might affect university research funding overall. The most likely scenario is that the increase in military spending would go to support readiness, both in troops and equipment, that has declined under sequester. For universities, a core of DOD research funding comes from the various research labs (ONR, ARO, AFOSR), DARPA, IARPA, etc.

Of course, for research offices and university staff who support faculty and institutional proposals, changes to federal mission agency funding priorities can be looked at from the aggregate perspective. From that vantage point, a loss of funding opportunities under the 2018 budget in one disciplinary area may be offset by funding increases in another disciplinary area, making the overall annual research funding obtained by the university closer to flat rather than declining significantly. Of course, taking the aggregate perspective on the 2018 budget is cold comfort to those faculty in areas where research funding is targeted for steep cuts or even elimination. Moreover, it is likely that overall research funding will decrease across all agencies, likely to be felt disproportionately by those whose research is more applied than basic. But at this point, it is anyone’s guess.

That said, the most important response by university research offices to the 2018 federal research budget is not “paralysis by analysis” but rather keeping in mind Louis Pasteur’s observation that “Fortune favors the prepared mind.” So how might this preparation be accomplished? There are two key ingredients to the “institutionally prepared mind” when it comes to the 2018 federal budget as it impacts funding agencies: First, assume that your current knowledge of the mission, culture, and program officers at each federal agency your institution targets for funding will become dated over the coming year. You will need to know what stays the same and what is different, and how. Start a process of methodically tracking each federal research agency as it advances a new mission and new research funding priorities over the coming months. Get ahead of the change with a coordinated information gathering and dissemination plan that targets each federal funding agency. Have a communication plan in place to disseminate that information across your institution, since this knowledge lies at the heart of funding success.

Secondly, remember that university grants are mostly awarded in a peer-review, merit-based process. Budget cuts mean fewer grants are awarded, not that no more grants are awarded, and that research priorities will change to favor some disciplines over others, not that no disciplines will be funded. The bottom line is that grants will become more competitive since there will be fewer of them. Research offices can prepare for a more competitive grants environment by training and sharing competitive information across the campus. The key here is better preparing those faculty at your institution that can be successful in a new funding environment through grant-writing training, workshops, consultations, and other mechanisms.

In the end, successful grant writing is a knowledge-based enterprise. The same proven formula for research funding success will still apply no matter how federal agency priorities and budgets change in the 2018 budget: know your research capacities, know your target agency’s research mission, and meld the two into a compelling narrative that explains the value added benefits you bring to the new research environment at each federal funding agency.
Impact of Infrastructure Funding on Research

There has been talk on and off again over the last decade of a major plan on the order of $1 trillion dollars to renew the US’s aging infrastructure. While the issue seems to blow hot one week and cold the next, creating uncertainty about whether infrastructure renewal will be a part of the 2018 federal budget, the backbone of the discussion has been the longstanding reports every four years by the American Society of Civil Engineer’s (ASCE) Report Card for America’s Infrastructure (2013 Report Card and 2017 Report Card). In this instance, the four-year expiration date of the 2013 report card and the March 9 release of the 2017 Report Card is timely given the current discussion in Congress and promotion by the Executive Branch of a major infrastructure funding bill. Such a bill would hopefully achieve sufficient bipartisan support for passage and go nearly a third of the way towards meeting the $3.6 trillion infrastructure renewal recommendation by ASCE.

(Note: the 2017 report card is very similar to the 2013 report card in terms of grading infrastructure components. Moreover, the 2017 report is still being posted online; therefore, if you are looking for your state’s specific ranking, you will have to look for it in the 2013 report card as the full 2017 report will be posted over a period of several weeks.)

Of course the bottom line here for university research offices is how does all this translate into research dollars and what faculty, departments, colleges, and centers will be most competitively positioned for funding related to infrastructure renewal? Obviously, the major benefactors of $1 trillion in infrastructure will go to such entities as engineering design firms, construction contractors, and materials and other providers such as steel, concrete, electronics, machinery, transportation systems, energy, etc. But new research is needed in all of those areas, particularly materials and smart systems, as well as in the area of smart, interconnected infrastructures, cyber security, and the like. So there will be space in this infrastructure renewal domain for university researchers. The only questions that need to be answered relate to how much space and in what areas, but those are questions that can be answered by disciplinary faculty and university research offices as the infrastructure plan unfolds into a funded initiative.

The 2017 ASCE report card will help to make this determination since it addresses infrastructures in four general categories: water and the environment, transportation, public facilities, and energy. The ASCE report card also offers an overview of the condition of the infrastructure in each state. As seen clearly on the ASCE screen capture on the following page, there is much room for improvement. Following the 2013 report card, in 2016, ASCE updated the series findings to reflect current conditions, Failure to Act: Closing the Infrastructure Investment Gap for America’s Economic Future. These reports cover 10 of the 16 categories addressed by the Report Card for America’s Infrastructure, and give specific figures on the cost of infrastructure inefficiencies.

Since the presidential election, the proposal of a $1 trillion investment in infrastructure renewal, most likely paid for from both public and private investments, has taken on a new life, although there is as yet little certainty about the eventual outcome, or whether a proposal will
occur for budget year 2018 or 2019, or not at all. However, determining what all this could potentially mean for university researchers is a worthy exercise for university research offices that would benefit by mapping the relevance of the research capacities of faculty, departments, and colleges to the 16 infrastructure domains included in the ASCE report card, as below.

Moreover, another potential benefactor of an infrastructure renewal program would be Wall Street investors in infrastructure-related stocks, and they have already begun to identify which US corporations’ stocks would rise should a $1 trillion infrastructure bill pass Congress and be signed by the President. A similar process of infrastructure scenario planning would benefit university research offices as well.

The newly issued [2018 ASCE Report Card](https://www.asce.org/report-card) on America’s infrastructure is an excellent foundational document for use by faculty and research offices in determining the institutional research capacities and expertise that will likely be competitive for research funding associated with the many component pieces that will constitute a major infrastructure renewal program over the coming years.

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<thead>
<tr>
<th>Infrastructure Domain</th>
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<tr>
<td>Aviation</td>
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<td>Bridges</td>
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<td>Drinking Water</td>
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<td>Energy</td>
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<td>Hazardous Waste</td>
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<td>Public Parks and Recreation</td>
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<td>Transit</td>
<td>D</td>
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<tr>
<td>Wastewater</td>
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Each category was evaluated on the basis of capacity, condition, funding, future need, operation and maintenance, public safety and resilience.

- A = Exceptional
- B = Good
- C = Mediocre
- D = Poor
- F = Failing

**Estimated Investment Needed by 2020:**

$3.6 Trillion
Avoid Common Proposal Figure Mistakes
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By Lucy Deckard, co-publisher

Including figures in your proposal can be extremely effective in engaging your reviewers, communicating the key concepts of the project you’re proposing, and convincing reviewers that your approach is likely to succeed. However, when including figures many PIs fall into common traps that undermine the effectiveness of those figures. When figures are not done well, they not only fail to accomplish their purpose, they can actually become a liability by wasting valuable space and irritating the reviewer. Below is a list of the most common figure mistakes that we often see in proposals.

1. The illegible figure.
This proposal cardinal sin is, unfortunately, extremely common. It comes in two flavors: either, in an effort to meet the page limit, the entire figure has been shrunk down to the point that the reader cannot discern the important features of the figure (e.g., Figure 1), or only the text in the figure (such as axis labels in a graph, feature labels in a micrograph, or text in a flow chart) is so small that it is illegible (e.g., Figure 2). Usually, this problem is caused by taking a figure that was originally published in a larger form such as a journal article or PowerPoint slide, and simply reducing its size to fit into a proposal. To avoid this, decide in advance how large your figure will be, and then redraw your figure so that all important features are legible at that size. This may be as simple as increasing the fonts of your axis labels, or you may need to reduce the number of your figures or cut text so that your figure is large enough to be effective. If you’re using a large screen, keep in mind that your reviewer may be reading your proposal on a small laptop, or she may print it out to read. Make sure you evaluate your figure without the zoom feature on.

2. The too-large figure.
This would seem to be the opposite mistake compared to mistake 1 above, but the cause is often the same: the PI took a PowerPoint slide and converted it directly into a figure without reformattting it (e.g., Figure 3). While a PowerPoint slide takes up an entire screen and can include lots of white space, taking up a third or half a page in a proposal with one figure is not only a waste of precious space, it can also convey to the reviewer that you don’t have enough to say and are padding your proposal.
Figure 3. While this illustration is great for a PowerPoint slide or website, it should be re-drawn (eliminating the photos and using the space more efficiently) for use in a proposal. (Image from http://www.isi.edu/projects/serc/projects)

3. The too-complex figure.
While figures are a great way to communicate complex ideas and non-linear relationships, if your figure is so complex that the reviewer will need to spend time trying to decipher it, you have defeated the purpose of the figure. A figure should be easily and quickly understandable and should draw the reader’s eye. If your figure includes, for example a spaghetti bowl of lines and arrows (Figure 4), the reader will actively avoid looking at the figure – the opposite of what you’re trying to accomplish.

4. The “fluff” figure.
While it’s a good idea to include figures in your proposal not only to communicate complex concepts more effectively, but also to make your proposal more reader-friendly, these figures should communicate something substantive. A figure that is included solely for eye appeal (e.g., Figure 5) will irritate your reviewers and, particularly for technical proposals, give the impression that your project is “light weight.”

5. The unexplained figure.
The principal that you should never force your reviewer to think applies to figures as well to your text. If you include a figure in your proposal, you should be very clear about what you are...
trying to communicate with that figure, and you should explicitly state that in your text and in your figure caption. So, instead of saying in your text, “Figure 6 shows the test results.” You should say, for example, “Figure 6 shows that the tensile strength was doubled by incorporating nanoparticles.” The same holds for figure captions. Ideally, all figure captions should include a verb, as in “The test results show that...” or “The viability of our approach is illustrated by the above results...”

