ONR FOA #N00014-20-S-F006 Amendment 0001

FUNDING OPPORTUNITY ANNOUNCEMENT (FOA)

FY2021 VANNEVAR BUSH FACULTY FELLOWSHIP

The purpose of this amendment is to change the dates for the following: Acqu Trak Deadline, White Paper Deadline and White Paper Inquires and Questions Deadline

Deadlines

AcquTrak Deadline
Your registration must be completed no later than
02 September 2020 (Wednesday) at 11:59 PM Eastern Time

White Paper Deadline
Your white paper must be received no later than
04 September 2020 (Friday) at 11:59 PM Eastern Time

Inquiries and Questions Deadline
White Papers: 14 August 2020 (Friday)
Invited Proposals: 08 January 2021 (Friday)

Invited Proposal Deadline
Your proposal must be received no later than
15 January 2021 (Friday) at 11:59 PM Eastern Time

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I. INTRODUCTION

This document constitutes a Funding Opportunity Announcement (FOA) as contemplated in the Department of Defense Grants and Agreements Regulations (DoDGARS) 32 CFR 22.315(a). A formal Request for Proposals (RFP), solicitation, and/or additional information regarding this announcement will not be issued.

The Office of Naval Research (ONR) will not issue paper copies of this announcement. The ONR reserves the right to select for award all, some or none of the proposals in response to this announcement. The ONR and other participating Department of Defense (DoD) agencies provide no funding for direct reimbursement of proposal development costs. Technical and cost proposals (or any other material) submitted in response to this FOA will not be returned. It is the policy of ONR to treat all proposals as sensitive competitive information and to disclose their contents only for evaluation purposes.

Awards will take the form of grants. Any assistance instrument awarded under this announcement will be governed by the award terms and conditions that conform to DoD's implementation of the Office of Management and Budget (OMB) circulars applicable to financial assistance. Terms and conditions of new awards made after December 26, 2014, will include revisions to reflect DoD implementation of new OMB guidance in 2 CFR Part 200, "Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards."

A requirement that the project summary/abstract required in the submission of the proposal must be publically releasable is noted in Section II. D. 6. (2) R&R Form: Project Abstract Form.

Potential applicants may obtain information by checking the following websites:

Information regarding this FOA and amendments: www.grants.gov or
https://www.onr.navy.mil/work-with-us/funding-opportunities/announcements

Information regarding submission of white papers and supporting documentation will also be posted at: https://acqupass.noblis.org/ApplyVBFF.

Information regarding submission of full proposal packages can be found at: http://www.grants.gov/web/grants/applicants/apply-for-grants.html.

Information regarding Basic Research Office, Office of the Under Secretary of Defense for Research & Engineering: http://basicresearch.defense.gov/.

Information regarding the Program overview and information: https://basicresearch.defense.gov/Programs/Vannevar-Bush-Faculty-Fellowship/.

A. Overview

1. Federal Awarding Agency

Office of Naval Research
One Liberty Center
875 N. Randolph Street
Arlington, VA 22203-1995

2. Funding Opportunity Title

The Fiscal Year (FY) 2021 Vannevar Bush Faculty Fellowship (VBFF) program

3. Announcement Type

Initial Announcement

4. Funding Opportunity Number

N00014-20-S-F006

5. Catalog of Federal Domestic Assistance (CFDA) Numbers

12.300

6. Key Dates

The following are key dates and deadlines for registration, questions and inquiries about the program, and submissions of white papers and full proposals. All deadlines refer to 11:59 PM, Eastern Time zone. See also Section F.

AcquTrak Registration Opens	29 June 2020 (Mon)
White Paper Questions	14 August 2020 (Fri)
Registration Closes	02 September 2020 (Wed)
White Paper Submission	04 September 2020 (Fri)
Full Proposal Questions	08 January 2021 (Fri)
Full Proposal Submission	15 January 2021 (Fri)

7. Description of the Opportunity

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A requirement that the project summary/abstract required in the submission of the proposal must be publically releasable is noted in Section D.2.b.

