Re-entry to Active Research Program (RARE)

PROGRAM SOLICITATION
NSF 18-525

National Science Foundation

Directorate for Engineering
Division of Chemical, Bioengineering, Environmental and Transport Systems

Full Proposal Deadline(s) (due by 5 p.m. submitter's local time):

Proposals Accepted Anytime

There is no deadline for this solicitation.

IMPORTANT INFORMATION AND REVISION NOTES

Any proposal submitted in response to this solicitation prior to January 29, 2018, should be submitted in accordance with the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) (NSF 17-1). Proposals submitted on or after January 29, 2018 should be submitted in accordance with the revised NSF PAPPG (NSF 18-1), which is effective for proposals submitted, or due, on or after January 29, 2018.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Re-entry to Active Research Program (RARE)

Synopsis of Program:

The Division of Chemical, Bioengineering, Environmental, and Transport Systems (CBET) is conducting a Re-entry to Active Research (RARE) program to reengage, retrain, and broaden participation within the academic workforce. The primary objective of the RARE program is to catalyze the advancement along the academic tenure-track of highly meritorious individuals who are returning from a hiatus from active research. By providing re-entry points to active academic research, the RARE program will reinvest in the nation's most highly trained scientists and engineers, while broadening participation and increasing diversity of experience. A RARE research proposal must describe potentially transformative research that falls within the scope of participating CBET programs.

The RARE program includes two Tracks to catalyze the advancement of investigators along the academic tenure system after a research hiatus, either to a tenure-track position or to a higher-tenured academic rank. Track 1 of the RARE program reengages investigators in a competitive funding opportunity with accommodations for gap in record that are a result of the research hiatus. A Track 1 proposal will follow the budgetary guidelines of the relevant CBET program for an unsolicited research proposal. Track 2 retrains investigators for whom the research hiatus has led to the need for new or updated techniques, such that retraining is required to return the investigator to competitive research activity. A description of how these new techniques will lead to competitive research in CBET programs is required. A Track 2 proposal budget will include only funds necessary for specific retraining activities, such as travel to a workshop or conference, workshop registration fees, a retraining sabbatical, or seed funding to support collection of preliminary data (including salary support, equipment usage fees, materials, and/or supplies).

General inquiries regarding this program should be made to:

RAREquestions@NSF.GOV or a RARE Program Officer listed below.

Cognizant Program Officer(s):

Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.

- José Lage, telephone: (703) 292-4997, email: jlage@nsf.gov
- Angela Lueking, telephone: (703) 292-2161, email: alueking@nsf.gov

- Robert McCabe, telephone: (703) 292-4826, email: rmccabe@nsf.gov
- Triantafillos Mountziaris, telephone: (703) 292-2894, email: tmountzi@nsf.gov
- Susan Muller, telephone: (703) 292-4543, email: smuller@nsf.gov
- Steven W. Peretti, telephone: (703) 292-7029, email: speretti@nsf.gov
- Carole Read, telephone: (703) 292-2418, email: cread@nsf.gov
- Nora F. Savage, telephone: (703) 292-7949, email: nosavage@nsf.gov

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.041 --- Engineering

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: 3 to 4

Anticipated Funding Amount: $1,200,000

A RARE proposal will typically be up to $100,000 per year, for a period of one to three years.

It is anticipated that there will be up to $1,200,000.00 total funds available for this program, pending availability of appropriations.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in, the US acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.

Who May Serve as PI:

Investigators must contact a RARE program director to confirm eligibility prior to submission. The investigator will receive an e-mail confirmation of eligibility, which must be uploaded as a Single Copy document with the proposal submission.