6. The low-resolution figure.
It is surprising how many proposals written by PIs who are highly qualified scientist and engineers include blurry, low-quality figures. Poor-quality figures create an unfavorable impression of the PI’s competence and rigor. One cause for these poor-quality figures is that in older versions of PowerPoint, you could save a slide as a graphics file (.png, .jpg, etc.) with acceptable resolution. However, for reasons known only to Microsoft, more recent versions of PowerPoint result in low resolution figures when you save a slide as a graphic file. To change the export resolution for PowerPoint, you have to go into the registry. You can find instructions here. If you’re not comfortable going into the registry (which can go horribly wrong if you do it incorrectly), enlist your IT support or a computer-savvy colleague to help you with this. Once it’s done, you won’t have to do it again unless you change your software. You might also look for a student (perhaps one of your graduate students or even an undergraduate worker) who is skilled with Photoshop or other graphics programs. Many high schools now have courses in computer graphics, so you may find that the students coming into your programs are more skilled in computer graphics than you are and can help you generate nice looking graphics for your proposal figures.

Figures can be extremely valuable additions to your proposal. Avoid these mistakes to maximize their effectiveness.
Research Grant Writing Web Resources
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NASA Handbooks and Guidance Documents
- NASA Grant and Cooperative Agreement Manual (12/16/2016)
- NASA Grant and Cooperative Agreement Handbook
- NASA Unsolicited Proposals - Guidance for the Preparation and Submission
- Forms - Search by a form number or view forms by distribution center. Forms are listed by form number/title in Portable Document Format (PDF) and Informed (IFM) Format.
- NASA Grants and Cooperative Agreements - Sponsored Research Business Activity (SRBA)
- NASA Procurement Metrics
  - Annual Procurement Reports
- NASA Procurement Tenets
  - NASA Procurement Tenets memo
  - NASA Procurement Tenets

New Peer Review Videos for Applicants and Reviewers
NIH’s Center for Scientific Review posted recordings of their most recent webinar series on peer review.
- 8 Ways to Successfully Navigate NIH Peer Review and Get a Fellowship Grant – covering things applicants need to know about the submission and review of a fellowship grant
- 8 Ways to Successfully Navigate NIH Peer Review and Get an R01 Grant – covering things applicants need to know about the submission and review of an R01 grant
- NIH Peer Review Briefing for Basic Research Applicants and Reviewers – covering NIH’s commitment to basic research and helping applicants and reviewers do their part in proposing and reviewing basic research

CSR is the portal for receipt and referral of NIH grant applications, and, for the majority of those applications, carries out the peer review process for assessing scientific and technical merit.

NSF: A Guide for Proposal Writing
Student Interest in Engineering Design-Based Science
Current reform efforts in science education around the world call on teachers to use integrated approaches to teach science. As a part of such reform efforts in the United States, engineering practices and engineering design have been identified in K-12 science education standards. However, there is relatively little is known about effective ways of teaching science through engineering design. The study explores the approaches or strategies used by a sixth grade science teacher to teach science and engineering in an integrative manner. Classroom observations, teacher interview, and student surveys were used to study the features of engineering integration implemented by the teacher and the changes in student interest in science and engineering by participating in an engineering design-based science unit. Findings suggest that the teacher explicitly included practices and core ideas from engineering and science; used an engaging, motivating engineering challenge; and provided students with opportunities to be autonomous. Students engaged in the activities in the engineering unit and their interest level slightly increased. The results suggest that the three strategies that the teacher used to teach engineering and science are important foundations of integrated science and engineering education.

Engineering Literacy and Engagement in Kindergarten Classrooms
Little is understood about how kindergarten students respond to literacy-enriched engineering activities and how engineering-centered literature (picture and story books) can be used to support engineering engagement and content understanding. This study sought to understand the effect of engineering-centered literature and academic conversations to enhance linguistically diverse kindergarten students' engagement with engineering content. A withdrawal single-case study with multiple measures was conducted to document the effects of the literacy-enriched engineering intervention program. The frequencies of three types of engagement were recorded: behavioral, affective, and cognitive engagement. Participation in discussions was also recorded to monitor academic conversations. Six female kindergarten students whose first language was not English, representing three ability levels, were targeted for data collection. The relative value of the types of engagement and discussion participation increased. These increases generally declined when the intervention was withdrawn. All ability levels showed significant increase during intervention. Engagement peaked during hands-on engineering design activities for all students. A second peak occurred during the engineering picture book read-aloud with active engagement activities. The combination of activities in the intervention is effective for English language learners and can improve engagement for all ability levels. Academic conversations enhanced all lessons by increasing discussion participation. Results show a functional relationship between enjoying the learning activities and being motivated to participate in discussion. Taken together, engineering-centered literature and academic conversations are effective tools for broadening meaningful participation in engineering education.
Designing Engineering Experiences to Engage All Students

New academic standards at the state and national level in the U.S. A. call for integrating engineering into K-12 education. As designers develop curricula to meet this new need, we must ensure that engineering instruction is inviting and engaging for all students, particularly those from populations that are underserved, underperforming, or underrepresented in STEM fields. Starting with the explicit goal of fostering equity, we designed an engineering curriculum for grades 1-5. In this paper we articulate the set of 14 inclusive design principles that guided the development of the Engineering is Elementary (EiE) curriculum, link them to relevant literature, provide examples of how they influenced our design decisions, and describe classroom outcomes.
NSF Proposal & Award Policy Newsletter
NSF announced the release of the Proposal & Award Policy Newsletter, which is a product of the Policy Office in the Division of Institution and Award Support. This will be another communications vehicle to inform the community about upcoming changes and clarifications to policies and procedures that affect the research community as you prepare and submit proposals for funding, and as you manage your organization’s NSF awards. Proposal and award policy is constantly shifting, and we hope this quarterly issuance will be yet another tool for you to learn about and disseminate the latest information NSF has to offer.

Dear Colleague Letter: Encouraging Submission of Industry/University Cooperative Research Centers (IUCRC) Proposals in the Area of Cybersecurity
This Dear Colleague Letter (DCL) encourages collaborations between industry and academe in the area of cybersecurity. The aim is to establish multi-university IUCRCs that, in collaboration with their industry partners, are capable of collectively addressing large-scale and cross-disciplinary challenges in the broad area of cybersecurity. NSF therefore welcomes and encourages proposals in response to the IUCRC program solicitation, NSF 17-516, in the areas outlined in this DCL. This DCL is also complementary to NSF’s Secure and Trustworthy Cyberspace (SaTC) program (https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504709), and topics highlighted in the SaTC program solicitation (NSF 16-580) are potential areas of precompetitive research that a multi-university IUCRC in cybersecurity might address.

Any precompetitive research that enhances the translation of basic research in the area of cybersecurity would be considered. The structure of IUCRCs promotes extensive industry involvement in research planning and review, which leads to direct technology transfer, bridging the gap that traditionally has kept industry from capitalizing fully and quickly on the results of research at academic institutions. This close relationship with industry in IUCRCs through the cooperative research model also ensures the broader impacts of the projects. Thus, any proposed themes should be considered with respect to the nature and structure of IUCRCs.

The NSF IUCRC program seeks to support novel IUCRCs covering unique research themes that do not overlap with other IUCRCs. To avoid the submission of IUCRC proposals overlapping significantly in research focus or industry sectors, any interested Principal Investigator(s) should email a one-page summary of the proposal concept to the cognizant NSF Program Directors.

NSF Q&A On Public Access
1. What is NSF’s public access policy?
NSF requires that either the version of record or the final accepted manuscript in peer-reviewed scholarly journals and papers in juried conference proceedings or transactions (also known as "juried conference papers") be deposited in a public access compliant repository designated by NSF (the NSF Public Access Repository; NSF-PAR); be available for download,
reading and analysis free of charge no later than 12 months after initial publication; possess a minimum set of machine-readable metadata elements in a metadata record to be made available free of charge upon initial publication; be managed to ensure long-term preservation; and be reported in annual and final reports during the period of the award with a persistent identifier that provides links to the full text of the publication as well as other metadata elements. For more information, see section 3.1 of "Today's Data, Tomorrow's Discoveries: Increasing Access to the Results of Research Funded by the National Science Foundation".

2. Why does NSF have a public access policy?

On February 22, 2013, the Office of Science and Technology Policy (OSTP) released a memorandum entitled "Increasing Access to the Results of Federally Funded Research". It directed Federal agencies with more than $100 million in research and development (R&D) expenditures to develop plans to make the published results of federally funded research freely available to the public within one year of publication, and it required researchers to better account for and manage the digital data resulting from federally funded scientific research. NSF’s response, "Today’s Data, Tomorrow’s Discoveries". The response builds upon NSF’s long history of encouraging data sharing. The Foundation requires that each proposal submitted to NSF include a data management plan, as set forth in the NSF Proposal & Award Policies & Procedures Guide (PAPPG) Chapter II.C.2.j. The data management plan describes how the proposal will conform to NSF policy on the dissemination and sharing of research results (see PAPPG Chapter XI.D.4 for additional information).

3. How does NSF's public access policy work?

The Foundation’s approach to implementing public access goals is based, to the greatest extent possible, on existing policies and procedures.

Data. Existing NSF policies on preparing data management plans are retained. In 2011, the Foundation updated implementation of its data sharing policy by requiring proposers to include a two-page supplementary document to their proposals in which they describe a data management plan (DMP) for data created under an award that resulted from the proposal. More information on preparing DMPs is available in PAPPG Chapter II.C.2.j. If an award is made, the investigator must manage data described in the DMP in accordance with the plan and should report these data-related activities in annual and final project reports. Investigators are expected to share with other researchers, at no more than incremental cost and within a reasonable amount of time, the primary data created or gathered in the course of their work under an NSF grant. Grantees are expected to encourage and facilitate such sharing.

Publications. Peer-reviewed journal articles and juried conference papers, based wholly or partially on NSF support, must be deposited in the designated NSF repository. Either the final accepted version of the manuscript or the version of record may be submitted. NSF made the repository service available at the end of 2015 for voluntary compliance. In accordance with the applicable award terms and conditions, NSF "expects significant findings from research and education activities it supports to be promptly submitted for publication, with authorship that accurately reflects the contributions of those involved" (Grant General Conditions (GC-1) Article 49). NSF also requires grantees to acknowledge NSF support, assure that any publication of NSF-funded material contains the appropriate disclaimer, and provide the cognizant NSF program officer with a copy of the publication, together with the award number and other appropriate identifying information, promptly after publication (GC-1 Article 28). The public
access policy concerning publications, including juried conference papers, went into effect for articles resulting from awards made for proposals submitted, or due, on or after January 25, 2016. NSF's public access requirements are imposed via the addition of a new award term and condition that is applied to awards resulting from proposals submitted, or due, on or after January 25, 2016.

