NJIT Research Newsletter

Issue: ORN-2016-023

NJIT Research Newsletter includes recent awards, and announcements of research related seminars, webinars, national and federal research news related to research funding, and ***Grant Opportunity Alerts***. The Newsletter is posted on the NJIT Research Website http://www.njit.edu/research/

Recent Research Grant and Contract Awards

Congratulations to faculty and staff on receiving research grant and contract awards!

PI: Haimin Wang (PI)
Department: Center for Solar Terrestrial Research
Grant/Contract Project Title: Collaborative Research: SHINE: Study of Long-Term Variability of Solar Chromospheric Activity in Multiple Solar Cycles
Funding Agency: NSF
Duration: 06/15/16-05/31/19

PI: Reggie Farrow (PI)
Department: Physics
Grant/Contract Project Title: Student Support for EIPBN 2016 Conference
Funding Agency: DOE
Duration: 05/31/16-11/01/16

PI: Methi Wecharatana (PI) and Taha Marahaba (Co–PI)
Department: Civil and Environmental Engineering
Grant/Contract Project Title: SCG Center of Excellence
Funding Agency: The Siam Cement Public Company Ltd.
Duration: 06/01/16-12/31/16

In the News…

(National and Federal News Related to Research Funding and Grant Opportunities)

Senate Defense Science and Technology (S&T) Appropriation Bill: he Coalition for National Security Research (CNSR), a broad-based coalition of 74 members (of which CRA is a member) including industry, research universities and institutes, and scientific and professional associations committed to a strong Defense Science and Technology (S&T) Program, **released a statement** commending the Senate Appropriations Committee for their work on S. 1558, the Fiscal Year 2016 funding bill for the Department of Defense. CNSR was specifically applauding the committee for their support of Defense S&T at the 6.2 applied and 6.2 advanced research accounts, while also raising concerns about 6.1 basic research funding levels. The statement makes the case that Congress should adhere to the "20/20 Principle," which calls for investment in basic research to comprise 20 percent of the Defense S&T overall budget and Defense S&T to comprise 20 percent of the RDT&E (or Research, Development, Test and Evaluation) budget. The statement points out that, "the 20/20 Principle is based on the recommendations from the National Academies reports Rising Above the Gathering Storm (2007) and the Assessment of Department of Defense Basic Research (2005)." The Senate bill would provide the following funding for the different defense research accounts:

6.1 Basic Research – $2.31 billion for FY16, which is an increase of $40 million, or 1.7 percent, over what was appropriated for FY15 ($2.28 billion) and $229 million more than what was in the President's budget request.

6.2 Applied Research – $4.93 billion for FY16, which is an increase of $280 million, or 6.0 percent, over what was appropriated for FY15 ($4.65 billion) and $214 million more than what was in the President's budget request.

6.3 Advanced Research – $5.58 billion for FY16, which is an increase of $252 million, or 4.7 percent, over what was appropriated for FY15 ($5.33 billion) and $114 million more than what was in the President's budget request.

DARPA – $2.87 billion for FY16, which is a decrease of $50 million, or -1.7 percent, over what was appropriated for FY15 ($2.92 billion) and $107 million less than what was in the President's budget request.

Read More: http://cra.org/govaffairs/blog/2015/07/cnsr-senate-defense-fy16/

DARPA Program on Predicting Contagiousness to Limit the Spread of Disease: DARPA's new Prometheus program is setting out to develop that predictive capability. Prometheus seeks to discover a minimal set of molecular biomarkers that would indicate, less than 24 hours after exposure to a pathogen, whether an individual will become contagious. That window is narrow enough to allow for early treatment or the initiation of other mitigating steps before a person begins infecting others. "Many infections are spread by people who haven't yet displayed symptoms of their illness," said Matt Hepburn, the Prometheus program manager. "These people don't know they are sick, so they often end up spreading the disease to close contacts. Our goal with Prometheus is to develop techniques that could alert people that they are likely to become contagious, so they can proactively take steps to keep the disease from spreading." Prometheus will focus on acute respiratory infections. As part of that effort, researchers on the program will set out to develop a fundamental understanding of the biological responses occurring in a recently infected person.

Enabling a prognosis of individuals' likelihood of spreading a disease would not only help

mitigate an outbreak and speed treatment of affected individuals, but also would help researchers forecast the spread of the disease. Current models of outbreaks rely heavily on reported cases, which are generated after symptomatic patients visit a healthcare provider and receive a diagnosis. Patients who only exhibit mild symptoms may never seek medical care, yet may still be capable of spreading infection.

Proposers to Prometheus are encouraged to build teams with experience in fields such as immunology, microbiology, clinical epidemiology, medical infectious diseases, computational biology, bioinformatics, and molecular biology. To familiarize potential participants with the technical objectives of Prometheus, DARPA will host a Proposers Day on Monday, June 27, 2016, in Chicago. The DARPA Special Notice announcing the Proposers Day and describing the specific capabilities sought is available at http://go.usa.gov/chPYd. A Broad Agency Announcement with full technical details on Prometheus will be forthcoming. For more information, please email DARPA-SN-16-36@darpa.mil. Press release on http://www.darpa.mil/news-events/2016-06-13a

$36 Million for University Nuclear R&D: The Department of Energy's **Nuclear Energy University Program (NEUP)** awards will "support 49 university-led nuclear energy research and development projects in 24 states. NEUP seeks to maintain U.S. leadership in nuclear research across the country by providing top science and engineering students and faculty members opportunities to develop innovative technologies and solutions for civil nuclear capabilities." An additional $6 million will be shared by 15 universities for research reactor and infrastructure improvements.

NSF: STILL ON PIRE: NSF's Partnerships in International Research and Education (PIRE), begun in 2005, "will promote cooperation among scientists and engineers from all nations, and will fund international collaborative activities through all areas of research supported by NSF." The **sixth round** encourages interdisciplinary proposals. PIRE is "working with counterpart funding agencies to lower barriers to international collaboration for U.S scientists, engineers and students, and to encourage jointly funded, bilateral and multilateral projects." Please see NSF RFP 16-571 on http://www.nsf.gov/pubs/2016/nsf16571/nsf16571.htm. This is limited submission opportunity with one submission per institution. Information about NJIT Internal Competition and proposal submission is included in the following Grant Opportunity section in this issue.