Potential applicants may obtain information by checking the following websites:

- Information regarding this FOA and amendments: www.grants.gov or http://www.onr.navy.mil/Contracts-Grants/Funding-Opportunities/Broad-Agency-Announcements.aspx
- Information regarding submission of white papers and supporting documentation will also be posted at: https://acqupass.noblis.org/ApplyVBFF
- Information regarding submission of full proposal packages can be found at: http://www.grants.gov/web/grants/applicants/apply-for-grants.html
- Information regarding Basic Research Office, Office of the Under Secretary of Defense for Research & Engineering: https://basicresearch.defense.gov/
- Information regarding the Program overview and information: https://basicresearch.defense.gov/Programs/Vannevar-Bush-Faculty-Fellowship/

II. DETAILED INFORMATION ABOUT THE GRANT OPPORTUNITY

A. PROGRAM DESCRIPTION/RESEARCH AREAS

Background

Before World War I, Dr. Vannevar Bush (1890-1974) was a professor and Dean of Engineering at the Massachusetts Institute of Technology, and founded a large defense and electronics company. He was a forward-thinking policymaker who, during World War II, went on to serve as the director of the U.S. Defense Department's Office of Scientific Research and Development, coordinating the work of thousands of scientists in the service of ending the war. In his 1945 report to the President of the United States, Science, "The Endless Frontier", Bush called for an expansion of government support for science, and he pressed for the creation of the National

Science Foundation (NSF). Dr. Bush was concerned about how the scientific research supported by the Department of Defense (DoD) during WWII could be sustained with a focus on peacetime goals. He believed that basic research was "the pacemaker of technological progress". "New products and new processes do not appear full-grown", Bush wrote. "They are founded on new principles and new conceptions, which in turn are painstakingly developed by research in the purest realms of science".

Dr. Bush's life work embodies the spirit of this research program, formerly known as the National Security Science and Engineering Faculty Fellowship (NSSEFF). Therefore, in his in his honor, the name was changed to the Vannevar Bush Faculty Fellowship (VBFF) program (https://www.defense.gov/News/Article/Article/955536/dod-debuts- vannevar-bush-faculty-fellowship).

Research Objectives

The VBFF program is sponsored by the Basic Research Office, Office of the Under Secretary of Defense for Research and Engineering (USD (R&E)). VBFF supports innovative basic research within academia, as well as opportunities intended to develop the next generation of scientists and engineers for the defense workforce.

The Office of Naval Research (ONR) manages the VBFF program for USD (R&E). To accomplish this task, ONR is soliciting proposals for the VBFF program through this FOA. This FOA seeks distinguished researchers for the purpose of conducting innovative basic research in areas of interest to the DoD and fostering long-term relationships between the VBFF Fellows and the DoD.

As defined by the DoD, basic research is "systematic study directed toward greater knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications towards processes or products in mind. It includes all scientific study and experimentation directed toward increasing fundamental knowledge and understanding in those fields of the physical, engineering, environmental, and life sciences related to long-term national security needs. It is farsighted high payoff research that provides the basis for technological progress." (DoD 7000.14-R, vol. 2B, chap. 5, para. 050105.A) (http://comptroller.defense.gov/Portals/45/documents/fmr/Volume_02b.pdf) The DoD's basic research program invests broadly in many scientific fields to ensure that it has early cognizance of new scientific knowledge.

VBFF is oriented towards bold and ambitious "blue sky" research that may lead to extraordinary outcomes such as revolutionizing entire disciplines, creating entirely new fields, or disrupting accepted theories and perspectives.

The objectives of the program are to:

- Support unclassified basic scientific and engineering research that could be the foundation for future revolutionary new capabilities for DoD.
- Educate and train student and post-doctoral researchers for the defense workforce.
- Foster long-term relationships between university researchers and the DoD.
- Familiarize university researchers and their students with DoD's current and projected future challenges.