The investigator must hold a PhD in engineering or a closely related discipline, with prior research experiences in an area within the scope of the Division of Chemical, Bioengineering, Environmental, and Transport Systems. Application to the RARE program is not limited by demographics. Tenured or tenure-track faculty may apply. Adjunct, affiliated, research, or teaching faculty may apply if they are employed either full or part-time by an academic institution, provided they have a plan to seek future employment on the tenure-track. Other qualified individuals who lack University affiliation may apply, provided they have identified a senior research mentor at a University; in this select case, the mentor may serve as PI (see 'Additional Eligibility' information below). Investigators that have previously received a RARE award are ineligible for a second award. PIs that are eligible for a CAREER submission are ineligible for a RARE submission. Proposals from investigators who have had no change in career status for an extended period of time are encouraged.

The RARE investigator must demonstrate a substantial decrease in research metrics that result from the research hiatus to receive a confirmation of eligibility. The metrics must be communicated to a RARE program director to receive an e-mail confirmation of eligibility. Also, full documentation of these metrics should be included in a full curriculum vitae that is uploaded as a **Single Copy** document with the proposal. Applicable research metrics include: (1) research publication activity; (2) external research support as PI or co-PI, at a funding level that is consistent with a typical CBET individual investigator award; (3) resources with which to collect preliminary data. A Track 1 investigator must demonstrate a decrease in one or more metrics. A Track 2 investigator must demonstrate a lack of activity in all three metrics in the new area of interest (publications and funding in other areas are allowed). Examples of acceptable documentation of these metrics include: a full curriculum vitae with all publications and funding activity, a budget balance sheet showing funds from current awards are fully committed, a lack of support for research staff, reviews from a proposal saying preliminary data is needed, declined seed grant proposal from home institution, a lack of access to a necessary collaborator. Other metrics and means for documentation of the metric may be considered, after consultation with a RARE program director. The curriculum vitae should be formatted such that a decline in the research metrics is clearly indicated, for example, by separating entries into pre- and post-stagnation periods. In cases where the curriculum vitae may be unclear or ambiguous, the investigator should discuss the metrics with the RARE program director during the initial eligibility discussion. Track 2 proposals from an investigator with an active NSF award are discouraged.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or Co-PI: 1

Each investigator may submit one proposal to the RARE program in a 12-month period. Individuals who have previously received a RARE award are ineligible for a second award.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required
- **Preliminary Proposal Submission:** Not required
- **Full Proposals:**
  - Full Proposals submitted via FastLane: *NSF Proposal and Award Policies and Procedures Guide* (PAPPG) guidelines apply. The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.
  - Full Proposals submitted via Grants.gov: *NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov* guidelines apply (Note: The *NSF Grants.gov Application Guide* is available on the Grants.gov website and on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide).

B. Budgetary Information

- **Cost Sharing Requirements:**

  Inclusion of voluntary committed cost sharing is prohibited.

- **Indirect Cost (F&A) Limitations:**

  Not Applicable

- **Other Budgetary Limitations:**

  Not Applicable

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. submitter's local time):

  Proposals Accepted Anytime

  There is no deadline for this solicitation.

Proposal Review Information Criteria

Merit Review Criteria:

National Science Board approved criteria apply.

Award Administration Information

Award Conditions:

Standard NSF award conditions apply.

Reporting Requirements:

Standard NSF reporting requirements apply.

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I. INTRODUCTION

The RARE program is intended to re-engage highly meritorious scientists and engineers who are returning from a hiatus from the active STEM research pipeline, either by no longer engaging in active academic research (Track 1) or by not having access to training relevant to recent advances in the field (Track 2). The term 'hiatus' will be used to refer to a significant post-tenure decrease or disengagement in productive academic research, or a departure from the academic tenure track (either pre- or post-tenure). As research is the primary mode by which many university faculty stay abreast of developments in rapidly evolving STEM fields, a research hiatus represents both a loss of engagement of the nation's educators as well as a loss of output from the nation's most highly trained scientific workforce. Prior training of these scientists has often been enabled through major investments, such as through student and post-doctoral fellowships, early career awards, and other research funding. Engaging all STEM faculty at the cutting edge of their fields will better serve both aspiring STEM students and the nation in addressing scientific challenges.