Crowding Out R&D: Subsidizing "technology that is ready for commercial deployment" is pretty much the whole point of the Small Business Innovation Research and Technology Transfer (SBIR-STTR) programs, for which Congress sets aside a percentage of federal research budgets. Since FY11, the SBIR program at NSF "has expanded by 5 percent a year, or almost 30 percent overall . . . almost three times as much as the rest of the agency during the same time period," Assistant Director for Engineering Pramod Khargonekar told a **House Research and Technology Subcommittee hearing**. While NSF supports permanent reauthorization of SBIR-STTR, it opposes a measure passed by the Small Business Committee that would increase program funding by 40 percent over 6 years for SBIR and 33 percent over 6 years for STTR. Such hikes "would come at the expense" of "existing highly meritorious fundamental research."

Department of Labor: Fair Labor Standards Act: On May 17, the Administration released a final rule updating the salary level salary threshold under which most salaried workers are entitled to overtime compensation. The salary threshold would increase from $23,660 to $47,476. For institutions of higher education, the rule would affect many classes of employees,

such as post docs, who have not been eligible for overtime pay in the past. Funding agencies will be obligated to increase allowable stipends. During rulemaking, comments from the higher education community have expressed concerns about the capacity of research intuitions to absorb these costs and the possibility that these will cut into overall research grant funding and increase tuition costs. The final rule will become effective December 1.Read More: Inside Higher Ed, American Council on Education

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Events and Announcements

Event: Webinar: Data Science - DevOps at Amazon: A Look at Our Tools and Processes
When: June 21, 2016 3.30 PM-4.30 PM
Where: http://www.nsf.gov/events/event_summ.jsp?cntn_id=138978&org=NSF
Brief Description: As Amazon has transitioned to the cloud, it moved from a monolithic architecture and waterfall based development model to a service oriented architecture based on an agile and DevOps methodology. We will discuss Amazon's move to the cloud, the development and growth of Amazon Web Services (AWS), and how the devops model is implemented within AWS. Amazon's customer focused methodology combined with devops and a flexible scaling infrastructure has allowed Amazon and AWS to significantly accelerate innovation and the delivery of new products and features.
BIO: Bill Vass is Vice President of Engineering at Amazon Web Services, where he oversees the team working on Amazon S3 Object Storage Service, Amazon Glacier, Simple Queuing Service, Simple Work Flow, Auto Scaling, Messaging, Transactional Systems, and Kinesis Streaming Services. With these projects, the Storage Services team runs the largest software defined storage system in the world, which is used by web-based companies, consumer companies, enterprises, and the growing world of Internet of Things stream, to store and retrieve information quickly and efficiently. The services help to on-ramp data into the AWS ecosystem so that companies can scale quickly and utilize data by taking advantage the AWS compute and analytic services. Most recently, Mr. Vass was the President and Chief Executive Officer of Liquid Robotics, Inc., a pioneering Data as a Service, cloud-based solutions company that designs and builds autonomous robots that serve a wide range of customers in the energy, shipping, defense, communications, scientific, intelligence, and environmental markets. Previously, Mr. Vass was the President and Chief Operating Officer of Sun Microsystems Federal, an independent subsidiary with its own board of directors, where he was responsible for growing over $1.4B of revenue. His responsibilities spanned Product Development, Sales and Business Development, Marketing, Partner Management, and Service Delivery.

Before leading Sun Microsystems Federal, Mr. Vass served as Chief Information Officer and Chief Information Security Officer at Sun, where he defined and delivered the technology vision, architecture, and managed global deployments in support of Sun's 50K business users. During his time as CIO, Mr. Vass significantly improved security, availability, and application delivery while reducing the overall operations cost of IT from $880M to $360M. Mr. Vass had a lengthy public service career. Working for the Secretary of Defense in the Office of the CIO, he was responsible for a $35.5B budget, as well as system and software acquisition, research, development, and integration standards for over 6,800 IT systems. His organization managed networks, servers and applications across the Pentagon's defense networks.
To Join the Webinar, please register at:
https://nsf.webex.com/nsf/j.php?RGID=r1cca5e51dcff710b4848ca957263de0e

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Event: NSF Lecture: A Complex Systems Science of Human Learning
When: June 30, 2016 10.00 AM-11.00 AM
Where:
http://www.nsf.gov/events/event_summ.jsp?cntn_id=138984&WT.mc_id=USNSF_13&WT.mc_ev=click
Brief Description: Complex systems science offers conceptual frameworks, analytical approaches, and computational tools to study systems of interacting parts that display emergent behavior. While traditionally applied to large-scale technological and social systems, recent data suggest that complexity science has an incredibly powerful role to play in our understanding of and support for human learning. In this talk I will review emerging lines of research using tools from complex network theory to understand the reconfiguration of connectivity patterns in the brain that support the learning of new skills or the acquisition of new knowledge. I will then discuss the drivers of those reconfigurations revealed by an intersection of neuroscience and network control theory. Finally, I will describe the complex structure of bodies of knowledge, and address the question of whether some sets of knowledge are easier to learn than others based on that structure. Together, these efforts not only enhance our understanding of human learning, but also have the potential to guide training approaches and inform our presentation of information to students or trainees to maximize acquisition and retention. I will close with futuristic aspirations and goals in using complex systems science to propel the field of neuroeducation towards measurable societal impact.
BIO: Danielle S. Bassett is an Associate Professor in the Department of Bioengineering at the University of Pennsylvania. She is most well-known for her work blending neural and systems engineering to identify fundamental mechanisms of cognition and disease in human brain networks. She received a B.S. in physics from the Pennsylvania State University and a Ph.D. in physics from the University of Cambridge, UK. Following a postdoctoral position at UC Santa Barbara, she was a Junior Research Fellow at the Sage Center for the Study of the Mind. In 2012, she was named American Psychological Association's `Rising Star' and given an Alumni Achievement Award from the Schreyer Honors College at Pennsylvania State University. In 2014, she was named an Alfred P. Sloan Research Fellow and received a MacArthur Research Fellowship. In 2015, she received the IEEE EMBS Early Academic Achievement Award and was named an ONR Young Investigator. In 2016, she received an NSF CAREER award. She lives with her husband and two sons in Wallingford, Pennsylvania.
More information and registration, please visit the website http://www.nsf.gov/events/event_summ.jsp?cntn_id=138984&WT.mc_id=USNSF_13&WT.mc_ev=click