- Increase the number of talented technical experts that DoD can call upon.

This FOA is for single investigator grant proposals for basic research. All awardees will receive a research grant and the title of VBFF Fellow. VBFF Fellows and their students are provided with opportunities that are designed to enhance their understanding of DoD's critical research needs and interact with DoD senior Science and Technology (S&T) program leaders. Fellows and their students are expected to attend VBFF activities scheduled throughout the year. These activities may include an orientation meeting, site visits to DoD labs, technical workshops, and an annual meeting to report the progress of VBFF–sponsored research. VBFF Fellows may also be encouraged to serve as members of DoD advisory boards, panels, or groups. For a list of current and past VBFF or NSSEFF Fellows, refer to: https://basicresearch.defense.gov/Programs/Vannevar-Bush-Faculty-Fellowship/.

SCIENTIFIC AREAS

The proposed research must satisfy the primary program objective of ambitious scientific exploration, as highlighted in Section A.2.b, with the potential for revolutionizing the scientific and technical (S&T) foundations of the future capabilities within the DoD. To that effect, this program is interested in a broad spectrum of scientific areas, described below. Submitted proposals must identify which of those areas it best corresponds to. Innovative ideas that do not fall under any of the defined categories in that list are also welcome, and can be submitted under the "Other" category. Proposals that are multi-disciplinary and are not perfectly matched to one of those categories should identify a primary and secondary one. An expert review panel will be assigned to each category, but the VBFF Program Manager and staff have the discretion to share the white papers and proposals across different review panels, for the purpose of obtaining a comprehensive and high-quality technical review of the overall submission. See also Section G for more details on the review process.

Proposed research should focus on developing a deep understanding of fundamental phenomena. Device development or equipment construction or integration is not a suitable goal in itself; if proposed, it must be integral to research that will advance scientific knowledge. Risk-taking is encouraged; however, all proposals must demonstrate solid judgment and rationale.

1. Area 1: Applied Mathematics and Computational Science

Advances in mathematics and their implementation on advanced information systems will provide the basis for critical capabilities across a broad range of DoD applications. These range from numerical simulations of physical systems with extreme complexities of scale and structure, to the most revolutionary approaches to Artificial Intelligence that may enable abstract reasoning abilities that match or exceed humans. While advanced mathematical concepts underlying future AI systems more accurately belong in Area 2 described below, this section is principally focused on areas in Applied Mathematics such as optimization, uncertainty quantification, numerical analysis, applied analysis, stochastics and statistics, or other, that can enable revolutionary computational capabilities of various types, for the purpose of simulation and design of complex physical and engineered systems.

The numerical simulation of complex natural environments or engineered systems is one of the

critical computational problems of interest to the DoD. We are dealing here with extreme cases of multi-physics and multi-scale problems such as, for example, solar flares and their interaction with the magnetosphere, or unsteady reacting flows and material interactions around aircrafts or within propulsion systems. The ability to obtain accurate solutions at a very high rate is critical to evaluating the potential performance of future DoD engineered systems in their simulated operational environments. This is a key and enabling step in an inverse and iterative process that can revolutionize the approach to design, analysis and manufacturing of future platforms and networks for national defense. By providing radical advances in computing abilities, basic research in Applied Mathematics can therefore enable visionary concepts of utmost importance, such as complete virtual copies of physical systems being accurately simulated at operational speeds. Multiscale phenomena of interest also include the time domain, and dynamics which can be difficult to accurately measure, or reproduce in laboratory conditions. For example, understanding and predicting the aging of materials under various environmental conditions is a challenging problem that has a high impact on the life-cycle and cost of military systems. Finally, multiscale phenomena can also be found in statistical information; rare and extreme events in natural and engineered systems can have a profound impact on design criteria and platform survivability. Such events can be the result of complex non-linear effects, with correlated dynamics cascading across energy scales, and their prediction is difficult, as signs of instability can be easily hidden in a noisy background and are not readily captured by practical numerical models or data sampling. Fundamental advances in the detection and long-term prediction of such extreme events in a variety of physical, engineered or networked systems, is therefore of significant interest.