4. Who must comply with NSF's public access policy?
Awards to institutions will include conditions to implement NSF public access requirements. Principal Investigators must ensure that all researchers who work on projects funded in whole or in part by NSF grants or cooperative agreements comply with the public access policy.

5. Does the public access policy apply to NSF staff?
NSF employees who generate published journal articles and juried conference papers in the course of official business must comply with NSF’s public access policy.

6. Who is responsible for meeting the public access requirement (e.g., submitting material to a designated repository; managing the data in accordance with the DMP)?
Principal Investigators are responsible for meeting the public access requirements.

7. What material is covered by NSF's public access policy?
NSF’s public access policy covers articles in peer-reviewed journals, juried conference papers, and data that result from NSF funding. These research outputs are a subset of the outcomes that should be reported in annual and final project reports. NSF’s public access policy for data is covered by NSF’s data management plan requirements. Principal Investigators are already required to include a two-page DMP as a supplementary document in their proposals (see PAPPG Chapter II.C.2.j), and the DMP is evaluated during the merit review process. The scope of the material covered by the DMP (for example, whether it includes software) is governed by guidance at the directorate, division, and program levels. PIs are encouraged to consult with the cognizant program officers.

8. When did the policy go into effect?
The public access requirement applies to new awards resulting from proposals submitted, or due, on or after January 25, 2016. For further information, see PAPPG Chapter II.C.2.j and https://www.nsf.gov/bfa/dias/policy/dmp.jsp.

9. What repository does NSF require PIs to use for depositing publications?
NSF requires principal investigators who publish peer-reviewed journal articles or juried conference papers to deposit a copy of the item (either the final accepted version or the version of record, as defined in NSF’s public access plan) in NSF-PAR hosted by the Department of Energy (DOE). More information on NSF-PAR may be found at https://www.research.gov/research-portal/appmanager/base/desktop?_nfpb=true&_pageLabel=research_node_display&_nodePath=/researchGov/Service/Desktop/AboutPublicAccess.html.

10. What is a "final accepted version" of a manuscript?
The final accepted version is the author's final manuscript of a peer-reviewed paper accepted for journal publication, including all modifications resulting from the peer-review process. It is the version before the journal makes edits that will constitute the final "version of record."

11. What is a "version of record"?
12. What are "page charges"?
A "page charge" may be imposed by the publisher to help cover the costs of publication. These also may be known as publication and printing costs. See PAPPG Chapter II.C.2.g.(vi) b., Publication/Documentation/Dissemination, for additional information.

13. What is an Article Processing Charge (APC)?
As defined by Wikipedia and based on research by David Solomon and Bo-Christer Björk, "An article processing charge (APC), also known as a publication fee, is a fee which is sometimes charged to authors in order to publish an article in an open access academic journal" (http://en.wikipedia.org/wiki/Article_processing_charge). These also may be known as "publication costs." See PAPPG Chapter II.C.2.g.(vi) b., Publication/Documentation/Dissemination, for additional information.

14. Does NSF require PIs to deposit their publications in a "trusted repository"?
As stated above, NSF requires principal investigators who publish peer-reviewed journal articles or juried conference papers to deposit a copy of the items (either the final accepted version or the version of record, as defined in NSF's public access plan) in NSF-PAR. NSF-PAR was made available for voluntary compliance at the end of the 2015 calendar year. At this time, NSF has not formally adopted ISO 16363, a recommended practice for assessing the trustworthiness of digital repositories. As outlined in NSF's public access plan (section 7.7), "DOE stores and preserves the information in a dark archive in a climate-controlled, appropriate environment in Oak Ridge, Tenn., with redundant, backup systems in geographically distinct locations. DOE accommodates both the widely used non-proprietary PDF and PDF/A formats and can convert material in PDF to PDF/A, should the need arise."

15. Does the NSF public access policy cover data as well as publications?
Yes. All proposals submitted to NSF must include a supplementary document of no more than two pages labeled "Data Management Plan," (DMP). For further information, see PAPPG Chapter II.C.2.j and https://www.nsf.gov/bfa/dias/policy/dmp.jsp.

16. What repository does NSF require PIs to use for depositing data?
Data management requirements and plans specific to the Directorate, Office, Division, Program, or other NSF unit, relevant to a proposal are available at https://www.nsf.gov/bfa/dias/policy/dmp.jsp. If guidance specific to the program is not available, then the requirements established in PAPPG Chapter II.C.2.j apply.

17. Are repositories going to be linked? If multiple repositories are acceptable for a particular discipline, how do PIs know which one to use?
NSF requires principal investigators to deposit a copy of their peer-reviewed journal publications or juried conference papers in NSF-PAR, which became available at the end of calendar 2015. Deposit of data and software should be addressed in the data management plan (DMP), which is a required element of every proposal and is evaluated as part of the merit review process. NSF encourages investigators to seek guidance from the cognizant program officer on selection of an appropriate repository.

18. Does NSF require PIs to deposit software, code, etc.?
The scope of material covered by the DMP (for example, whether it includes software or code) is governed by guidance at the directorate, division, and program levels. Investigators are encouraged to consult with the cognizant program officer.

19. How does NSF handle situations in which the journal that has accepted a paper requires the PI to submit the data on which the paper is based in a specified repository? Does NSF require the PI to deposit the data in another repository, as well? Data resulting from the award should be managed according to the data management plan that accompanied the proposal. If the repository identified by the journal is different from the one in the DMP or if the principal investigator is only depositing a subset of the data collected by the award, then the PI should consult the cognizant program officer about appropriate deposit.

20. Does NSF allow for an embargo or delay for access to journal publications? And if so, how long is it? NSF allows an embargo or administrative delay for access of up to 12 months from the date of publication for journal articles or juried conference papers. Individual journal titles (or proceedings or transactions) may institute shorter periods. If a publisher's embargo exceeds 12 months, NSF will make available the version deposited in NSF-PAR.

21. How can the public search material resulting from NSF's awards? NSF offers several ways to search for publications resulting from NSF awards. Through Research.gov and the NSF website, the public can search active and expired awards by keywords. The results of those queries provide a list of relevant awards, abstracts and other information about the awards, and publications that have been reported. Search capability is also provided in NSF-PAR. Finally, commercial search services, such as Google and Bing, also provide access to NSF-funded research. More information and guidance on searching for publications resulting from NSF awards is provided at https://www.research.gov/research-portal/appmanager/base/desktop?_nfpb=true&_eventName=viewQuickSearchFormEvent_so_rsr.

22. Why does NSF use the term "public access" (instead of "open access")? NSF is following the practice established by the National Institutes of Health (NIH) in using the term "public access" to characterize the policy that implements the objectives of the OSTP memorandum of February 22, 2013.

II. FROM THE INVESTIGATOR'S PERSPECTIVE

23. Do NSF's public access requirements apply to me? It depends. Are you a principal investigator of research that is funded, wholly or in part, by NSF? Is it a new award that resulted from a proposal that was submitted or due on or after January 25, 2016? If your answer to both questions is "Yes," the public access requirements apply to you.

24. I am working on an article supported by an award that was made prior to January 25, 2016. Is this work subject to the public access requirements? No, material resulting from awards made prior to the January 2016 effective date is not subject to public access requirements for publications. However, the data resulting from your award should be managed according to the data management plan included in your proposal.

25. May I submit an article to NSF-PAR on a voluntary basis? Yes. NSF encourages principal investigators to make their peer-reviewed journal publications and juried conference papers available to the public through NSF-PAR. Information on how to
do so may be found at https://www.research.gov/research-portal/appmanager/base/desktop?_nfpb=true&_pageLabel=research_node_display&_nodePath=/researchGov/Service/Desktop/AboutPublicAccess.html. Please note that, if your publication is not subject to the new requirement, you will still need to separately report the publication in your annual or final report.

26. What repository must I use for depositing publications?
NSF requires principal investigators who publish peer-reviewed journal articles or juried conference papers to deposit a copy of the item (either the final accepted version or the version of record, as defined in NSF’s public access plan) in NSF-PAR. Information on how to do so may be found at https://www.research.gov/research-portal/appmanager/base/desktop?_nfpb=true&_pageLabel=research_node_display&_nodePath=/researchGov/Service/Desktop/AboutPublicAccess.html.

27. Do I have to deposit an article into NSF-PAR in order to report it in my annual or final project report?
Yes. You must deposit a copy of any peer-reviewed journal publication (either the final accepted version or the version of record) or any juried conference paper in NSF-PAR for articles (eligible publications or conference papers) resulting from an award made for a proposal submitted, or due, on or after January 25, 2016 in order to report that publication or conference paper in your annual or final project report. We have developed a streamlined process to support the entry of publications and related metadata in annual and final project reports for all publications subject to the requirement.

28. I am publishing an article in an Open Access journal; do I still have to deposit a copy of the article in NSF-PAR?
Yes. You must deposit a copy of any peer-reviewed journal publication (either the final accepted version or the version of record) or any juried conference paper in NSF-PAR for articles (eligible publications or conference papers) resulting from an award made for a proposal submitted, or due, on or after January 25, 2016, even if the article was published in an Open Access journal, in order to report that publication or conference paper in your annual or final project report.

29. I am publishing an article in a journal that does not have a public or open access policy. Am I still required to comply with the public access deposit requirement?
Yes. You must deposit a copy of any peer-reviewed journal publication (either the final accepted version or the version of record) or any juried conference paper in NSF-PAR for articles (eligible publications or conference papers) resulting from an award made for a proposal submitted, or due, on or after January 25, 2016, even if the article was published in an Open Access journal that is a member of CHORUS, in order to report that publication or conference paper in your annual or final project report. CHORUS: Clearinghouse for the Open Research of the United States is a coalition of publishers that provides a set of services to increase access to the publicly funded journal literature.

30. I am publishing an article in a journal that does not have a public or open access policy. Am I still required to comply with the public access deposit requirement?
Yes. You must deposit a copy of any peer-reviewed journal publication (either the final accepted version or the version of record) or any juried conference paper in NSF-PAR for articles (eligible publications or conference papers) resulting from an award made for a
31. My university maintains an institutional repository. If I deposit a copy of my article there, do I still have to deposit a copy in the NSF-designated repository?
You may deposit a copy of your juried article in your institution's repository. But depositing a copy of your article in the institutional repository does not satisfy NSF's deposit requirement. You must also submit a copy (either the final accepted version or the version of record) to NSF-PAR.