There are a multitude of reasons why even the most talented scientists might take a research hiatus, including, for example, a change in funding priorities, a decrease in funding opportunities post-tenure, a highly restricted funding environment, a lack of mentoring opportunities post-tenure [1], a lack of access to techniques or facilities following a significant advancement in the field, or a significant personal event that leads to an extended absence (either formal or informal) from research. This solicitation targets individual investigators by providing re-entry points to active academic research. It is anticipated that re-engaging these investigators will increase diversity of experience, enhance the STEM workforce, broaden participation, and seed new role models for underrepresented groups.

A hiatus from research will often contribute to stagnation along the academic tenure track, and thus likely contributes to the well-documented "leaking pipeline", which disproportionally affects women and under-represented minorities (URM) [2]. The leaking pipeline phenomenon is worse in engineering than in other STEM fields [3], and there is increasing evidence that doctoral students are 'opting out' of tenure track positions, due, in part, to work-life balance considerations and a lack of diversity amongst faculty role models [4]. Furthermore, women are disproportionately affected by family care responsibilities [2b] [5], and returning to full time employment after a career gap is difficult [6]. Although more family friendly policies have been put in place at most Universities for the probationary pre-tenure period, research suggests there is a 'motherhood penalty' versus a 'fatherhood bonus' in terms of hiring, promotion, and salary decisions, even when controlling for factors such as career interruptions, part-time status, and decreased seniority/experience [7]. Providing a career re-entry pathway is anticipated to address the leaking pipeline, which disproportionately affects these under-represented groups.

Although interruptions in career progression due to a hiatus are not unique to academic research, there are a number of unique parameters to the tenure track system that make re-entry into active research quite rare. These include the use of highly specialized equipment, paucity of institutional support after the start-up period, and increasing expectations for teaching and service post-tenure [2]. In today's competitive funding environment, a creative and original idea often must be substantiated with preliminary data and an exemplary track record to minimize investment risk. If time away from active research compromises one's ability to collect preliminary data or publish, many investigators may experience a snow-balling effect, with diminished capacity to maintain a laboratory and recruit students. Post-tenure, faculty may lack mentoring and institutional support to remain highly active in cutting-edge research, and subsequently, lose incentive to engage in research [2]. Retraining opportunities are anticipated to re-engage this highly-skilled subset of the academic workforce.

Increasing the participation of STEM faculty, increasing diversity of experience, and reinvesting in the nation's most highly trained faculty is critical in addressing the nation's most challenging problems [8]. A diversity of ideas, perspectives, and experiences will provide a competitive advantage in addressing these challenges, including developments in competitive manufacturing, clean energy, clean water, and healthcare. Ensuring that aspiring students have mentors and instructors that are engaged, experienced, and talented will usher in the next generation of engineers and scientists to address both national and global challenges.

[1] Kiernan Mathews, Ed.D. "Perspectives on Midcareer Faculty and Advice for Supporting Them", Cambridge, MA: The Collaborative on Academic Careers in Higher Education, 2014.
http://scholar.harvard.edu/files/kmathews/files/coache_mathews_midcareerfaculty_20140721.pdf

[2] (a) According to the National Center for Science and Engineering Statistics (NCSES), a snapshot in 2013 shows that women made up 50% of STEM PhD recipients, 46% of assistant professors, 38% of associate professors, and 24% of full professors; URM made up more than 57% of STEM PhD recipients, but only 34% of assistant professors, 25% of associate professors, and 18% of full professors. (b) Marc Goulden, Mary Ann Mason, Karie Frasch, "Keeping Women in the Science Pipeline," Annals, AAPSS, 638, 141-162, 2011. http://www.jstor.org/stable/41328583

[3] Data derived from National Center for Science and Engineering Statistics 2001-2013 Survey of Doctorate Recipients. https://nsf.gov/statistics/srvydoctoratework/#tabs-2