Computational problems are also not limited to dynamical evolution of multiscale systems, as described for example by partial differential equations. The space can be continuous, discrete or both; for example, hybrid system dynamics are important for describing the evolution and control of many classes of engineered platforms of interest. The dynamics can be constrained, often in a non-linear feedback fashion, subject to random forces, and in many cases *unknown*. For example, sub-scale phenomena can be irreproducible with the limited information of resolved scales, and their dynamics and couplings may need to be discovered entirely. Another area in Applied Mathematics with high relevance to the modeling and design of complex systems, is constrained, distributed stochastic optimization, or in general, methodologies based on infinite dimensional optimization, calculus of variation, or optimal mass transport. Novel research ideas in these areas, that are not simple extensions of current methods, is also of high interest.

The research directions mentioned above are broad, but do not constitute an exhaustive list, by far. All revolutionary approaches in applied mathematics and computing are of potential interest, as long as they can be argued to have the capacity to radically transform our abilities in information science enabling important future DoD capabilities, such as modeling, computing, and optimization. This program in particular is looking for new and comprehensive ideas, which may or may not be listed above, but with the potential to radically alter our frameworks and visions for advanced computing in the service of scientific discovery and modeling.

As a final note, although this research area is not restricted to computing performed on large-scale platforms, it is not concerned with new computer architectures, e.g. neuromorphic chips;

the design and manufacture of those is better suited elsewhere in this announcement, and only if there is a case for transformative fundamental research. Similarly, quantum algorithms belong to the area of quantum information sciences. However, within this category lies also the issue of computational security, if a revolutionary (non-quantum) approach based on new mathematical concepts can be found and justified.

2. Area 2: Networks and Artificial Intelligence

New mathematical concepts are called for, to model the extreme complexity of networks, their dynamics, optimization, resilience, and security, in a rapidly changing, stochastic and adversarial environment. This can involve a wide range of physical interactions, as well as information resource management, cybersecurity, and social and psychological interactions with human agents. Fundamental research in the mathematics of compressive sensing, encryption and authentication, distributed optimization, and game theory are therefore highly relevant, in particular when combined for behavior prediction of large scale and coupled networks of autonomous machines and human agents interacting between themselves at multiple levels in uncertain environments, and in often irrational or adversarial fashion. Complex networks are also found in biological, chemical and ecological systems, and these are also of high significance. Research in techniques for understanding the behavior of extremely large networks is therefore critical for many applications; this may take, for example, the form of direct analytical techniques or methods based on properties of limiting objects of sequences of larger and larger networks. Also of importance are new mathematical methodologies for understanding the properties, and predicting the behavior of networks that are partially hidden from an observer. It is emphasized here that this topic does not call for data analytics or software development, but for mathematical concepts and methods specifically aimed at the complexity of scale and diversity of interactions in networks. As with all scientific areas listed in this announcement, radically new approaches are sought, rather than incremental research.

Network science also underlies advances in robotics (e.g. multi-agent systems), autonomy (e.g. distributed sensing and optimization), or cyber and social science. Along with novel approaches in Applied Mathematics, it can also provide the foundation for revolutionary advances in machine learning (ML) and artificial intelligence (AI), going well beyond data analysis and classification, into rapid and inductive learning and high-level and abstract reasoning. Despite their widespread use, artificial neural nets (ANN) still provide opportunities for mathematical research into their properties and behavior that can provide deep insight into the design and optimization of radically new neural nets with transformative capabilities.