32. If I deposit a copy of my article in my university's institutional repository, do I still have to deposit a copy in NSF-PAR?
Yes.

33. I am required to deposit a copy of my article in my university's institutional repository. Do I still have to deposit a copy in NSF-PAR?
Yes.

34. May I post a copy of my article to my personal webpage?
NSF's public access policy permits you to post to your personal webpage a copy of the article version that has been deposited in NSF-PAR. You should consult your journal publisher to determine what restrictions may be imposed on the publisher's version of record.

35. If I post a copy of my article to my personal webpage, am I still required to deposit a copy in NSF-PAR?
Yes.

36. Who owns the copyright to my journal articles arising from NSF grants?
Unless otherwise provided in the award, grantees own or may permit others to own copyright, subject to the Federal Government's license.

37. What is the Federal Government's license?
The Federal Government has a non-exclusive, irrevocable, worldwide, royalty-free license to exercise or authorize others to exercise all rights under copyright to use a federally-funded work for Federal purposes. The Federal Government license includes the right to have the copyrighted material included in a repository where the public can search, read, download, and analyze the material in digital form.

38. Am I required to use a license to allow others to use my journal article?
You should consult with your publisher or the repository in which the article is housed to ascertain conditions that may be imposed on future uses of the article. The Federal Government has a non-exclusive, irrevocable, worldwide, royalty-free license to exercise or authorize others to exercise all rights under copyright to use a federally-funded work for Federal purposes. The Federal Government license includes the right to have the copyrighted material included in a repository where the public can search, read, download, and analyze the material in digital form.

39. My article has been submitted but is not yet accepted. How do I report this article in my annual or final project report?
Only articles in "Final Accepted" or "Published" states may be deposited into NSF-PAR. Products in any other state may be reported in the Products section of the annual or final project report. Please refer to current Research Performance Progress Report (RPPR) requirements for reporting instructions.
40. My article has been accepted but is not yet published. How do I report this article in my annual or final project report?
Only articles in "Final Accepted" or "Published" states may be deposited into NSF-PAR. Products in any other state may be reported in the Products section of the annual or final project report. Please refer to current Research Performance Progress Report (RPPR) requirements for reporting instructions.

41. I have deposited a copy of my article in one of the disciplinary repositories (e.g., SSRN, arXiv, etc.). How do I report this paper in my annual or final project report?
Juried articles deposited in one of the disciplinary repositories must also be submitted to NSF-PAR. These should be reported in annual and final reports during the period of performance with a unique persistent identifier that provides links to the full text of the publication as well as other metadata elements.

42. Do I have to deposit the data that support findings in my article in a public access repository?
Mandatory deposit of data on which an article is based may be required by the journal publisher or other funders. Data collected as part of NSF-funded research, whether or not they are used to support a given publication, should be managed according to the data management plan.

43. I am not the lead author on an article that has been partially supported by research funding provided by NSF. Does NSF still require a copy of the article to be deposited in the NSF-designated repository?
Yes. The principal investigator of the award is responsible for ensuring deposit in NSF-PAR of all articles based on research funded under that award.

44. More than one Federal funding agency, in addition to NSF, has supported the research on which an article is based. Where do we deposit a copy of the article? Do we need to deposit a copy at every agency that has supported the research?
Deposit of a copy, either the final accepted version or the version of record, in NSF-PAR is required if NSF has supported part of the research. You should consult the policies of the other funders to determine if deposit in another repository is also required.

45. Funding for the research supporting an article is provided by several sources, including NSF and private philanthropies. Do I need to deposit a copy at every organization that has supported the research?
Deposit of a copy, either the final accepted version or the version of record, in NSF-PAR is required if NSF has supported part of the research. You should consult the policies of the other funders to determine if deposit in another repository is also required.

46. May I use funds from my NSF award to pay for article processing charges, publication or page charges, or charges for preparing data for deposit?
Refining the Concept of Scientific Inference When Working with Big Data: Proceedings of a Workshop

The concept of utilizing big data to enable scientific discovery has generated tremendous excitement and investment from both private and public sectors over the past decade, and expectations continue to grow. Using big data analytics to identify complex patterns hidden inside volumes of data that have never been combined could accelerate the rate of scientific discovery and lead to the development of beneficial technologies and products. However, producing actionable scientific knowledge from such large, complex data sets requires statistical models that produce reliable inferences (NRC, 2013). Without careful consideration of the suitability of both available data and the statistical models applied, analysis of big data may result in misleading correlations and false discoveries, which can potentially undermine confidence in scientific research if the results are not reproducible. In June 2016 the National Academies of Sciences, Engineering, and Medicine convened a workshop to examine critical challenges and opportunities in performing scientific inference reliably when working with big data. Participants explored new methodologic developments that hold significant promise and potential research program areas for the future. This publication summarizes the presentations and discussions from the workshop.

Undergraduate Research Experiences for STEM Students: Successes, Challenges, and Opportunities

Undergraduate research has a rich history, and many practicing researchers point to undergraduate research experiences (UREs) as crucial to their own career success. There are many ongoing efforts to improve undergraduate science, technology, engineering, and mathematics (STEM) education that focus on increasing the active engagement of students and decreasing traditional lecture-based teaching, and UREs have been proposed as a solution to these efforts and may be a key strategy for broadening participation in STEM. In light of the proposals questions have been asked about what is known about student participation in UREs, best practices in UREs design, and evidence of beneficial outcomes from UREs. Undergraduate Research Experiences for STEM Students provides a comprehensive overview of and insights about the current and rapidly evolving types of UREs, in an effort to improve understanding of the complexity of UREs in terms of their content, their surrounding context, the diversity of the student participants, and the opportunities for learning provided by a research experience. This study analyzes UREs by considering them as part of a learning system that is shaped by forces related to national policy, institutional leadership, and departmental culture, as well as by the interactions among faculty, other mentors, and students. The report provides a set of questions to be considered by those implementing UREs as well as an agenda for future research that can help answer questions about how UREs work and which aspects of the experiences are most powerful.

Service-Learning in Undergraduate Geosciences: Proceedings of a Workshop
The term “service-learning” generally refers to projects planned as components of academic coursework in which students use knowledge and skills taught in the course to address real needs in their communities. This kind of learning experience, which allows students to focus on critical, reflective thinking and civic responsibility, has become an increasingly popular component of undergraduate science education. In April 2016, the National Academies of Sciences, Engineering, and Medicine planned a workshop to explore the current and potential role of service-learning in undergraduate geosciences education. Participants explored how service learning is being used in geoscience education, its potential benefits, and the strength of the evidence base regarding the nature and benefits of these experiences. This publication summarizes the presentations and discussions from the workshop.

**Flowback and Produced Waters: Opportunities and Challenges for Innovation: Proceedings of a Workshop**

Produced water—water from underground formations that is brought to the surface during oil and gas production—is the greatest volume byproduct associated with oil and gas production. It is managed by some combination of underground injection, treatment and subsequent use, treatment and discharge, or evaporation, subject to compliance with state and federal regulations. Management of these waters is challenging not only for industry and regulators, but also for landowners and the public because of differences in the quality and quantity of produced water, varying infrastructure needs, costs, and environmental considerations associated with produced water disposal, storage, and transport. Unconventional oil and gas development involves technologies that combine horizontal drilling with the practice of hydraulic fracturing. Hydraulic fracturing is a controlled, high-pressure injection of fluid and proppant into a well to generate fractures in the rock formation containing the oil or gas. After the hydraulic fracture procedure is completed, the injected fluid is allowed to flow back into the well, leaving the proppant in the newly created fractures. As a result, a portion of the injected water returns to the surface and this water is called “flowback water” which initially may mix with the naturally occurring produced water from the formation. The chemistry and volume of water returning to the surface from unconventional oil and gas operations thus changes during the lifetime of the well due to the amount of fluid used in the initial stage of well development, the amount of water naturally occurring in the geologic formation, the original water and rock chemistry, the type of hydrocarbon being produced, and the way in which production is conducted. The volume and composition of flowback and produced waters vary with geography, time, and site-specific factors. A workshop was conducted by the National Academies of Sciences, Engineering, and Medicine to highlight the challenges and opportunities associated in managing produced water from unconventional hydrocarbon development, and particularly in the area of potential beneficial uses for these waters. This publication summarizes the presentations and discussions from the workshop.

**Preparing for Future Products of Biotechnology**

Between 1973 and 2016, the ways to manipulate DNA to endow new characteristics in an organism (that is, biotechnology) have advanced, enabling the development of products that were not previously possible. What will the likely future products of biotechnology be over the next 5–10 years? What scientific capabilities, tools, and/or expertise may be needed by the
regulatory agencies to ensure they make efficient and sound evaluations of the likely future products of biotechnology? Preparing for Future Products of Biotechnology analyzes the future landscape of biotechnology products and seeks to inform forthcoming policy making. This report identifies potential new risks and frameworks for risk assessment and areas in which the risks or lack of risks relating to the products of biotechnology are well understood.

Supporting Students’ College Success: The Role of Assessing Intrapersonal and Interpersonal Competencies
The importance of higher education has never been clearer. Educational attainment—the number of years a person spends in school—strongly predicts adult earnings, as well as health and civic engagement. Yet relative to other developed nations, educational attainment in the United States is lagging, with young Americans who heretofore led the world in completing postsecondary degrees now falling behind their global peers. As part of a broader national college completion agenda aimed at increasing college graduation rates, higher education researchers and policy makers are exploring the role of intrapersonal and interpersonal competencies in supporting student success. Intrapersonal competencies involve self-management and the ability to regulate one’s behavior and emotion to reach goals, while interpersonal competencies involve expressing information to others as well as interpreting others’ messages and responding appropriately. Supporting Students’ College Success: Assessment of Intrapersonal and Interpersonal Competencies examines how to assess interpersonal and intrapersonal competencies (e.g., teamwork, communication skills, academic mindset, and grit) of undergraduate students for different purposes. This report establishes priorities for the development and use of assessments related to the identified intrapersonal and interpersonal competencies that influence higher education success, especially in STEM.
New Funding Opportunities

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

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

New Funding Solicitations Posted Since February 15 Newsletter

Office of Postsecondary Education (OPE): Federal TRIO Programs: Ronald E. McNair Postbaccalaureate Achievement (McNair) Program CFDA Number 84.217A
The Ronald E. McNair Postbaccalaureate Achievement (McNair) Program is one of the eight programs known as the Federal TRIO Programs, which provides postsecondary educational support for qualified individuals from disadvantaged backgrounds. The McNair Program awards discretionary grants to institutions of higher education for projects designed to provide disadvantaged college students with effective preparation for doctoral study. Catalog of Federal Domestic Assistance (CFDA) Number: 84.217A. Applications for grants under the McNair Program, CFDA number 84.217A, must be submitted electronically using the Governmentwide Grants.gov Apply site at www.Grants.gov. Through this site, you will be able to download a copy of the application package, complete it offline, and then upload and submit your application. You may access the electronic grant application for the McNair Program at www.Grants.gov. You must search for the downloadable application package for this program by the CFDA number. Do not include the CFDA number's alpha suffix in your search (e.g., search for 84.217, not 84.217A). Due April 7.