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Grant Opportunity Alerts

Keywords and Areas Included in Grant Opportunity Alerts**:**

NSF: Cooperative Studies Of The Earth's Deep Interior (CSEDI); Partnerships for International Research and Education (PIRE); Origin of Life A Joint Ideas Lab Activity Between NSF and NASA
NIH: Bold New Bioengineering Methods and Approaches for Heart, Lung, Blood and Sleep Disorders and Diseases (R21); Advancing Basic Behavioral and Social Research on Resilience: An Integrative Science Approach (UG3/UH3); Improvement of Animal Models for Stem Cell-Based Regenerative Medicine (R24)

Department of Defense/US Army/DARPA/ONR: Data-Driven Discovery of Models (D3M); Peer Reviewed Medical Research Program: Investigator-Initiated Research Award
Department of Energy: Innovative Development in Energy-Related Applied Science (IDEAS)
NASA: ROSES 2016: Atmospheric Composition: Aura Science Team and Atmospheric Composition Modeling and Analysis Program; ROSES 2016Atmospheric Composition: Upper Atmospheric Composition Observations
National Endowment for Humanities: Media Projects: Development Grants

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Grant Opportunities

National Science Foundation

Grant Program: Cooperative Studies Of The Earth's Deep Interior (CSEDI)
Agency: National Science Foundation NSF 16-572
RFP Website: http://www.nsf.gov/pubs/2016/nsf16572/nsf16572.htm
Brief Description: The Division of Earth Sciences (EAR) invites the submission of proposals for collaborative, interdisciplinary studies of the Earth's interior within the framework of the community-based initiative known as Cooperative Studies of the Earth's Deep Interior (CSEDI). Funding will support basic research on the character and dynamics of the Earth's mantle and core, their influence on the evolution of the Earth as a whole, and on processes operating within the deep interior that affect or are expressed on the Earth's surface. Projects may employ any combination of field, laboratory, and computational studies with observational, theoretical, or experimental approaches. Support is available for research and research infrastructure through grants and cooperative agreements awarded in response to investigator-initiated proposals from U.S. universities and other eligible institutions. Interdisciplinary projects are required. EAR will consider co-funding of projects with other agencies and supports international collaborations.
Awards: Standard grants. **Anticipated Funding Amount:** $2,000,000 per year
Letter of Intent: Not required.
Full Proposal Submission Due Date: September 27, 2016
Contacts:

- Robin Reichlin, Program Director, Geophysics, 785 S, telephone: (703) 292-8556, fax: (703) 292-9025, email: rreichli@nsf.gov
- Sonia Esperanca, Program Director, Petrology and Geochemistry, 785 S, telephone: (703) 292-8554, email: sesperan@nsf.gov

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Grant Program: Partnerships for International Research and Education (PIRE)
Agency: National Science Foundation NSF 16-571
RFP Website: http://www.nsf.gov/pubs/2016/nsf16571/nsf16571.htm
Brief Description: Partnerships for International Research and Education (PIRE) is an NSF-wide program that supports international activities across all NSF-supported disciplines. The primary goal of PIRE is to support high quality projects in which advances in research and education could not occur without international collaboration. PIRE seeks to catalyze a higher level of international engagement in the U.S. science and engineering community. International partnerships are essential to addressing critical science and engineering problems. In the global context, U.S. researchers and educators must be able to operate effectively in teams with partners from different national environments and cultural backgrounds. PIRE promotes

excellence in science and engineering through international collaboration and facilitates development of a diverse, globally-engaged, U.S. science and engineering workforce.
This PIRE competition will be open to all areas of science and engineering research which are supported by the NSF.
Awards: Standard grants. **Anticipated Funding Amount:** $8,000,000 to $12,000,000 annually, for all new awards, pending the availability of funds
Letter of Intent: Not Required.
Preliminary Proposals: Submission of Preliminary Proposals is required. Please see the full text of this solicitation for further information. Deadline: September 14, 2016
Full Proposal Submission Due Date: April 24, 2017
Limit on Number of Proposals per Organization: 1
A single organization may submit one preliminary proposal as the lead institution. Full proposals will be accepted by invitation only. There is no limit on the number of proposals in which an institution can participate as a partner.
Limit on Number of Proposals per PI or Co-PI: There are no restrictions or limits.
Contacts:

- Cassandra M. Dudka, telephone: (703)292-7250, email: PIRE-info@nsf.gov
- Cassidy Burke, telephone: (703)292-2464, email: PIRE-info@nsf.gov

NJIT Internal Competition:

Due to the limit of only one submission per institution, an internal competition has been set up to select NJIT proposal to PIER RFP opportunity. All internal preliminary proposals should be submitted to respective college deans by August 1, 2016. Only one preliminary proposal per college with the recommendation of the college dean must be forwarded to the Office of Research by August 8 for institutional review. Selected preliminary proposal will be announced by August 12 for submission to NSF by the due date of September 14, 2016. NJIT internal preliminary proposal should consist of the following elements:

- **Cover Sheet:** Check the box indicating that this is a preliminary proposal. Provide an informative title that begins with "PIRE:". The proposed PIRE Project Director must be shown as the Principal Investigator.
- **Project Summary:** (1 page maximum) Describe the concept of the proposed PIRE project, including why the international partnership is critical to the project success. Separately address the intellectual merit and broader impacts of the project. The summary should be informative to those working in the same or related field(s), and understandable to a scientifically or technically literate reader.
- **Project Description (6 page maximum):** The Project Description should take the form of a concept paper that clearly outlines the research challenges being addressed or breakthroughs being sought in the proposed PIRE project. The proposed approaches must be innovative and must show clear benefit from international collaboration (for example, expertise, facilities, resources, access to phenomena) and active engagement of US students and junior researchers. Include the following elements:
    - **Administrative Summary** (1 page maximum) should include:
      title of the project
      principal investigator
      length of study (maximum 5 years)
      estimated total budget (does not need to be itemized)
      lead institution
      list of partner institutions and key researchers

If the proposal is to be considered for Additional Funding Opportunity(ies) as described in Section II.D., **explicitly name the funding partner agency(ies)**.

- **Research Summary** (3 page maximum): Summarize the main ideas and essence of the proposed research. Describe the issue/topic the proposed research is trying to address, the overall goal, approaches, expected outcomes, and the synergy that each participant brings to the project.
- **Education Summary** (2 page maximum): Describe the goals of the proposed education activities, and how the integration of research and education will advance the proposed PIRE project in a way that other funding mechanisms cannot. A justification for education programs and activities should be included and described in the context of current knowledge of teaching and learning.