[4] Mary Ann Mason, Marc Goulden, Karie Frasch, "Why Graduate Students Reject the Fast Track", Academe, January-February 2009, https://www.aaup.org/article/why-graduate-students-reject-fast-track#.WaV4QuSouUk

[5] (a) Melissa A. Milkie, Sara B. Raley, Suzanne M. Bianchi, "Taking on the Second Shift: Time Allocations and Time Pressures of U.S. Parents with Preschoolers," Social Forces 88 (2), 287-517, 2009. (b) Scott S. Hall, Shelley M. MacDermid, "A Typology of Dual Earner Marriages Based on Work and Family Arrangements,", Journal of Family and Economic Issues, 30 (3), 220, 2009.

[6] Based on a survey of 2,443 highly qualified women (defined as those with a graduate or professional degree or a high-honors undergraduate degree), only 74% who wish to return to employment after time off are able to, and only 40% return to full-time, professional positions. As reported in: Sylvia Ann Hewlett, "Off-Ramps and On-Ramps: Keeping Talented Women on the Road to Success", Harvard Business School Reporting, 2007. As summarized in: Sylvia Ann Hewlett and Carolyn Buck Lace, Harvard Business Review, 2005. See: https://hbr.org/2005/03/off-ramps-and-on-ramps-keeping-talented-women-on-the-road-to-success ; retrieved May 18, 2017.

[7] Shelley J. Correll, Stephen Benard, In Paik, "Getting the Job: Is There a Motherhood Penalty?", American Journal of sociology, 112 (5), 1297-1338, 2007. And references therein. http://gender.stanford.edu/sites/default/files/motherhoodpenalty.pdf

[8] National Academy of Sciences, National Academy of Engineering, and the Institute of Medicine, *Expanding Underrepresented Minority Participation: America's Science and Technology Talent at the Crossroads* (Washington, DC: The National Academies Press, 2011).

II. PROGRAM DESCRIPTION

The primary objective of the RARE program is to re-engage highly meritorious individuals who have experienced a decrease in active research productivity after a hiatus, and catalyze their promotion or advancement on the academic tenure-track. By providing re-entry points to active academic research, the RARE program will reinvest in the nation's most highly trained scientists and engineers, while broadening participation and increasing diversity of experience.

Track 1 of the RARE program is intended to reengage qualified PhD scientists and engineers, and diversify the experiences of the nation's tenure-track STEM faculty. Typically, a Track 1 investigator will have a hiatus in active research, due to a non-traditional career path, a significant personal/family event leading to time away from research, a non-research based appointment, or a lack of funding related to external factors. These experiences provide diverse perspectives to STEM departments and their students. However, these pathways will often be associated with a decline in metrics typically associated with research productivity, such as research publications, funding, and/or a lack of resources by which to collect preliminary data to support the concept. A decline in these productivity metrics may have an adverse effect in securing future research funding.

A Track 1 proposal will typically be a three-year, hypothesis-driven research proposal that advances the field, with high intellectual merit and broader impact as reviewed by experts in the field, following standard CBET review procedures. Preliminary data, recent research publications, and recent funding are not expected in a RARE proposal. There is no minimum budget, and the maximum budget should be that of the CBET program of interest, typically $100,000 per year unless otherwise specified in the most relevant program description. Other guidelines for CBET unsolicited proposals apply.

Track 2 of the RARE program will provide retraining grants, and target investigators for which a new research technique is required to conduct transformative research in their field such that they may competitively pursue future federal funding opportunities. Track 2 awards provide the investigator with funds to obtain training on a new technique, typically through seed funding, an apprenticeship, or other training opportunities not otherwise available. Budgets for a Track 2 proposal may include funds to support travel to a workshop or conference, workshop registration fees, a retraining sabbatical, seed funding to support collection of preliminary data (including salary support, equipment usage fees, materials, and/or supplies). Budgets for Track 2 may not exceed $300,000 without written permission from a RARE program director.