Office of Postsecondary Education: Strengthening Institutions Program CFDA Number 84.031F
The Strengthening Institutions Program (SIP) provides grants to eligible institutions of higher education (IHEs) to help them become self-sufficient and expand their capacity to serve low-income students by providing funds to improve and strengthen the institution's academic quality, institutional management, and fiscal stability. Note: The Department of Education (Department) is conducting two separate competitions for SIP grants in 2017. In this competition (CFDA number 84.031F), applicants must address an absolute priority. The separate competition under CFDA number 84.031A does not include any priorities. The 84.031A competition will be announced in a separate Federal Register notice. Applicants may apply for grants in both the 84.031A and 84.031F competitions but can only receive one grant. Catalog of
Federal Domestic Assistance (CFDA) Number: 84.031F. Applications for grants under the SIP (CFDA number 84.031F) must be submitted electronically using the Governmentwide Grants.gov Apply site at www.Grants.gov. Through this site, you will be able to download a copy of the application package, complete it offline, and then upload and submit your application. You may not email an electronic copy of a grant application to us. You may access the electronic grant application for this competition at www.Grants.gov. You must search for the downloadable application package for this program by the CFDA number. Do not include the CFDA number's alpha suffix in your search (e.g., search for 84.031, not 84.031F). **Due April 17.**

**Office of Postsecondary Education (OPE): Gaining Early Awareness and Readiness for Undergraduate Programs (Partnership Grants)**

The GEAR UP Program is a discretionary grant program that provides funding for academic and related support services to eligible low-income students, including students with disabilities and English learners, to help them to obtain a secondary school diploma and to prepare for and succeed in postsecondary education. Under the GEAR UP Program, the Department awards grants to two types of entities: (1) States and (2) partnerships comprised, at minimum, of institutions of higher education (IHEs) and local educational agencies (LEAs). **SUPPLEMENTARY INFORMATION:** In this notice we invite applications for partnership grants only. We will invite applications for State grants in another notice. Required services under the GEAR UP Program are specified in sections 404D(a) of the Higher Education Act of 1965, as amended (HEA) (20 U.S.C. 1070a-24(a)), and permissible services under the GEAR UP Program are specified in section 404D(b) of the HEA (20 U.S.C. 1070a-24(b)). For partnership grantees, services must include providing financial aid information, encouraging enrollment in challenging coursework in order to reduce the need for remediation at the postsecondary level, implementing activities to improve the number of students who obtain a high school diploma and complete applications for and enroll in a program of postsecondary education. GEAR UP funds may also be used to provide a number of additional support services such as mentoring, tutoring, academic English language development, academic and career counseling, and exposure to college campuses, and provision of scholarships as specified in section 404E of the HEA. **Catalog of Federal Domestic Assistance (CFDA) Number: 84.334A.** Applications for grants under the GEAR UP Program, CFDA number 84.334A, must be submitted electronically using the Governmentwide Grants.gov Apply site at www.Grants.gov. Through this site, you will be able to download a copy of the application package, complete it offline, and then upload and submit your application. You may not email an electronic copy of a grant application to us. You may access the electronic grant application for the GEAR UP Program at www.Grants.gov. You must search for the downloadable application package for this program by the CFDA number. Do not include the CFDA number's alpha suffix in your search (e.g., search for 84.334, not 84.334A). **Due April 19.**

**Office of Postsecondary Education (OPE): Developing Hispanic-Serving Institutions (DHSI) Program CFDA Number 84.031S**

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 also 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 low-income individuals complete postsecondary degrees. Catalog of Federal Domestic Assistance (CFDA) Number: 84.031S. Applications for grants under the DHSI Program, CFDA number 84.031S, must be submitted electronically using the Governmentwide Grants.gov Apply site at www.Grants.gov. Through this site, you will be able to download a copy of the application package, complete it offline, and then upload and submit your application. You may not email an electronic copy of a grant application to us. You may access the electronic grant application for the DHSI Program at www.Grants.gov. You must search for the downloadable application package for this program by the CFDA number. Do not include the CFDA number's alpha suffix in your search (e.g., search for 84.031, not 84.031S). Due April 24.

FY 2017 Professional Fellows Program Department of State Educational and Cultural Affairs
The Professional Fellows Division in the Office of Citizen Exchanges at the U.S. Department of State's Bureau of Educational and Cultural Affairs (ECA) invites proposal submissions for the FY 2017 Professional Fellows Program (PFP) in the regions of Africa (AF), East Asia and the Pacific (EAP), Europe and Eurasia (EUR), the Middle East and North Africa (NEA), South and Central Asia (SCA), and the Western Hemisphere (WHA). The Professional Fellows Program is a two-way global exchange program designed to promote mutual understanding, enhance leadership and professional skills, and build lasting and sustainable partnerships between mid-level emerging leaders from foreign countries and the United States. The defining element of the program for non-U.S. participants is a substantive five- to six-week Fellowship program, including a four-week individually tailored working placement with a U.S. organization. Due May 1.

FY 2017 Professional Fellows Congress Department of State
The Office of Citizen Exchanges of the Bureau of Educational and Cultural Affairs invites proposal submissions to conduct the 2018 spring and fall Professional Fellows Congress (PFC), the concluding element of the FY 2017 Professional Fellows Program. U.S. public and private non-profit organizations meeting the provisions described in Internal Revenue Code section 26 USC 501(c)(3) may submit proposals to conduct a three-day Professional Fellows Congresses in spring and fall 2018. The Professional Fellows Program (PFP) is a two-way exchange program which brings young leaders from civil society and government from around the world to the United States for month-long working placements with U.S. organizations throughout the country. The PFP provides non-U.S. participants with knowledge and experience of U.S. practices and techniques in their field of expertise, while deepening their understanding of U.S. society, culture, and people. Similarly, through their involvement in the PFP, U.S. participants gain a deeper understanding of the societies, cultures, and professional standards of their non-U.S. counterparts. The Professional Fellows Congress brings all non-U.S. participants together at the end of their fellowship program and provides a larger context for their shared experiences, promotes collaboration, introduces them to alumni and other resources, and strengthens the PFP's role as a vital element of U.S. public diplomacy. Due May 1.

Crop Protection and Pest Management Competitive Grants Program
The purpose of the Crop Protection and Pest Management program is to address high priority issues related to pests and their management using IPM approaches at the state, regional and national levels. The CPPM program supports projects that will ensure food security and respond effectively to other major societal pest management challenges with comprehensive IPM approaches that are economically viable, ecologically prudent, and safe for human health. The CPPM program addresses IPM challenges for emerging issues and existing priority pest concerns that can be addressed more effectively with new and emerging technologies. The outcomes of the CPPM program are effective, affordable, and environmentally sound IPM practices and strategies needed to maintain agricultural productivity and healthy communities. **Due May 9.**

**DOE Office of Science Graduate Student Research (SCGSR) Program**
The goal of the Office of Science Graduate Student Research (SCGSR) program is to prepare graduate students for science, technology, engineering, or mathematics (STEM) careers critically important to the DOE Office of Science mission, by providing graduate thesis research opportunities at DOE laboratories. The SCGSR program provides supplemental awards to outstanding U.S. graduate students to pursue part of their graduate thesis research at a DOE laboratory in areas that address scientific challenges central to the Office of Science mission. The research opportunity is expected to advance the graduate students’ overall doctoral thesis while providing access to the expertise, resources, and capabilities available at the DOE laboratories. **Due May 16.**

**W911NF-17-S-0001 Quantum Computing Research In New And Emerging Qubits & Cross-Quantum Systems Science & Technology, Department of Defense**
The U.S. Army Research Office (ARO) in collaboration with the Laboratory for Physical Sciences (LPS) is soliciting proposals for research in two focused topic areas: (A) new and emerging qubit science and technology (NEQST) and (B) cross quantum technology systems (CQTS). NEQST focuses on qubit systems that explore new operating regimes and environments, fundamentally new methods of fabrication, and new methods of design, control, or operation. These explorations should have in mind the development of quantum computation where the novel properties of these systems create significant advantages in coherence, fabrication, and/or qubit operation over current state-of-the-art qubits. While NEQST focuses on developing new qubit and quantum gate technologies, CQTS focuses on combining existing disparate quantum technologies to provide functionality that significantly improves the performance of, or adds capability to, any of the individual qubit types. Topics of particular interest are quantum state transfer (e.g. microwave-to-optical), novel classical control paradigms, and quantum memories. (Note: this BAA is concerned only with the circuit model of quantum computation). **Jun 06, 2017**  **White Papers: 4:00 PM Eastern Daylight Savings Time on: 30 March 2017**  **Proposals: 4:00 PM Eastern Daylight Savings Time on: 6 June 2**

**USDA-AMS-TM-SCBG-P-G-17-003 Specialty Crop Block Grant Program – Farm Bill Department of Agriculture Agricultural Marketing Service**
The Agricultural Marketing Service (AMS) announces the availability of approximately $60.6 million in grant funds, less AMS administrative costs, to solely enhance the competitiveness of
specialty crops. Specialty crops are defined as fruits and vegetables, dried fruit, tree nuts, horticulture and nursery crops (including floriculture). State departments of agriculture interested in obtaining grant program funds are invited to submit applications to AMS. State departments of agriculture, meaning agencies, commissions, or departments of a State government responsible for agriculture within the 50 States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the U.S. Virgin Islands, and the Commonwealth of the Northern Mariana Islands are eligible to apply. Please contact your local State department of agriculture if you are not eligible to apply. State departments of agriculture are encouraged to conduct outreach regarding the Specialty Crop Block Grant Program – Farm Bill to specialty crop stakeholders, socially disadvantaged, and beginning farmers and conduct a competitive grant proposal process. State department of agriculture contacts and state requests for proposals can be found at www.ams.usda.gov/scbgp. Applications from State departments of agriculture must be submitted by June 7, 2017.