Such advances are needed to create AI that can ultimately match or exceed human-level reasoning abilities. These new mathematical approaches may rely on inspiration from disparate fields, such as statistical physics and others, whether as closely related as neuroscience or as remote as quantum information theory. However, these approaches must provide a reasonable pathway towards accurately and efficiently formulating key activities associated with human intelligence, including for example “common-sense” reasoning for resilience against false information, development of physical “intuition” to rapidly learn constraints, or a theory of mind when interacting with other AI agents. The mathematics may also be intimately related to the architecture underlying the computational processes, such as neural network topologies and non-

linear thresholding, memory kernels, time delays and analog transforms. Evolutionary concepts of AI are also of interest, from AI training AI to adaptive neural topology and hierarchical abstraction, based on the data environment, as well as sensory and physical interactions in the case of advanced robotics. Another example of particular interest is the ability of AI to demonstrate "creativity", well beyond the constrained framework of generative networks, and into the realm of ideas and concept generation, such as those required for scientific discovery.

3. Area 3: Cognitive Neuroscience

The VBFF Program is interested in forward-thinking theoretical, computational, and experimental basic research in neuroscience and cognitive science, to better understand the mechanisms of human perception, reasoning, and behavior. Maintaining the effectiveness and resilience of human operators, as well as sustaining or enhancing their cognitive capabilities in stressful environments are of high importance to the DoD. Warfighters encounter ever-increasing levels of physical and emotional stress combined with greater cognitive demands from a data-rich operational environment. The volume of data and the pace at which processing must be accomplished is already challenging the capabilities of the warfighter for decision making. This challenge is expected to grow further as weapon systems, platforms, and networks increase in complexity. Advances in the brain sciences provide a fundamental understanding of these cognitive processes as function of the environment and human physiological state and are therefore of high interest with the potential for improved human capabilities, such as faster and more accurate information processing, more robust decision making, greater resilience, and more effective communication, including in both human-human and human-machine teams.

Fundamental research in neural activity and brain functions also can lead to the development of brain-machine interfaces (BMIs) to facilitate the integration of the warfighters and future AI agents, provide new forms of control of weapon systems and platforms, offer new and enhanced sensing abilities, and allow smooth motion of motor augmentation devices (e.g., exoskeletons) or prosthetics to restore abilities after injury, or help warfighters recover from brain injury.

Revolutionary basic research is needed to elucidate brain functions, their relationships with the structures and dynamics of neurons and neural networks, neurochemistry, and how these might inform novel approaches to computing and artificial intelligence. Recent advances in neuroscience have shown that brain activity is organized at the levels of molecules, neurons, neural circuits, and systems. Computational/theoretical neuroscience uses empirical data to model functional mechanisms at each of these levels. Fundamental research in neuroscience could then provide key insights into perception, learning, inferential reasoning, and decision making in artificial neural networks (ANN). Novel neuroimaging approaches, ANN architecture experimentations and new learning strategies, as well as improved mathematical tools, potentially provide a sufficient foundation for novel computing architectures with high-level, human-like cognitive functions. This reverse-engineering of human and/or animal brain functions into ANNs could initiate an iterative feedback loop to bootstrap our understanding of the brain, make giant steps towards general AI, and design brain-machine interfaces that can repair or augment brain functions.

The human brain relies on underlying biochemical and electrochemical processes and large-

scale, adaptive geometric and topological network structures to perform extraordinary cognitive tasks (e.g., representation, association, abstraction, prediction) in incredibly robust and flexible ways. The correspondence between radically different theories of human cognition still remains unclear; although there is greater insight into the neural basis of some brain functions, mostly related to sensory processing, we cannot establish a mapping between, for example, abstract thoughts or consciousness and specific neural pathways, and opportunities abound for the discovery of new theories that can rigorously link higher-level cognitive operations with lower-level mechanisms. At yet another level of complexity, the human brain does not mature in isolation; it is part of a body embedded in a complex physical and social environment. Human brains have developed the ability to reason using the subtle language of social interactions via physical cues or language. Understanding this ability at a fundamental level can help develop *new* languages and cues to interact with future AI systems, as well providing the basis for rigorous integration of human cognitive models into large scale social interaction models.