Outside of the RARE program, investigators who wish to develop a new skill through an established PI with an existing NSF award may wish to explore a supplement to the existing NSF award, and should contact a RARE program director for information or referral.

III. AWARD INFORMATION

Up to 4 awards, up to $300,000.00 each, contingent on availability of funds.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in, the US acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.

Who May Serve as PI:

Investigators must contact a RARE program director to confirm eligibility prior to submission. The investigator will receive an e-mail confirmation of eligibility, which must be uploaded as a Single Copy document with the proposal submission.

The investigator must hold a PhD in engineering or a closely related discipline, with prior research experiences in an area within the scope of the Division of Chemical, Bioengineering, Environmental, and Transport Systems. Application to the RARE program is not limited by demographics. Tenured or tenure-track faculty may apply. Adjunct, affiliated, research, or teaching faculty may apply if they are employed either full or part-time by an academic institution, provided they have a plan to seek future employment on the tenure-track. Other qualified individuals who lack University affiliation may apply, provided they have identified a senior research mentor at a University; in this select case, the mentor may serve as PI (see 'Additional Eligibility' information below). Investigators that have previously received a RARE award are ineligible for a second award. PIs that are eligible for a CAREER submission are ineligible for a RARE submission. Proposals from investigators who have had no change in career status for an extended period of time are encouraged.

The RARE investigator must demonstrate a substantial decrease in research metrics that result from the research hiatus to receive a confirmation of eligibility. The metrics must be communicated to a RARE program director to receive an e-mail confirmation of eligibility. Also, full documentation of these metrics should be included in a full curriculum vitae that is uploaded as a **Single Copy** document with the proposal. Applicable research metrics include: (1) research publication activity; (2) external research support as PI or co-PI, at a funding level that is consistent with a typical CBET individual investigator award; (3) resources with which to collect preliminary data. A Track 1 investigator must demonstrate a decrease in one or more metrics. A Track 2 investigator must demonstrate a lack of activity in all three metrics in the new area of interest (publications and funding in other areas are allowed). Examples of acceptable documentation of these metrics include: a full curriculum vitae with all publications and funding activity, a budget balance sheet showing funds from current awards are fully committed, a lack of support for research staff, reviews from a proposal saying preliminary data is needed, declined seed grant proposal from home institution, a lack of access to a necessary collaborator. Other metrics and means for documentation of the metric may be considered, after consultation with a RARE program director. The curriculum vitae should be formatted such that a decline in the research metrics is clearly indicated, for example, by separating entries into pre- and post-stagnation periods. In cases where the curriculum vitae may be unclear or ambiguous, the investigator should discuss the metrics with the RARE program director during the initial eligibility discussion. Track 2 proposals from an investigator with an active NSF award are discouraged.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or Co-PI: 1

Each investigator may submit one proposal to the RARE program in a 12-month period. Individuals who have previously received a RARE award are ineligible for a second award.

Additional Eligibility Info:

All researchers are encouraged to submit the proposal as the PI. However, qualified investigators that lack University affiliation may also apply, provided they have identified a tenured faculty member at a university who is willing to act as a research mentor. The research mentor may then serve as the PI, with the RARE investigator listed as co-Principal Investigator (preferred) or senior personnel, adhering to the guidelines in place at the mentor's institution. The research mentor should generally be a senior administrator (such as a Department Head, Institute Director, Dean, or Provost) who will oversee project and budgetary management and facilitate access to necessary university facilities. As RARE funds are not intended to support a post-doctoral fellowship or other research associate position, such relationships that are seen to benefit the mentor's own research program may be returned without review at the discretion of a RARE program director.

Investigators that have a pending NSF proposal that they wish to be considered as a RARE proposal may contact a program director for consideration in the RARE program, provided they meet the RARE eligibility criteria, and receive an invitation from a RARE program director as outlined above.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via

Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG). The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg. Paper copies of the PAPPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov. Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the *NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov*. The complete text of the *NSF Grants.gov Application Guide* is available on the Grants.gov website and on the NSF website at: (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. PAPPG Chapter II.D.3 provides additional information on collaborative proposals.