- **References Cited:** Per NSF Grant Proposal Guide instructions.
- **Biographical Sketches:** Required for PIRE Project Director (PI), Co-PIs, and key domestic and international partners. Use the required NSF Biographical Sketch format as specified in the NSF Grant Proposal Guide (GPG Chapter II.C.2.f).

Any question on internal preliminary proposal competition should be directed to Atam Dhawan, Vice Provost for Research (dhawan@njit.edu)

Grant Program: Origin of Life A Joint Ideas Lab Activity Between NSF and NASA
Agency: National Science Foundation NSF 16-570
RFP Website: http://www.nsf.gov/pubs/2016/nsf16570/nsf16570.htm
Brief Description: This solicitation describes an Ideas Lab on "Origin of Life." Ideas Labs are intensive workshops focused on finding innovative solutions to grand challenge problems. The ultimate aim of this Ideas Lab organized by the Directorates for Biological Sciences (BIO) and Geosciences (GEO) at the National Science Foundation (NSF), and the Astrobiology Program at the National Aeronautics and Space Administration is to facilitate the generation and execution of innovative research projects aimed at identifying and funding potentially transformative research to address grand challenge questions in the origin of life. The primary aim of this Ideas Lab is to foster the development of a theoretical framework that encompasses the "metabolism first" and "RNA first" theories for the origin of life by stimulating creative thinking and new research on the earliest events leading to life on early Earth. Understanding plausible pathways for the origin of life will contribute directly to our understanding of the indispensable properties of life on Earth and inform our search for life on other worlds.
US researchers may submit preliminary proposals for participating in the Ideas Lab only *via* FastLane. Participation in the Ideas Lab is required to be eligible to submit a full proposal. Multidisciplinary ideas developed in the Ideas Lab will be submitted as full proposals to NSF or to NASA by invitation only. Collaboration among researchers is strongly encouraged in the invited full proposals.
Awards: Standard grants. **Anticipated Funding Amount:** $8,000,000
Letter of Intent: Not Required.
Full Proposal Submission Due Date:

- **Preliminary Proposal Due Date(s)** ***(required)*** (due by 5 p.m. submitter's local time): August 05, 2016 required for participation in Ideas Lab
- **Full Proposal Deadline(s)** (due by 5 p.m. submitter's local time): December 19, 2016

Contacts:

- Arcady Mushegian, Program Director, BIO/MCB, telephone: (703) 292-8528, email: amushegi@nsf.gov

- Charles Liarakos, Program Director, BIO/EF, telephone: (703) 292-7904, email: cliarako@nsf.gov
- Paco Moore, Program Director, BIO/DEB, telephone: (703) 292-2707, email: fbmoore@nsf.gov
- Enriqueta C. Barrera, Program Director, GEO/EAR, telephone: (703) 292-7780, email: ebarrera@nsf.gov

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National Institutes of Health

Grant Program: Bold New Bioengineering Methods and Approaches for Heart, Lung, Blood and Sleep Disorders and Diseases (R21)
Agency: National Institutes of Health RFA-HL-17-015
RFP Website: http://grants.nih.gov/grants/guide/rfa-files/RFA-HL-17-015.html
Brief Description: This program is meant to foster discovery- and design-driven bioengineering research ideas that are important across the Institute and that are critical for future hypothesis-generating projects. It is noteworthy that this program emphasizes development, not so much efficacy, of first-generation prototypes. The NHLBI is interested in the development of new ideas for diagnostics, therapeutics, surgical technologies, computational modeling tools, smart biomaterials for self-adjusting implants, and nanotechnologies, as applied to the cardiovascular, pulmonary, non-malignant hematologic, and sleep health mission areas of the Institute.
Topic areas include, but are not limited to:

- Development of: noninvasive and nondestructive 3D imaging methods, including new molecular probes, for *in vivo* real-time monitoring, and techniques for metabolic imaging of disease progression
- Image processing tools and methodology for big data, precision medicine, systems biology and –omics, especially for guiding interventions and patient screening
- Approaches to improve cardiovascular, lung and blood repair and regeneration
- Artificial lungs as a bridge to transplant or for treatment of lung failure
- New platforms for clinical decision support, electronic health records, and mobile health monitoring devices
- New additive solutions and cell/tissue/organ processing and preservation technologies
- New storage bags and/or new processes to enhance blood cell function and survival after storage and transfusion
- New design principles that affect organ-specific transplantation biology and regenerative medicine
- Development of tools/algorithms for objective evaluation of sleep health and disorders
- New tools, methods and technologies that facilitate therapeutic advances and behavioral changes to address problems in energy balance, weight control and obesity
- Tools to better understand biological host sex differences
- Development of artificial oxygen (O2) carrier to substitute for banked blood in settings where stored blood is unavailable or undesirable
- Mathematical modeling, and computational simulation techniques to understand mechanisms of HLBS systems, including gene, protein, and metabolic regulatory networks
- Innovative ways to measure tissue microoxygenation
- Nanotechnologies that significantly improve diagnostic and medical devices.

Awards: Direct costs are limited to $275,000 over a two-year period, with no more than $150,000 in direct costs allowed in any single year.
Letter of Intent: 30 days before the application due date
Deadline: October 13, 2016; January 10, 2017; May 10, 2017; October 13, 2017; January 10, 2018; May 10, 2018; October 10, 2018; January 10, 2019; May 10, 2019, by 5:00 PM local time of applicant organization. All types of non-AIDS applications allowed for this funding opportunity announcement are due on these dates.
Applicants are encouraged to apply early to allow adequate time to make any corrections to errors found in the application during the submission process by the due date.

Grant Program: Advancing Basic Behavioral and Social Research on Resilience: An Integrative Science Approach (UG3/UH3)
Agency: National Institutes of Health PAR-16-326
RFP Website: http://grants.nih.gov/grants/guide/pa-files/PAR-16-326.html
Brief Description: The term "resilience" has broad associations and conveys different meanings in different contexts. It has been used to describe the absence of adverse consequences after exposure to a stressor as well as processes of recovery and adaptation that may involve learning or post-traumatic growth. Life challenges such as natural disasters, cumulative social and financial pressures, and serious illnesses are unavoidable, and have psychological and health consequences. However some individuals or social groups are able to maintain high levels of functioning and adaptation in the face of such challenges. Insights into the processes and mechanisms that maintain function, support recovery, or enhance function in response to severe challenges may help identify potential targets for behavioral or biomedical interventions to promote lifelong health.