**Fiscal Year 2018 Defense University Research Instrumentation Program (DURIP)**
The Department of Defense (DoD) announces the Fiscal Year 2018 Defense University Research Instrumentation Program (DURIP). DURIP is designed to improve the capabilities of accredited United States (U.S.) institutions of higher education to conduct research and to educate scientists and engineers in areas important to national defense, by providing funds for the acquisition of research equipment or instrumentation. For-profit organizations are not eligible for DURIP funding. We refer to eligible institutions of higher education as universities in the rest of this announcement. DURIP is part of the University Research Initiative (URI). **Due Jul 07, 2017** Pre-Proposal inquires and questions must be submitted not later than Friday, 16 Jun 2017.

**Internet of Battlefield Things (IoBT) Collaborative Research Alliance (CRA)**
The ability of the Army to understand, predict, adapt, and exploit the vast array of internetworked things that will be present of the future battlefield is critical to maintaining and increasing its competitive advantage. The explosive growth of technologies in the commercial sector that exploits the convergence of cloud computing, ubiquitous mobile communications, networks of data-gathering sensors, and artificial intelligence presents an imposing challenge for the Army. These Internet of Things (IoT) technologies will give our enemies ever increasing capabilities that must be countered, but commercial developments do not address the unique challenges that the Army will face in using them. The U.S. Army Research Laboratory (ARL) has established an Enterprise approach to address the challenges resulting from the Internet of Battlefield Things (IoBT) that couples multi-disciplinary internal research with extramural research and collaborative ventures. ARL intends to establish a new collaborative venture (the IoBT CRA) that seeks to develop the foundations of IoBT in the context of future Army operations. The Collaborative Research Alliance (CRA) will consist of private sector and government researchers working jointly to solve complex problems. The overall objective is to develop the fundamental understanding of dynamically-composable, adaptive, goal-driven IoBTs to enable predictive analytics for intelligent command and control and battlefield services. The Future Army will operate in a highly complex and rapidly changing environment, thus the U.S. Army’s Operating Concept is to “Win in a Complex World”. The Army must tackle
wicked problems wherein objectives and constraints evolve in unpredictable ways. Complexity arises from the increasing heterogeneity, connectivity, scale, dynamics, functionality and interdependence of networked elements, and from the increasing velocity and momentum of human interactions and information. Events now unfold in internet time, as noted by the Defense Science Board (DSB) 2014 Study on Decisive Army Strategic and Expeditionary Maneuver. In this context, future IoBTs will be significantly more complex that today’s networked systems, and novel mathematical approaches and techniques will be needed to represent them, reason about them, understand their behaviors, and to provide predictive analytics in diverse and dynamic environments. The Army will use IoTs for diverse and dynamic missions and will require rapid deployment and adaptation in environments with high mobility, resource constraints, and extreme heterogeneity in both very dense and sparse environments. Due July 27.

**FY17 Acquisition Research Program Department of Defense**
The Acquisition Research Program (ARP) at the Naval Postgraduate School is interested in stimulating and supporting scholarly research in academic disciplines that bear on public procurement policy and management. These include economics, finance, financial management, information systems, organization theory, operations management, human resources management, risk management, and marketing, as well as the traditional public procurement areas such as contracting, program/project management, logistics, test and evaluation and systems engineering management. The ARP primarily supports scholarly research through assistance vehicles that will benefit the general public and/or private sector to a larger extent than any direct benefits that may be gained by the Government. Studies of government processes, systems, or policies should also expand the body of knowledge and theory of processes, systems, or policies outside the government. The ARP in this FOA is interested only in proposals that will provide unclassified and non-proprietary findings suitable for publication in open scholarly literature. Offerors bear prime responsibility for the design, management, direction and conduct of research. Researchers should exercise judgment and original thought toward attaining the goals within broad parameters of the research areas proposed and the resources provided. Offerors are encouraged to be creative in the selection of the technical and management processes and approaches and consider the greatest and broadest impact possible. Note: Proposals for workshops, conferences, and symposia, or for acquisition of technical, engineering, advisory and assistance, and other types of support services for the direct benefit of the Government will not be considered. Due August 1.

**Research Education: Bridges to the Doctorate (R25)**
Funding Opportunity PAR-17-209 from the NIH Guide for Grants and Contracts. The NIH Research Education Program (R25) supports research education activities in the mission areas of the NIH. The over-arching goal of this National Institute of General Medical Sciences (NIGMS) R25 program is to support educational activities that enhance the diversity of the biomedical research workforce. To accomplish the stated over-arching goal, this FOA will support creative educational activities with a primary focus on Courses for Skills Development and Research Experiences. Due September 25.
Bridges to the Baccalaureate Program (R25)
Funding Opportunity PAR-17-210 from the NIH Guide for Grants and Contracts. The NIH Research Education Program (R25) supports research education activities in the mission areas of the NIH. The over-arching goal of this National Institute of General Medical Sciences (NIGMS) R25 program is to support educational activities that enhance the diversity of the biomedical research workforce. To accomplish the stated over-arching goal, this FOA will support creative educational activities with a primary focus on Courses for Skills Development, Research Experiences, and Curriculum or Methods Development. A program application must include each activity, and describe how they will be synergized to make a comprehensive program. Due September 25.

URL Links to New & Open Funding Solicitations

- SAMHSA FY 2014 Grant Announcements and Awards
- DARPA Microsystems Technology Office Solicitations
- Open Solicitations from IARPA (Intelligence Advanced Research Projects Activity)
- Bureau of Educational and Cultural Affairs, Open Solicitations, DOS
- ARPA-E Funding Opportunity Exchange
- DOE Funding Opportunity Exchange
- NIAID Funding Opportunities List
- NPS Broad Agency Announcements (BAAs)
- NIJ Current Funding Opportunities
- NIJ Forthcoming Funding Opportunities
- Engineering Information Foundation Grant Program
- Comprehensive List of Collaborative Funding Mechanisms, NORDP
- ARL Funding Opportunities — Open Broad Agency Announcements (BAA)
- HHS Grants Forecast
- American Psychological Association, Scholarships, Grants and Awards
- EPA 2014 Science To Achieve Results (STAR) Research Grants
- NASA Open Solicitations
- Defense Sciences Office Solicitations
- The Mathematics Education Trust
- EPA Open Funding Opportunities
- CDMRP FY 2014 Funding Announcements
- Office of Minority Health
- Department of Justice Open Solicitations
- DOE/EERE Funding Opportunity Exchange
- New Funding Opportunities at NIEHS (NIH)
- National Human Genome Research Institute Funding Opportunities
- Army Research Laboratory Open Broad Agency Announcements (BAA)
- SBIR Gateway to Funding
- Water Research Funding
Fellowship and Grant Opportunities for Faculty Humanities and Social Sciences
DARPA Current Solicitations
Office of Naval Research Currently Active BAAs
HRSA Health Professions Open Opportunities
NIH Funding Opportunities Relevant to NIAID
National Institute of Justice Current Funding Opportunities
Funding Opportunities by the Department of Education Discretionary Grant Programs
EPA’s Office of Air and Radiation (OAR) Open Solicitations
NETL Open Solicitations
DoED List of Currently Open Grant Competitions
Foundation Center RFP Weekly Funding Bulletin

Solicitations Remaining Open from Prior Issues of the Newsletter

Rehabilitation Engineering Research Centers (RERCs) Program: RERC on Health, Exercise, and Recreation
Purpose of Program: The purpose of the RERC program is to improve the effectiveness of services authorized under the Rehabilitation Act by conducting advanced engineering research on and development of innovative technologies that are designed to solve particular rehabilitation problems or to remove environmental barriers. RERCs also demonstrate and evaluate such technologies, facilitate service delivery system changes, stimulate the production and distribution of new technologies and equipment in the private sector, and provide training opportunities. RERC on Health, Exercise, and Recreation: NIDILRR seeks to fund an RERC to a) conduct research on links between exercise and recreation, and significant health conditions of individuals disabilities, b) develop and foster the adoption of assistive, service, and or systems technologies to promote healthy activities and to improve or control health conditions among people with disabilities, and c) carry out substantive dissemination, technical assistance, capacity building, and knowledge translation activities. Due April 6.

DE-FOA-0001634 Stewardship Science Academic Alliances (SSAA) Program
The Stewardship Science Academic Alliances (SSAA) Program was established in 2002 to support state-of-the-art research at U.S. academic institutions in areas of fundamental physical science and technology of relevance to the SSP mission. The SSAA Program provides the research experience necessary to maintain a cadre of trained scientists at U.S. universities to meet the nation’s current and future SSP needs, with a focus on those areas not supported by other federal agencies. It supports the DOE/NNSA’s priorities both to address the workforce specific needs in science, technology, engineering, and mathematics and to support the next generation of professionals who will meet those needs. Due April 30.

Faculty Early Career Development Program (CAREER) Includes the description of NSF Presidential Early Career Awards for Scientists and Engineers (PECASE)
The Faculty Early Career Development (CAREER) Program is a Foundation-wide activity that offers the National Science Foundation's most prestigious awards in support of early-career
faculty who have the potential to serve as academic role models in research and education and to lead advances in the mission of their department or organization. Activities pursued by early-career faculty should build a firm foundation for a lifetime of leadership in integrating education and research. NSF encourages submission of CAREER proposals from early-career faculty at all CAREER-eligible organizations and especially encourages women, members of underrepresented minority groups, and persons with disabilities to apply. **Due July 19-21.**

**DARPA Information Innovation Office BAA**

I2O sponsors basic and applied research in three thrust areas:

**Cyber.** As human activity has moved into cyberspace, cyber threats against our information systems have grown in sophistication and number, and protecting and assuring information is a matter of national security. Progress in the cyber security of best-of-breed systems has been significant over the last few years, giving us hope that we are no longer facing an impossible task. Looking to the future, I2O challenges itself with the goal: Win at Cyber. The I2O defensive cyber research and development (R&D) portfolio is focused on high-end cyber threats, including advanced persistent threats (cyber espionage and cyber sabotage) and other sophisticated threats to embedded computing systems, cyber-physical systems, enterprise information systems, and national critical infrastructure. I2O develops technologies that create software that is provably secure, applications that enhance cyberspace situational awareness, and systems for planning military operations in the cyber domain. Exploration of offensive methods is undertaken to inform the defensive cyber R&D and to establish viability of developed techniques with transition partners.