See PAPPG Chapter II.C.2 for guidance on the required sections of a full research proposal submitted to NSF. Please note that the proposal preparation instructions provided in this program solicitation may deviate from the PAPPG instructions.

RARE proposals must be technical research proposals that describe research that is potentially transformative to fields described in current CBET program descriptions. RARE proposals will be reviewed by disciplinary experts in fields relevant to the CBET programs. Prior to submission, the investigator must contact a RARE program director to discuss eligibility. To facilitate this discussion, the investigator is encouraged to submit a one page summary of the research idea, the name of the most relevant CBET program(s), and a curriculum vitae to RAREquestions@NSF.GOV. The investigator will then be contacted to schedule a conversation regarding program eligibility. Eligible investigators will receive an e-mail invitation from a RARE program director, which must be uploaded as a **Single Copy document** when the proposal is submitted. Proposals that are submitted to the RARE program that have not received this e-mail invitation will be returned without review. After invitation, the investigator is strongly encouraged to discuss the scope of the research idea with the disciplinary CBET program director prior to preparing a full proposal.

The proposal should be prepared according to guidance given in the NSF PAPPG, with the following amendments. The proposal title must begin with “RARE-1:" or “RARE-2:”, for Track 1 or 2, respectively. This title tag will be removed if an award is made. In addition to the guidance given in the PAPPG, the Broader Impacts section of a RARE proposal should include a discussion of how the award will contribute to an increase in diversity of the field or institution through the unique experiences or perspectives of the applicant.

A complete curriculum vitae (CV) should be uploaded as a **Single Copy document,** during proposal submission. The CV will be used by RARE program directors to verify eligibility criteria that were discussed during the initial inquiry. Any research metrics that will be used to demonstrate eligibility should be demarcated into periods that correspond to before and after the time the investigator identifies as the research hiatus point. More details will be provided to the investigator during the initial eligibility inquiry, on a case-by-case basis.

When the primary researcher is not listed as principal investigator (see Additional Eligibility Criteria), then a research mentor must provide a letter of support, uploaded as **Special Information and Supplementary Documentation**. This letter will be considered during the review process, and should explain how the research project will launch the primary researcher on an independent career trajectory. The research mentor is encouraged to follow the guidance given in the PAPPG for a post-doctoral mentoring plan, while also including a discussion on how the project will launch the investigator on an independent career. When the RARE-eligible individual is listed as the PI, this letter is not required.

All RARE investigators should include a short (1-2 page) memorandum as a **Single copy** document in Fastlane. The document should discuss short-term (i.e. 2-5 year) career goals and a plan for advancement (e.g., attainment of tenure, promotion, publication in a new area or field, attainment of a new skill, or others) that the researcher feels will realistically be enabled by this award. Those not currently on the tenure-track should include an outline of a plan to secure a tenure-track position, as the RARE program is limited to career advancement of investigators along the academic tenure system, either from a non-tenure track position to a tenure-track position or to a higher-tenure academic rank. The document should not include any description of personal factors that led to the hiatus in active research. This document will not be seen by reviewers, nor used in the evaluation of the proposal for intellectual merit or broader impact. The primary use of this document will be in evaluating the RARE program at the conclusion of the pilot period. The RARE program directors may also consider the content in formulating final recommendations, which include considerations related to programmatic balance, the integration of research and education, and broadening participation.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. submitter's local time):

Proposals Accepted Anytime

There is no deadline for this solicitation.