VBFF funding allows the exploration of potentially revolutionary ideas in the brain sciences that do not necessarily have extensive preliminary data or previous attention in the literature and which may not fall into the categories described above.

4. Area 4: Fundamentals of Bioengineering

Fundamental research in bioengineering harnesses the power of multidisciplinary approaches to study and leverage biological processes that will transform multiple technologies of high importance to the DoD and enable new ones. These include, for example: new sensing modalities and self-assembled sensory networks; structural biomaterials and electronics with designed functionalities; synthetic and controlled synthesis of complex living matter, e.g. artificial organs; maintenance or enhancement of warfighter resilience and performance in highly stressful situations; and many, new capabilities that are yet to be discovered. Fundamental and far-reaching advances are required in multiple, often inter-connected research directions to enable such revolutionary abilities. These include (but are not limited to): gene-editing, computational biology and bioinformatics, biomechanics and mechanobiology, biophysics, and other approaches to understanding and design the interaction between living matter and conventionally engineered, abiotic systems, predict biological system response and evolution, and control their functionalities *ab-initio*, in realistic and dynamic environments.

One of the primary objectives of bio-engineering research for the DoD, was and still remains, the design and manufacture of complex biomaterials. This interest extends beyond bulk biochemical processes, as biological functions are also the result of collective self-organization across multiple scales, from complex bio-molecular structures to subcellular and multicellular assemblies. The formation of specialized micro-structures, the result of a complex interplay between biochemical and physical processes, and improved understanding, prediction and control of these interactions towards revolutionary concepts of the first principles of biological processes, biomaterials, and physical structures are of high interest.

Bio-materials are also highly interactive and can be subject to unpredictable environmental conditions. Precise engineering of the programmability of biochemical and biophysical functions within individual organisms or microbial consortia, and their transient response to environmental

changes and stimuli, are required for safe deployment and prevent undesired natural activity. Thus, rigorous approaches to control, verifiability and trust are also of special interest, and perceived as key enablers to widespread development of bio-engineering technology.

There is also significant interest in the interfacing of biological and abiotic systems, leading to the design and engineering of hybrid materials, components, platforms, and systems, whether bio-electronics, chemical processing, sensing, or other function with transformative potential. This includes biological/DNA computing, given the potential for biological systems to read, write, storage, and process information with increasing speed and complexity, with negligible or unconventional power requirements. The combination of such biological and abiotic components and functions has the potential to open a new design space for engineered systems with a revolutionary impact on DoD applications.

These are only suggested areas, and the VBFF Program is interested in basic, innovative, and transformative proposals in *all* aspects of fundamental research in bioengineering, that are well beyond technology development. This is a call for new, transformative approaches to break the barriers limiting our understanding of underlying biological processes and to solve new or long existing problems, with far-reaching and visionary potential.

5. Area 5: Quantum Information Science

Quantum Information Science (QIS) focuses on the creation, control, manipulation, and detection of non-classical states of light and matter with the potential for exceeding classical limits in areas ranging from communications, sensing, metrology, and imaging to computing and simulation and well beyond. Although the ideas of using atoms for clocks and quantum mechanics for computing appeared in the 1940s and 1950s, the more recent intensification of QIS was precipitated by the demonstration in the mid-1990s of a “quantum advantage” in computing due to the development of Shor's factoring and Grover's search algorithms. Recent experiments have also suggested that the regime of “quantum supremacy” has been reached, or is close at hand. There is significant interest in QIS for its potential impact on DoD capabilities including, but not limited to, ensuring information security, enabling novel materials discovery and design, attaining precise navigation and positioning without GPS, greatly improved sensing (local and remote) and metrology, and accomplishing significant improvements in high resolution imaging.