**Analytics.** Exponential increases in computation, storage, and connectivity have combined over the past five years to fundamentally alter science, engineering, commerce, and national security. Going under names such as “big data,” “machine learning,” and “analytics,” empirical modeling and data-driven approaches are providing powerful insight and competitive advantage for astute practitioners from biology to sports to finance. Through new analytics, algorithms, and software ecosystems, the modern data-centric paradigm exploits the increasingly dense, detailed measurements produced by networked sensors to optimize products, services, operations, and strategy. I2O is working to keep the Department of Defense (DoD) at the forefront of data-driven design and decision-making with the goal: Understand the World. I2O explores fundamental mathematical and computational issues such as complexity and scalability and develops applications in high-impact areas such as intelligence, software engineering, and command and control. I2O coordinates its R&D with the national security community to ensure timely transition of tools and techniques.

**Symbiosis.** The world is moving faster than humans can assimilate, understand, and act. At present we design machines to handle well-defined, high-volume or high-speed tasks, freeing humans to focus on complexity. I2O envisions a future in which machines are more than just tools that execute pre-programmed instructions. Rather, machines will function more as colleagues. Towards this end, I2O sets a goal: Partner with Machines. The symbiosis portfolio develops technologies to enable machines to understand speech and extract information contained in diverse media, to learn, to reason and apply knowledge gained through experience, and to respond intelligently to new and unforeseen events. Application areas in which machines will prove invaluable as partners include: cyberspace operations, where highly-
scripted, distributed cyber attacks have a speed, complexity, and scale that overwhelms human cyber defenders; intelligence analysis, to which machines can bring super-human objectivity; and command and control, where workloads, timelines and stress can exhaust human operators. **Due August 25.**

**Mind, Machine and Motor Nexus (M3X)**
The Mind, Machine and Motor Nexus (M3X) program supports fundamental research at the intersection of mind, machine and motor. A distinguishing characteristic of the program is an integrated treatment of human intent, perception, and behavior in interaction with embodied and intelligent engineered systems and as mediated by motor manipulation. M3X projects should advance the holistic analysis of cognition and of embodiment as present in both human and machine elements. This work will encompass not only how mind interacts with motor function in the manipulation of machines, but also how, in turn, machine response and function may shape and influence both mind and motor function. The M3X program seeks to support the development of theories, representations, and working models that draw upon and contribute to fundamental understanding within and across diverse fields, including but not limited to systems science and engineering; mechatronics; cognitive, behavioral and perceptual sciences; and applied computing. Research funded through this program is expected to lead to new computable theories and to the physical manifestation of these theories. Application areas supported by the M3X program span the full breadth of the Division of Civil, Mechanical and Manufacturing Innovation. Methodological innovation is emphasized, as is a focus on engaging new and emerging thematic areas. The M3X program does not support disaggregated, parallel efforts from individual disciplines or investigators: rather, supported activities must strongly integrate across disciplines to enable discoveries that would not otherwise be possible. Additionally, the M3X program will not consider proposals that do not integrate physical considerations in a fundamental way. Principal investigators proposing pure artificial intelligence or pure machine learning research are referred to funding opportunities in the Directorate for Computer and Information Science and Engineering. **Due September 1-15.**

**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.]

**US Special Operations Command Broad Agency Announcement**
This BAA is intended to solicit extramural research and development ideas, and is issued under the provisions of the Competition in Contracting Act of 1984 (Public Law 98-369), as implemented in Federal Acquisition Regulation 6.102(d) (2) and 35.016. This announcement provides a general description of USSOCOM’s research areas of interest, general information, evaluation and selection criteria, and proposal/application preparation instructions. In
accordance with FAR 6.102, projects funded under this announcement must be for basic and applied research and that part of development not related to the development of a specific system or hardware procurement. Projects must be for scientific study and experimentation directed toward advancing the state-of-the-art or increasing knowledge or understanding. Projects that are for the development of a specific system or hardware procurement will not be considered. The selection process is highly competitive and the quantity of meaningful proposal/applications (both pre-proposal/pre-applications and full proposal/full applications) typically received exceed the number of awards that available funding can support. This BAA provides a general description of USSOCOM’s research and development programs, including research areas of interest, evaluation and selection criteria, pre-proposal/pre-application and full proposal/application preparation instructions, and general administrative information. Specific submission information and additional administrative requirements can be found in the document titled “General Submission Instructions” available in Grants.gov along with this BAA. Open to May 14, 2017.

**W91NF-12-R-0012 Army Research Office Broad Agency Announcement for Basic and Applied Scientific Research**

The purpose of this Broad Agency Announcement (BAA) is to solicit research proposals in the engineering, physical, life, and information sciences for submission to the Army Research Office (ARO) for consideration for possible funding. For ease of reference, this BAA is an extraction of the ARO sections of the Army Research Laboratory BAA. ([www.arl.army.mil/www/default.cfm?page=8](www.arl.army.mil/www/default.cfm?page=8)). Open to May 31, 2017

**DARPA-BAA-16-46 Defense Sciences Office Office-wide**

The mission of the Defense Advanced Research Projects Agency (DARPA) Defense Sciences Office (DSO) is to identify and pursue high-risk, high-payoff research initiatives across a broad spectrum of science and engineering disciplines and to transform these initiatives into game-changing 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 in one or more of the following technical areas: Mathematics, Modeling and Design; Physical Systems; Human-Machine Systems; and Social Systems. Each of these areas 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 until June 22, 2017.

**ARL Core Broad Agency Announcement for Basic and Applied Scientific Research for Fiscal Years 2012 through 2017**

**University Small Grants Broad Agency Announcement**

This is a five-year, open-ended Broad Agency Announcement (BAA) to solicit research proposals for the United States Air Force Research Laboratory (AFRL) Directed Energy (RD) Directorate. This BAA is a university grant vehicle that can provide small grants of $100k or less to
students/professors in a timely manner for the purpose of engaging U.S./U.S. territories’ colleges and universities in directed energy-related basic, applied, and advanced research projects that are of interest to the Department of Defense. **Open to April 1, 2017.**

**Long Range Broad Agency Announcement (BAA) for Navy and Marine Corps Science and Technology Department of Defense**

All responsible sources from academia and industry may submit proposals under this BAA. Historically Black Colleges and Universities (HBCUs) and Minority Institutions (MIs) are encouraged to submit proposals and join others in submitting proposals. However, no portion of this BAA will be set aside for Small Business or other socio-economic participation. All businesses both small and large are encouraged to submit proposals and compete for funding consideration. B. Federally Funded Research & Development Centers (FFRDCs), including Department of Energy National Laboratories, are not eligible to receive awards under this BAA. However, teaming arrangements between FFRDCs and eligible principal Offerors are allowed so long as such arrangements are permitted under the sponsoring agreement between the Government and the specific FFRDC. C. Navy laboratories, military universities, and warfare centers as well as other Department of Defense and civilian agency laboratories are also not eligible to receive awards under this BAA and should not directly submit either white papers or full proposals in response to this BAA. If any such organization is interested in one or more of the programs described herein, the organization should contact an appropriate ONR Technical POC to discuss its area of interest. The various scientific divisions of ONR are identified at [http://www.onr.navy.mil/](http://www.onr.navy.mil/). As with FFRDCs, these types of federal organizations may team with other eligible sources from academia and industry that are submitting proposals under this BAA. D. University Affiliated Research Centers (UARCs) are eligible to submit proposals under this BAA unless precluded from doing so by their Department of Defense UARC contract. E. Teams are also encouraged and may submit proposals in any and all areas. However, Offerors must be willing to cooperate and exchange software, data and other information in an integrated program with other contractors, as well as with system integrators, selected by ONR. **Open to September 30, 1917.**

**HM0210-14-BAA-0001 National Geospatial-Intelligence Agency Academic Research Program**

NGA welcomes all innovative ideas for path-breaking research that may advance the GEOINT mission. The NGA mission is to provide timely, relevant, and accurate geospatial intelligence (GEOINT) in support of national security objectives. GEOINT is the exploitation and analysis of imagery and geospatial information to describe, assess, and visually depict physical features and geographically referenced activities on the Earth. GEOINT consists of imagery, imagery intelligence, and geospatial information. NGA offers a variety of critical GEOINT products in support of U.S. national security objectives and Federal disaster relief, including aeronautical, geodesy, hydrographic, imagery, geospatial and topographical information. The NGA Academic Research Program (NARP) is focused on innovative, far-reaching basic and applied research in science, technology, engineering and mathematics having the potential to advance the GEOINT mission. The objective of the NARP is to support innovative, high-payoff research that provides the basis for revolutionary progress in areas of science and technology affecting the needs and mission of NGA. This research also supports the National System for Geospatial Intelligence
(NSG), which is the combination of technology, systems and organizations that gather, produce, distribute and consume geospatial data and information. This research is aimed at advancing GEOINT capabilities by improving analytical methods, enhancing and expanding systems capabilities, and leveraging resources for common NSG goals. The NARP also seeks to improve education in scientific, mathematics, and engineering skills necessary to advance GEOINT capabilities. It is NGA’s intent to solicit fundamental research under this BAA. Fundamental research means basic and applied research in science and engineering, the results of which ordinarily are published and shared broadly within the scientific community, as distinguished from proprietary research and from Industrial development, design, production, and product utilization, the results of which ordinarily are restricted for proprietary or national security reason. (National Security Decision Directive (NSDD) 189, National Policy on the Transfer of Scientific, Technical, and Engineering Information). NGA seeks proposals from eligible U.S. institutions for path-breaking GEOINT research in areas of potential interest to NGA, the DoD, and the Intelligence Community (IC). Open to September 30, 2017.