Currently behavioral and social science research on resilience lacks a common framework, taxonomy, or approach that extends across multiple levels of analysis (e.g., genetic/epigenetic, neurobiological, physiological, psychological, behavioral, social, environmental). In addition current research does not clearly articulate the various predisposing factors, classes of adverse exposures, dynamic processes of adaptation, and potential environmental moderators of those processes. This initiative seeks to address these gaps.

The focus of studies to be funded under this FOA is on the characterization of the patterns of response to a challenge across multiple, interacting levels of analysis and the identification of the factors associated with physical, psychological or social resilience in individuals or social communities. Critical elements of all proposals include a well characterized precondition and an assessment of the dynamic changes over time on the relevant outcomes. Selection of a challenge should be based on feasibility of assessment and significance to human health. The approach must have relevance to the mission of one of the participating NIH Institutes, Centers or Offices, including assessments of health-relevant processes and outcomes. Applications may address dynamic responses over time to either acute (e.g. crime victimization, natural disaster, disease diagnosis, onset of disability, bereavement, job loss) and/or chronic (e.g. poverty, ongoing abuse, social isolation, long-term illness or disability) challenges or exposures. Optimization of quantitative outcome variables is required to evaluate the response to the stressor, so that enough variance is obtained to distinguish non-responders, normal responders, and exceptionally robust responders. Projects may include aims examining the "steeling" effects of a challenge, also described as stress inoculation, and how this may impact (ameliorate) risk for future problems, potential for thriving, and the ability to handle stress in the future.

Applications are encouraged that advance our ability to measure the change process, offer novel insights into pre-disposing/pre-existing factors and identify the predictive potential of these factors for distinct health-related or disease outcomes.

Importantly, assessments of dynamic processes of adaptation to challenge should focus on measuring resilience as an integrative response, rather than being specific to a given level of analysis (e.g. behavioral or physiological). Important parameters might include the identity, duration and magnitude of the stressors, as well as measures of various response parameters, including response magnitude, frequency and duration, the extent and time to recovery and refractory times. The proposed outcome measures should have the potential for predictors of future health outcomes relevant to the missions of the sponsoring NIH Institutes, Centers and Offices.

Awards: UG3 phase support is limited to $250,000 per year with the exception of studies incorporating well-justified pilot studies, in which case there is no budget limit. The budget for the UH3 phase is not limited but needs to reflect the actual needs of the proposed project.

Letter of Intent: November 1, 2016

Deadline: December 1, 2016, by 5:00 PM local time of applicant organization. All types of non-AIDS applications allowed for this funding opportunity announcement are due on this date.

Applicants are encouraged to apply early to allow adequate time to make any corrections to errors found in the application during the submission process by the due date.

Grant Program: Improvement of Animal Models for Stem Cell-Based Regenerative Medicine (R24)

Agency: National Institutes of Health PAR-16-322

RFP Website: http://grants.nih.gov/grants/guide/pa-files/PAR-16-322.html

Brief Description: Regenerative Medicine is the process of creating living, functional tissues to repair or replace tissue or organ function lost due to damage or congenital defects. Regenerative medicine has the potential to solve the problem of the shortage of organs available for donation. It also holds the promise of repairing or replacing damaged tissues and organs in the body by stimulating organs previously considered irreparable to heal themselves. The recent discovery of the reprogramming of adult cells to a pluripotent state provides opportunities to address a major problem of regenerative medicine, immune rejection of transplanted tissue. The ability to generate differentiated cells and tissues using cells from specific patients will facilitate individualized medicine and eventually will lead to specialized therapies. The field is moving toward translation to clinical practice and is becoming increasingly dependent on animal models and information regarding the potential therapeutic efficacy of new technologies. Generating the correct type and quantity of the specific cell types required for replacement therapy is a significant challenge, as are the problems associated with introducing these cells into the proper environment in vivo and overcoming immune reactions. Finding solutions to these problems will require extensive testing in experimental animal models.

Projects supported under this FOA are intended to improve existing, and create new, animal models for regenerative medicine. Efficient use of animal models is facilitated by development of specific resources for characterizing, archiving and distributing animals as well as research tools, reagents and stem cell lines of utility to research on a variety of animal species. Development of an animal-based resource often requires preliminary work that is research-based. This resource-related research is often not hypothesis driven and cannot be addressed appropriately by NIH R01 or R21 grant applications. Accordingly, ORIP/DPCPSI supports resource grants which have the following features:

- The grants support applied studies to characterize and develop new animal based resources or to improve existing resources.
- The grants support research projects that contribute to the knowledge of a model system, making the system more useful and accessible to the research community.
- In all cases, the potential results of investigations must be applicable to the research interests of two or more of categorical NIH Institutes and Centers (ICs). Furthermore, investigations of a disease or category of research that predominantly relates to the interests of one NIH categorical IC and peripherally relates to the interests of other NIH ICs are not appropriate for this FOA. Preference will be given to investigations that examine general principles involved in developing the most informative animal models for regenerative medicine, rather than focusing on a specific disease. However, investigations involving specific diseases can be used as proof of principle. An example of an inappropriate request is one exclusively involving an animal model of cancer, heart disease, or neurological disorders. The ultimate objective of these efforts should be to provide essential preclinical knowledge that can help inform future clinical investigations.
- The particular emphasis of a specific application can vary in regard to the balance of research- versus resource-related activities, depending on the state of the art at the time. An application can be predominantly research based, if the research will plausibly lead to development of a resource, or can be predominantly aimed at final development or enhancement of a resource if most of the necessary research has already been accomplished.
- The application must demonstrate a need for the resource (or resource to be developed) by the biomedical research community.
- Cost recovery is not required.

Investigators considering applying are strongly encouraged to consult with ORIP program staff (see Scientific/Research Contacts in Section VII. Agency Contacts) as early as possible to be advised whether their research plans are appropriate for this FOA.