Such advances require radically new approaches, both experimental and theoretical. Despite the increased attention and even commercial investments, many fundamental questions remain open to research. For instance, while entanglement is a critical quantum resource that underlies multiple subareas within QIS, the generation, characterization, manipulation, and measurement of multipartite entanglement are still largely unexplored. The uniqueness of quantum resources – having no classical counterparts – affords exceptional opportunities for inventions that push the boundaries of human imagination. Thus the theoretical and experimental understanding, and optimal harnessing of quantum resources are pivotal for the development of multiple facets of QIS, such as computing, sensing, communications, etc. Rigorous analysis of the parameter space where QIS can be most useful is also generally uncharted territory. On the theoretical side, developments of new algorithms for physically realizable quantum systems are in eager demand

in order to push well beyond the classical possibilities in all aspects of information science, including generation, retention, transformation, protection, and transmission. At the same time, significant innovations of the physical platforms are required not simply to extend the number of qubits, but to comprehend and exploit quantum mechanical behavior that incorporates interactions with other quantum information systems, as well as the external environment. These couplings could be inadvertent by-products of the physical scheme, or cleverly designed to achieve optimal control and quantum coherence. Comprehensive approaches that effectively fuse theory with realistic experimental platforms deserve special attention. Also of particular interest are fresh perspectives to quantum constructs, such as research that goes beyond current circuit-based computational models or their theoretical equivalents. These provide opportunities to re-examine the current quantum schemes that are heavily-based on classical exemplars, in favor of novel quantum information science concepts that are based on foundational quantum principles from the start. Furthermore, fundamental discoveries in the relationship between previously distinct disciplines, such as connections between quantum many-body systems and gravity in higher-dimensional space-time, raise the possibility of leveraging far-reaching ideas to create more general, hierarchical and powerful approaches to QIS (e.g. enhancing quantum computational complexity).

The VBFF program is interested in foundational theoretical and experimental concepts with broad impact that will significantly advance our understanding of quantum information and processes, and more notably, disrupt the current research directions of QIS. Approaches should be a departure from improvements aimed at narrow challenges or technological advancements of devices and components. Of particular interest are transformational ideas that reach beyond quantum analogies of classical concepts.

6. Area 6: Electronics, Photonics and Quantum Materials

Materials remain a central research interest in the DOD, as nearly all new capabilities rely on advancing the state-of-the-art in material properties as well as material synthesis and processing. At its core, this topic focuses on unfettered, beyond-conventional approaches to the discovery and predictive design of materials (such as, but not limited to, semiconductors, electron conducting oxides, ultra-wide band gap materials, magnetic materials, dielectric materials, etc.) that exhibit previously unattainable or unknown functionalities. This topic therefore also seeks advances in our fundamental understanding of the material properties and characteristics, potentially opening new research directions in theoretical and computational physics, as well as new diagnostic methods with wide-ranging, transformative impact. Of particular interest are materials that present extraordinary and novel electronic, photonic and quantum mechanical behavior. It is expected that materials based on these new physical phenomena can ultimately lead to paradigm shifts in physical platforms that are needed to modernize key DOD capabilities spanning from communications to sensing and beyond.

Remarkable electronic, photonic, and quantum mechanical phenomena can arise in materials due to various circumstances including the presence or breaking of various symmetries (e.g. time-reversal, particle-hole, chiral, point group, etc.), existence or lifting of degeneracies, and/or stimulation, perhaps nonlinearly, by external excitations (e.g. electromagnetic waves, electric fields, magnetic fields, etc.). These new classes of materials can exhibit combinations of multiple

phenomena, host various types of quasi-particles, or exhibit distinctive functionalities including enhanced (or reduced) sensitivities to external perturbations. More broadly, such classes of materials can be found within bulks, interfaces, composites, photonic systems or even mechanical (phononic) ones, as well as for multiple dimensionalities, including synthetic ones. The interplay between local and global (e.g. topological order) properties, as well as the discovery and realization of new quantum phases, are also of particular interest. Fundamental issues may include new emergent physics, non-linear interactions, wave phenomena, coherence, dissipation, transport, fermionic/bosonic topological mode couplings, or anyonic statistics. Other considerations include the material physics in far from equilibrium conditions, driven states, high dimensional disorder, density of states, and thermodynamic trade-offs.