D. FastLane / Grants.gov Requirements

For Proposals Submitted Via FastLane:

To prepare and submit a proposal via FastLane, see detailed technical instructions available at: https://www.fastlane.nsf.gov/a1/newstan.htm. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

For Proposals Submitted Via Grants.gov:

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: http://www.grants.gov/web/grants/applicants.html. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

Proposers that submitted via FastLane are strongly encouraged to use FastLane to verify the status of their submission to NSF. For proposers that submitted via Grants.gov, until an application has been received and validated by NSF, the Authorized Organizational Representative may check the status of an application on Grants.gov. After proposers have received an e-mail notification from NSF, Research.gov should be used to check the status of an application.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in PAPPG Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: https://www.nsf.gov/bfa/dias/policy/merit_review/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Investing in Science, Engineering, and Education for the Nation's Future: NSF Strategic Plan for 2014-2018*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the strategic objectives in support of NSF's mission is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions must recruit, train, and prepare a diverse STEM workforce to advance the frontiers of science and participate in the U.S. technology-based economy. NSF's contribution to the national innovation ecosystem is to provide cutting-edge research under the guidance of the Nation's most creative scientists and engineers. NSF also supports development of a strong science, technology, engineering, and mathematics (STEM) workforce by investing in building the knowledge that informs improvements in STEM teaching and learning.

NSF's mission calls for the broadening of opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (PAPPG Chapter II.C.2.d(i). contains additional information for use by proposers in development of the Project Description section of the proposal). Reviewers are strongly encouraged to review the criteria, including PAPPG Chapter II.C.2.d(i), prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
    a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
    b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, as appropriate.

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review.

Reviewers will be asked to evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. A summary rating and accompanying narrative will generally be completed and submitted by each reviewer and/or panel. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF strives to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new awardees may require additional review and processing time. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director acts upon the Program Officer's recommendation.

After programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications. After an administrative review has occurred, Grants and Agreements Officers perform the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

Once an award or declination decision has been made, Principal Investigators are provided feedback about their proposals. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers or any reviewer-identifying information, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award notice, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award notice; (4) the applicable award conditions, such as Grant General Conditions (GC-1)*; or Research Terms and Conditions* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award notice. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at https://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer no later than 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). No later than 120 days following expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report, will delay NSF review and processing of any future funding increments as well as any pending proposals for all identified PIs and co-PIs on a given award. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through Research.gov, for preparation and submission of annual and final project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via Research.gov

constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

More comprehensive information on NSF Reporting Requirements and other important information on the administration of NSF awards is contained in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.

VIII. AGENCY CONTACTS

Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.

General inquiries regarding this program should be made to:

- José Lage, telephone: (703) 292-4997, email: jlage@nsf.gov
- Angela Lueking, telephone: (703) 292-2161, email: alueking@nsf.gov
- Robert McCabe, telephone: (703) 292-4826, email: rmccabe@nsf.gov
- Triantafillos Mountziaris, telephone: (703) 292-2894, email: tmountzi@nsf.gov
- Susan Muller, telephone: (703) 292-4543, email: smuller@nsf.gov
- Steven W. Peretti, telephone: (703) 292-7029, email: speretti@nsf.gov
- Carole Read, telephone: (703) 292-2418, email: cread@nsf.gov
- Nora F. Savage, telephone: (703) 292-7949, email: nosavage@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.gov.

General inquiries regarding this program should be made to:

- RAREquestions@NSF.GOV or a RARE Program Officer listed above.

IX. OTHER INFORMATION

The NSF website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this website by potential proposers is strongly encouraged. In addition, "NSF Update" is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Grants Conferences. Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "NSF Update" also is available on NSF's website.

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this mechanism. Further information on Grants.gov may be obtained at http://www.grants.gov.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 55,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Arctic and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See the *NSF Proposal & Award Policies & Procedures Guide* Chapter II.E.6 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at https://www.nsf.gov

- **Location:** 2415 Eisenhower Avenue, Alexandria, VA 22314
- **For General Information** (NSF Information Center)**:** (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**

  Send an e-mail to: nsfpubs@nsf.gov

  or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and NSF-51, "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
Reports Clearance Officer
Office of the General Counsel
National Science Foundation
Alexandria, VA 22314


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