The following are examples of research topics of particular interest to ORIP, though other innovative concepts are also encouraged:

- Characterization and enhancement of animal stem cells as model systems for human stem cells. Development of innovative approaches to understand the biology of stem cells from species widely used in regenerative medicine. Rat stem cells are of particular interest, taking into account current advances in isolation and characterization of stem cells from rats, the progress of the rat genome project and current advances in the ability to manipulate rat genes.
- Development and characterization of stable, well characterized pluripotent stem cell lines from large animal species, such as rabbits, dogs, pigs, goats, sheep and monkeys. Development of stem cell lines from this type of animal model should be justified as having direct relevance to potential uses in the field of regenerative medicine. Creation of biomarkers, standard protocols, species-specific reagents, proteomics, transcriptomics and genetic tools to assist the use of these cells is also of interest.
- Comparative analysis of animal and human stem cells to define criteria that will assist in choosing the most appropriate animal species and stem cell type for a particular application.
- Development of new techniques for guiding and verification of the accuracy of cell injection, tracking cell migration, evaluating off-target effects, and monitoring long-term integration and the phenotype and function of transplanted stem cells and their derivatives.

- Development of new approaches to understand and target the cell-fate-determining niche to improve extrinsic effects on stem cell function, increase cell survival and proper integration into the host environment, and establish correct regulatory connections after cell-grafting experiments.
- Redirection of existing or creation of new national centralized facilities with robust capacity to purify, characterize and store stem cells from large animal species for regenerative medicine applications, to maintain databases and make biomaterials available to the wide biomedical community as well as to develop and produce isogenic lines.
- Investigations of the therapeutic benefits of human and animal MSCs in animal models and mechanisms of their biological action. Improvement of methods for testing the efficacy and potency of MSCs in animals and for controlling the MSC secretome post-transplantation.
- Development of definitive markers for the multipotent state of the cells. Investigations of the cause of the high sensitivity of MSCs to the microenvironment. Standardization of culture conditions for scale up of production.
- Investigations of animal GSCs as models for understanding embryogenesis and organogenesis, stem-cell niche interactions and fate decisions. The focus should be on facilitating the application of GSCs for regenerative medicine, for example, exploring the potential for generating pluripotent cells and for deriving genetically modified animal models, including the use of haploid cells for this purpose. Preference will be given to applications working with large animal models, such as rabbits, dogs, pigs, goats, sheep and monkeys.
- Investigations to improve existing humanized animal models and create new ones. Preference will be given to studies involving species other than rodents. Of particular interest are advances in the reproducible and cost-effective generation of humanized chimeras, which is currently technically challenging. Development of humanized animals for in vivo generation of complex human tissues and organs using stem cells.
- Development of high throughput genetic and therapeutic screens to study stem cell biology and homeostasis in appropriate animal species, such as Drosophila and zebrafish.
- Improvement and distribution of the reagents, protocols, stem cell lines, vectors, genetically altered animal strains and disease models, suitable for such high throughput genetic and therapeutic screens.
- Improvement of animal disease models for regenerative medicine, which will better emulate physiological, cellular and molecular manifestations seen in humans. Development of methods to increase the predictability of stem cell based treatments in regard to effectiveness, major complications, safety and off target effects. Demonstration of the functionality of specific stem cells or their derivatives and the effectiveness of achieving specific results in improved animal disease models.
- Investigations of mammalian stem cell reprogramming and somatic cell transdifferentiation. Development of approaches and protocols for manipulating cell fate using efficient and safe methods, including removable vectors and vector systems with temporal expression of transcription factors, RNA or small molecules. Investigations regarding how these modifications can be used to control the expansion and differentiation of resident progenitor cells for direct reprogramming in vivo.
- Development of animal models for effective and sustained gene-therapy using ex-vivo engineered stem cells and their derivatives as well as endogenous stem cell populations to correct gene defects. Preference will be given to applications that provide general

approaches for a broad array of uses. Applications should not be focused on therapy for specific diseases. However, a specific disease can be used as a proof of principle, if also applicable to other disease conditions. Improvement and assessment of the safety of newer technologies such as CRISPR/Cas9, allowing targeted approaches for the elimination of disease-causing mutations, as tested in animal models.

- Development of solutions to problems of stem cell therapy that have already been identified, such as heterogeneity of cell populations, genetic instability, high mutation rate during in vitro manipulations, epigenetic memory of differentiated iPSCs and immune responses induced after stem cell transplantation. Of particular interest is the development of functional assays and high-throughput techniques that will predict the potential immunogenicity of transplants and the tumorigenicity or metastatic potential of stem cell lines.
- Development of new methods or animal models to evaluate the safety of stem cell transplantation in animals, including studies of adsorption, distribution, metabolism, excretion and toxicity of stem cell-based therapeutic products. These models should take into account properties of the specific stem cell populations and should mimic the intended use of the cells in humans.
- Development of public databases that will contain information on: reproducible experimental conditions; cell lines and related biomaterials; results of testing animal and human stem cells in animal models; and cross-species and unique phenotypes that will assist future biomedical scientists and medical practitioners in the selection of the most relevant pre-clinical model.

Awards: Application budgets are not limited but need to reflect the actual needs of the proposed project. For Renewal (a.k.a. competing continuation or Type 2) applications, no more than a 5 percent (direct cost) increase from the last non-competing year will be accepted.
Letter of Intent: Not Required
Deadline: Standard dates apply, by 5:00 PM local time of applicant organization. All types of non-AIDS applications allowed for this funding opportunity announcement are due on these dates.
Applicants are encouraged to apply early to allow adequate time to make any corrections to errors found in the application during the submission process by the due date.

Department of Defense/US Army/DARPA/ONR

Grant Program: Data-Driven Discovery of Models (D3M)
Agency: Department of Defense DARPA-BAA-16-43
Website:
https://www.fbo.gov/index?s=opportunity&mode=form&id=a93bd7c9187c88966b3ba078364a5970&tab=core&_cview=0
Brief Description: DARPA is soliciting innovative research proposals in the area of automated model discovery systems that create empirical models of real, complex processes from data. Proposed research should investigate innovative approaches that enable revolutionary advances in science, devices, or systems. Specifically excluded is research that primarily results in evolutionary improvements to the existing state of practice.

Understanding the complex and increasingly data-intensive world around us relies on the construction of robust empirical models, i.e., representations of real, complex systems that enable decision makers to predict behaviors and answer "what-if" questions. Empirical models play key roles in military tactical and strategic planning. They allow us to optimize logistics in

the presence of stochastic elements such as weather and traffic, help us improve job placement within the military, and enable tracking and prediction of enemy troop movements and tactics during conflicts.