**NOAA-NFA-NFAPO-2016-2004791 FY2016 to FY2017 NOAA Broad Agency Announcement**

This notice is not a mechanism to fund existing NOAA awards. The purpose of this notice is to request applications for special projects and programs associated with NOAA’s strategic plan and mission goals, as well as to provide the general public with information and guidelines on how NOAA will select proposals and administer discretionary Federal assistance under this Broad Agency Announcement (BAA). This BAA is a mechanism to encourage research, education and outreach, innovative projects, or sponsorships that are not addressed through our competitive discretionary programs. Funding for activities described in this notice is contingent upon the availability of Fiscal Year 2016 and Fiscal Year 2017 appropriations. Applicants are hereby given notice that funds have not yet been appropriated for any activities described in this notice. Publication of this announcement does not oblige NOAA to review an application beyond an initial administrative review, or to award any specific project, or to obligate any available funds. Open to September 30, 2017.

**NOAA-OAR-SG-2016-2004772 National Sea Grant College Program 2016-17 Special Projects**

The purpose of this notice is to request proposals for special projects associated with the National Sea Grant College Program’s (Sea Grant) strategic focus areas, and to provide the general public with information and guidelines on how Sea Grant will select proposals and administer Federal assistance under this announcement. This announcement is a mechanism to encourage research or other projects that are not normally funded through Sea Grant national competitions. This opportunity is open only to Sea Grant Programs. Section III of this announcement describes eligibility requirements in more detail. Funding has not yet been made available to support applications submitted to this Federal Funding Opportunity (FFO), but such funding may become available during the year. Section II.A. below describes individual competition announcements that will be used to announce when funding is available; any restrictions or requirements on such funding, such as matching funds; and other funding details. Awards will be made under this FFO only if funds have been announced as provided in this FFO. Open to September 30, 2017.
**BAA-16-100-SOL-00002 Broad Agency Announcement (BAA) for the Advanced Development of Medical Countermeasures for Pandemic Influenza- BARDA**

BARDA (full announcement) encourages the advanced research, development and acquisition of medical countermeasures such as vaccines, therapeutics, and diagnostics, as well as innovative approaches to meet the threat of Pandemic Influenza in support of the preparedness mission and priorities of the HHS Public Health Emergency Medical Countermeasures Enterprise (PHEMCE) articulated in the 2014 PHEMCE Implementation Plan. The Implementation Plan is located on the ASPR website: [http://www.phe.gov/Preparedness/mcm/phemce/Documents/2014-phemce-sip.pdf](http://www.phe.gov/Preparedness/mcm/phemce/Documents/2014-phemce-sip.pdf)

The Pandemic and All Hazard Preparedness Act Pub. L. No. 109-417, 42 U.S.C. § 241 et seq. (PAHPA; [http://www.gpo.gov/fdsys/pkg/PLAW-109publ417/pdf/PLAW-109publ417.pdf](http://www.gpo.gov/fdsys/pkg/PLAW-109publ417/pdf/PLAW-109publ417.pdf)) and The Pandemic and All Hazard Preparedness Reauthorization Act Pub. L. No. 113-5, (PAHPRA: [http://www.gpo.gov/fdsys/pkg/PLAW-113publ5/pdf/PLAW-113publ5.pdf](http://www.gpo.gov/fdsys/pkg/PLAW-113publ5/pdf/PLAW-113publ5.pdf)) authorizes BARDA to (i) conduct ongoing searches for, and support calls for, potential qualified countermeasures and qualified pandemic or epidemic products; (ii) direct and coordinate the countermeasure and product advanced research and development activities of the Department of Health and Human Services; (iii) establish strategic initiatives to accelerate countermeasure and product advanced research and development (which may include advanced research and development for purposes of fulfilling requirements under the Federal Food, Drug, and Cosmetic Act or section 351 of this Act) and innovation in such areas as the Secretary may identify as priority unmet need areas; and (iv) award contracts, grants, cooperative agreements, and enter into other transactions, for countermeasure and product advanced research and development.

Development Area of Interest: The purpose of this BAA is to solicit proposals that focus on one or more of the following area of interest as listed below: Development Area of Interest; Personal Protective Equipment (Mask and Respirators) for Influenza Infection for All-Hazards; Full-Featured Continuous Ventilators for Influenza and All-Hazards; Influenza Test Systems and Diagnostic Tools; Influenza Therapeutics; Influenza Vaccines BARDA anticipates that research and development activities awarded from this Broad Agency Announcement (BAA) will serve to advance the knowledge and scientific understanding of candidates' to protect the civilian population of the United States against pandemic influenza and serve to advance candidate medical countermeasures towards licensure or approval by the Food and Drug Administration (FDA). **Open to Oct. 24, 2017.**

**AFRL Research Collaboration Program**

The objective of the AFRL Research Collaboration program is to enable collaborative research partnerships between AFRL and Academia and Industry in areas including but not limited to Materials and Manufacturing and Aerospace Sensors that engage a diverse pool of domestic businesses that employ scientists and engineers in technical areas required to develop critical war-fighting technologies for the nation’s air, space and cyberspace forces through specific AFRL Core Technical Competencies (CTCs). **Open until December 20, 2017.**

**FY17 Funding Opportunity Announcement for Navy and Marine Corps Science, Technology, Engineering & Mathematics Education, Outreach and Workforce Program**
The ONR seeks a broad range of proposals for augmenting existing or developing innovative solutions that directly maintain, or cultivate a diverse, world-class STEM workforce in order to maintain the U.S. Navy and Marine Corps’ technological superiority. The goal of any proposed effort must provide solutions that will establish and maintain pathways of diverse U.S. citizens who are interested in uniformed or civilian DoN (or Navy and Marine Corps) STEM workforce opportunities. As the capacity of the DoN Science and Technology (S&T) workforce is interconnected with the basic research enterprise and STEM education system, ONR recognizes the necessity to support efforts that can jointly improve STEM student outcomes and align with Naval S&T current and future workforce needs. This announcement explicitly encourages projects that improve the capacity of education systems and communities to create impactful STEM educational experiences for students including active learning approaches and incorporating 21st century skills. Projects must aim to increase student engagement in STEM and persistence of students in STEM degrees, while improving student technical capacity. ONR encourages proposals to utilize current STEM educational research for informing project design and advancing our understanding of how and why students choose STEM careers and opportunities of naval relevance. While this announcement is relevant for any stage of the STEM educational system, funding efforts will be targeted primarily toward the future and current DoN (naval) STEM workforce in High School, all categories of Post-Secondary institutions, the STEM research enterprise, and efforts that enhance the current naval STEM workforce and its mission readiness. Open to December 31, 2017.

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

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

BAA-HPW-RHX-2014-0001 Human-Centered Intelligence, Surveillance Air Force Research Lab
This effort is an open-ended BAA soliciting innovative research concepts for the overall mission of the Human-Centered Intelligence, Surveillance, & Reconnaissance (ISR) Division (711 HPW/RHX). It is intended to generate research concepts not already defined and planned by RHX as part of its core S&T portfolio. The core RHX mission is to develop human-centered S&T that (1) enables the Air Force to better identify, locate and track humans within the ISR environment and (2) enhance the performance of ISR analysts. To accomplish this mission, the RHX core S&T portfolio is structured into three major research areas: (1) Human Signatures - develop technologies to sense and exploit human bio-signatures at the molecular and macro (anthropometric) level, (2) Human Trust and Interaction – develop technologies to improve human-to-human interactions as well as human-to-machine interactions, and (3) Human Analyst Augmentation – develop technologies to enhance ISR analyst performance and to test the efficacy of newly developed ISR technologies within a simulated operational environment.

The RHX mission also includes research carried over from the Airman Biosciences and Performance Program. While not directly linked to the core S&T strategic plan, there exists a unique capability resident within RHX to address critical Air Force operational and sustainment needs resulting from chemical and biological hazards. Research areas include contamination detection, hazard assessment and management, individual and collective protection, and restoration and reconstitution of operational capability. **Open to Feb. 12, 2018.**

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

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

### PAR-16-242 Bioengineering Research Grants (BRG) (R01) Department of Health and Human Services National Institutes of Health

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

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

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

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

** Fundamental Research BAA posted on 20 March 2015.** Potential applicants are strongly encouraged to review the BAA in its entirety. **Please note that ALL general correspondence for this BAA must be sent to HDTRA1-FRCWMD-A@dtra.mil. Thrust Area-specific correspondence must be sent to the applicable Thrust Area e-mail address listed in Section 7: Agency Contacts.** **Open to Sept. 30, 2019.**

**BAA-RQKH-2015-0001 Methods and Technologies for Personalized Learning, Modeling and Assessment Air Force -- Research Lab**
The Air Force Research Laboratories and 711th Human Performance Wing are soliciting white papers (and later technical and cost proposals) on the following research effort. This is an open ended BAA. The closing date for submission of White Papers is 17 Nov 2019. This program deals with science and technology development, experimentation, and demonstration in the areas of improving and personalizing individual, team, and larger group instructional training methods for airmen. The approaches relate to competency definition and requirements analysis, training and rehearsal strategies, and models and environments that support learning and proficiency achievement and sustainment during non-practice of under novel contexts. This effort focuses on measuring, diagnosing, and modeling airman expertise and performance, rapid development of models of airman cognition and specifying and validating, both empirically and practically, new classes of synthetic, computer-generated agents and teammates. An Industry Day was held in November 2014. Presentation materials from the Industry Day and Q&A's are attached. If you would like a list of Industry Day attendees, send an email request to helen.williams@us.af.mil

Open until November 17, 2019.

**BAA-AFRL-RQKMA-2016-0007** Air Force Research Laboratory, Materials & Manufacturing Directorate, Functional Materials and Applications (AFRL/RXA) Two-Step Open BAA

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

**Research Interests of the Air Force Office of Scientific Research BAA-AFRL-AFOSR-2016-0007**

The Air Force Office of Scientific Research “we, us, our, or AFOSR” manages the basic research investment for the U.S. Air Force. As a part of the Air Force Research Laboratory (AFRL), our technical experts discover, shape, and champion research within the Air Force Research Laboratory, universities, and industry laboratories to ensure the transition of research results to support U.S. Air Force needs. Using a carefully balanced research portfolio, our research managers seek to foster revolutionary scientific breakthroughs enabling the Air Force and U.S. industry to produce world-class, militarily significant, and commercially valuable products. Our focus is on research areas that offer significant and comprehensive benefits to our national warfighting and peacekeeping capabilities. These areas are organized and managed in two scientific Branches: Engineering and Information Sciences (RTA) Physical and Biological Sciences (RTB). **Open until superseded.**
What We Do--

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

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

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

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

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

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

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

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

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

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**Workshops by Academic Research Funding Strategies**

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

(View Index of Articles)

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