Data-driven models also lie at the heart of empirical science (e.g., quantitative physics, material science, chemistry, biology/medicine, etc.). Basic research often aims to develop these models, which engineers and scientists can then use to develop new technologies (e.g., to fabricate new semiconductors, or develop new sensors and better weapon systems). Today, construction of complex empirical models is largely a manual process requiring access to data scientists who can:

a. collaborate with subject matter experts to define a suitable modeling problem,
b. curate, select and annotate appropriate data,
c. transform, cleanse and structure data,
d. extract features from data into a form that can be modeled,
e. model the data, and
f. visualize and explain the modeled outcomes.

Awards: Multiple awards are anticipated.
Deadline: Abstract Due: June 24, 2016, 12:00 noon (ET)
Proposal Due Date: August 12, 2016, 12:00 noon (ET)
Agency contact: D3M@darpa.mil Wade Shen, Program Manager, DARPA/I2O

Grant Program: Peer Reviewed Medical Research Program: Investigator-Initiated Research Award
Agency: Department of Defense; Defense Health Program: Congressionally Directed Medical Research Programs W81XWH-16-PRMRP-IIRA
RFP Website: http://cdmrp.army.mil/funding/pa/16prmrpiira_pa.pdf
Brief Description: Applications to the Fiscal Year 2016 (FY16) Peer Reviewed Medical Research Program (PRMRP) are being solicited for the Defense Health Agency, Research, Development, and Acquisition (DHA RDA) Directorate, by the U.S. Army Medical Research Acquisition Activity (USAMRAA). As directed by the Office of the Assistant Secretary of Defense for Health Affairs (OASD[HA]), the DHA RDA Directorate manages the Defense Health Program (DHP) Research, Development, Test, and Evaluation (RDT&E) appropriation. The managing agent for this Program Announcement/Funding Opportunity is the Congressionally Directed Medical Research Programs (CDMRP). The PRMRP was initiated in 1999 to provide support for military health-related research of exceptional scientific merit. Appropriations for the PRMRP from FY99 through FY15 totaled $1.092 billion. The FY16 appropriation is $278.7 million (M).

The vision of the FY16 PRMRP is to improve the health and well-being of all military Service members, Veterans, and beneficiaries. The PRMRP challenges the scientific and clinical communities to address at least one of the FY16 Topic Areas with original ideas that foster new directions along the entire spectrum of research and clinical care. The program seeks applications in laboratory, clinical, behavioral, epidemiologic, and other areas of research to advance knowledge in disease etiology, improve prevention, detection, diagnosis, treatment, and quality of life for those affected by a relevant disease or condition, and to develop and validate clinical care or public health guidelines.
Awards: The anticipated direct costs budgeted for the entire period of performance will not exceed **$1.2M**. Indirect costs are to be budgeted in accordance with the organization's negotiated rate. No budget will be approved by the Government exceeding **$1.2M** direct costs or using an indirect rate exceeding the organization's negotiated rate.
Deadline: Pre-Application Submission Deadline: 5:00 p.m. Eastern time (ET), June 23, 2016

- **Invitation to Submit an Application:** August 2016
- **Application Submission Deadline:** 11:59 p.m. ET, October 19, 2016

Department of Energy

Grant Program: Innovative Development in Energy-Related Applied Science (IDEAS)
Agency: Department of Energy Advanced Research Projects Agency
DE-FOA-0001496
RFP Website: https://arpa-e-foa.energy.gov/#FoaId45210635-66d2-4e12-a9ee-fb39dca1d01b
Brief Description: This Funding Opportunity Announcement (FOA) provides a continuing opportunity for the rapid support of early-stage applied research to explore innovative new concepts with the potential for transformational and disruptive changes in energy technology. IDEAS awards are intended to be flexible and may take the form of analyses or exploratory research that provides the agency with information useful for the subsequent development of focused technology programs. IDEAS awards may also support proof-of-concept research to develop a unique technology concept, either in an area not currently supported by the agency or as a potential enhancement to an ongoing focused technology program. Applications must propose concepts that are *not* covered by open ARPA-E focused FOAs and that also do not represent incremental improvements over existing technology.

This FOA is a continuation of the IDEAS Program initially announced in September 2013 and continued for a second year in September 2014. ARPA-E continues to view the IDEAS program as a success and therefore plans to extend this FOA on an annual basis, based on the availability of funds.

Prior to submitting a Concept Paper to this FOA, Applicants may contact an ARPA-E Program Director or an ARPA-E Fellow to discuss their research concept and its potential responsiveness to this FOA. Program Directors and Fellows will respond to Applicant inquiries as their availability permits. **Prior communication with an ARPA-E Program Director or an ARPA-E Fellow is entirely optional and is NOT required prior to Concept Paper submission.** Furthermore, prior communication with an ARPA-E Program Director or an ARPA-E Fellow, or the lack thereof, is not taken into consideration in the technical review of a submitted Concept Paper.
Awards: IDEAS awards are defined as single-phase efforts of durations 12 months or less with a total project cost of $500,000 or less and will be issued through Grants.
Deadline: September 30, 2016
Agency contact: Applicants will submit brief Concept Papers (4 page maximum) as described below and selected Concept Paper Applicants will then be invited to submit Full Applications. This FOA addresses only the Concept Paper process. Applicants are encouraged to review current ARPA-E projects programs, FOAs, and RFIs prior to application.

NASA

Grant Program: ROSES 2016: Atmospheric Composition: Aura Science Team and Atmospheric Composition Modeling and Analysis Program
Agency: NASA NNH16ZDA001N-ACMAP
RFP Website:
https://nspires.nasaprs.com/external/solicitations/summary.do?method=init&solId={2CA9C467-DBE7-1438-E69D-2BB5CC9D4E1F}&path=init

Brief Description: This solicitation seeks proposals for the analysis of satellite remote-sensing data of the Earth's atmosphere, particularly those using data generated by the Earth Observing System (EOS) Aura satellite. Observations from Aura include those from the Microwave Limb Sounder (MLS), Ozone Monitoring Instrument (OMI), Tropospheric Emission Spectrometer (TES), and High Resolution Dynamics Limb Sounder (HIRDLS) that ceased operation in 2008. We are also encouraging proposals that combine data from Aura with data from other sensors within the "A- Train", S-NPP orbit, or morning crossing constellations (particularly Aqua, Terra, CALIPSO, and CloudSAT, S-NPP) or satellites or instruments from other space agencies (for example; SciSat/ACE, MetOp), ground based networks (e.g., but not limited to ozonesondes, NDACC, AGAGE, AERONET, and MPLNET), and NASA suborbital campaigns (e.g., but not limited to DISCOVER-AQ, ATTREX, CARVE, and SEAC4RS). These proposals should enable NASA research in the area of stratospheric and tropospheric chemistry, as well as improve the measurements of aerosols and trace gases, and determining the impacts of trace gasses and aerosols on climate and air quality. Proposals should specifically address the use of the satellite data.

The Atmospheric Composition Modeling and Analysis Program (ACMAP) addresses the following research issues, all of which are relevant to the data sets from Aura:

- Tropospheric air quality and oxidation efficiency,
- Pollution-generated aerosols where they impact cloud properties,
- Stratospheric chemistry, including ozone depletion, and
- Chemistry/climate interactions.

Studies of long-term trends in atmospheric composition (potentially using both current and past mission data sets) are also of interest to the ACMAP program, where the connection between cause and effect is elucidated using models. The program is interested in studies that integrate observations from multiple instruments with models to address attribution and predictions.
Award: Available funds: $7,000,000
Proposal Deadline: August 17, 2016

Grant Program: ROSES 2016: Atmospheric Composition: Upper Atmospheric Composition Observations
Agency: NASA NNH16ZDA001N-UACO
RFP Website:
https://nspires.nasaprs.com/external/solicitations/summary.do?method=init&solId={B554F971-2BDF-A8A0-A909-8CF7C07DB175}&path=init
Brief Description: Atmospheric composition changes affect air quality, weather, climate, and critical constituents, such as ozone. Atmosphere-biosphere exchange links terrestrial and oceanic pools within the carbon cycle and other biogeochemical cycles. Solar radiation affects atmospheric chemistry and is thus a critical factor in atmospheric composition. Atmospheric composition is central to Earth system dynamics, since the atmosphere integrates surface emissions globally on time scales from weeks to years and couples several environmental issues. NASA's research for furthering our understanding of atmospheric composition is geared to providing an improved prognostic capability for such issues (e.g., the recovery of stratospheric ozone and its impacts on surface ultraviolet radiation, the evolution of greenhouse gases and their impacts on climate, and the evolution of tropospheric ozone and aerosols and their impacts on climate and air quality). Toward this end, research within the Atmospheric Composition Focus Area addresses the following science questions:

- How is atmospheric composition changing?
- What trends in atmospheric constituents and solar radiation are driving global climate?

- How do atmospheric trace constituents respond to and affect global environmental change?
- What are the effects of global atmospheric chemical and climate changes on regional air quality?
- How will future changes in atmospheric composition affect ozone, climate, and global air quality?

NASA expects to provide the necessary monitoring and evaluation tools to assess the effects of climate change on ozone recovery and future atmospheric composition, improved climate forecasts based on our understanding of the forcings of global environmental change, and air quality forecasts that take into account the feedbacks between regional air quality and global climate change. Achievements in these areas via advances in observations, data assimilation, and modeling enable improved predictive capabilities for describing how future changes in atmospheric composition affect ozone, climate, and air quality. Drawing on global observations from space, augmented by suborbital and ground-based measurements, NASA is uniquely poised to address these issues. This integrated observational strategy is furthered via studies of atmospheric processes using unique suborbital platform-sensor combinations to investigate, for example: (1) the processes responsible for the emission, uptake, transport, and chemical transformation of ozone and precursor molecules associated with its production in the troposphere and its destruction in the stratosphere and (2) the formation, properties, and transport of aerosols in the Earth's troposphere and stratosphere. NASA's research strategy for atmospheric composition encompasses an end-to-end approach for instrument design, data collection, analysis, interpretation, and prognostic studies.

Award: 15 to 20 awards for a total budget of $6,000,000
Letter of Intent: Not requested.
Proposal Deadline: July 1, 2016.

National Endowment for Humanities

Grant Program: Media Projects: Development Grants
Agency: National Endowment for Humanities
RFP Website: http://www.neh.gov/grants/public/media-projects-development-grants
Brief Description: The Media Projects program supports film, television, and radio projects that engage general audiences with humanities ideas in creative and appealing ways. All projects must be grounded in humanities scholarship in disciplines such as history, art history, film studies, literature, drama, religious studies, philosophy, or anthropology. Projects must also demonstrate an approach that is thoughtful, balanced, and analytical (rather than celebratory). The approach to the subject matter must go beyond the mere presentation of factual information to explore its larger significance and stimulate critical thinking. NEH is a national funding agency, so the projects that we support must demonstrate the potential to attract a broad general audience.

Film and television projects may be single programs or a series addressing significant figures, events, or ideas. Programs must be intended for national distribution, via traditional carriage or online distribution. The Division of Public Programs welcomes projects that range in length from short-form to broadcast-length video.

The Division of Public Programs also encourages film and television projects that examine international themes and subjects in the humanities, in order to spark Americans' engagement with the broader world beyond the United States. These projects should demonstrate international collaboration by enlisting scholars based both in the United States

and abroad, and/or by working with an international media team. The collaborations should bring broad cross-cultural perspectives to the proposed topics and should be intended primarily for U.S. public audiences.

Radio projects, including podcasts, may involve single programs, limited series, or segments within an ongoing series. They may also develop new humanities content to augment existing radio programming or add greater historical background or humanities analysis to the subjects of existing programs. Programs receiving production grants may be either broadcast or disseminated online. They may be intended for national or regional distribution.

NEH encourages projects that engage public audiences through multiple formats in the exploration of humanities ideas. Proposed projects might include complementary components to a film, television, or radio project. These components should deepen the audience's understanding of the subject in a supplementary manner: for example, book/film discussion programs, supplemental educational websites, or museum exhibitions.

Development Grants enable media producers to collaborate with scholars to develop humanities content and to prepare programs for production. Grants should result in a script and may also yield a detailed plan for outreach and public engagement in collaboration with a partner organization or organizations.

Awards: Awards for development typically range from $40,000 to $75,000, depending on the complexity of the project, and are usually made for a period of six to twelve months.

Deadline: August 10, 2016

Contact Information: Contact the staff of NEH's Division of Public Programs at 202-606-8269 or publicpgms@neh.gov.