To bring these new classes of materials across the threshold towards practical application, there are still many fundamental questions to be answered and challenges to be met. Unorthodox static and dynamic characterization approaches need to be developed to directly probe and conclusively determine the origin of the electronic, photonic or quantum behavior. Clever approaches to the design and scalable synthesis of materials are required to realize such phenomena and provide a pathway towards future applications. Radically new theoretical and computational approaches that are highly integrated with the material characterization, synthesis and processing, are necessary to discover, understand and even predict the behavior, as well as guide physical realizations.

The VBFF program is interested in the discovery of new classes of electronic, photonic and quantum materials. Of particular interest are innovative approaches in unifying theoretical concepts, computational methods, tailored diagnostics, and precise synthesis to address physics and material sciences challenges that will lead to breakthroughs for DOD capabilities of interest.

7. Area 7: Engineered Materials and Structures

Curiosity-driven research is of paramount importance for the discovery of new materials that enable transformative functionalities and/or performance under extreme environmental or operational conditions. It is expected that these new materials properties will emerge via the design and control of spatial architectures relevant to the properties of interest. By carefully controlling manufacturing parameters, from micrometers down to nanometers or even atomic scales, materials with exceptional bulk properties can be obtained. Such engineered materials include for example, super-lattices, quantum dots, nano-particles, or ordered arrays of nano-holes, but other and novel forms of multi-scale structural ordering, from which unexpected properties might emerge, are of potential interest as well. The material design can build upon combinations of bulk, surface, and structural properties, as well as physical interactions between atomic, electronic, electro-magnetic, chemical, and other degrees of freedom. It can be solid, “soft”, or both; rigid and with extreme strength and resistance characteristics, or flexible, morphing, and adaptive to multiple environmental constraints; a combination of manufactured and living matter, or components derived from processes found in natural organisms, in their physiology and their biology.

Of particular interest is the *ab-initio* design of materials with tailored combinations of physical characteristics, such as thermal and transport properties, chemical reactivity, mechanical strength, optical or electromagnetic responses, etc. Materials that are intrinsically multi-

functional, morphing, adaptive, self-healing, can become reality. Dynamic behavior can be integrated in this *ab-initio* design process for far-from equilibrium effects, extreme non-linearities, and/or ultra-fast control. Structural and physico-chemical dynamics can also lead to new capabilities in materials that can rapidly adapt to external stimuli, demonstrate geometric and topological transformations, control phase change, towards radically new concepts of operation and platform designs, and means of survivability under extreme environmental conditions.

A comprehensive approach and unifying theory to formulate predictive design would replace accidental discovery. Novel approaches to manufacturing are also much needed to build at scale. These desired outcomes present challenges, but also opportunities for exploration. For example, can self-assembly be programmed into the material design parameters? Can biological and bio-chemical processes be leveraged to build the material across multiple structural length scales? Are there fundamental challenges to the optimization and inverse design problems? New diagnostic methods, computational approaches, theory, and manufacturing practices may be needed, in order to obtain a deeper understanding of the physics of materials at multiple scales of length and time, and within a high-dimensional parameter space.

This VBFF program seeks unparalleled, original ideas that are beyond the state of the art in engineered materials and structures, that revolutionize our understanding and predictive capability at all scales, and generate new classes of materials with extraordinary combinations of physical characteristics.

8. Area 8: Other Fields of Research

The list of subjects provided above is by no means a comprehensive list of topics for which white papers and proposals may be accepted. Proposed research in all areas of relevance to DoD will be considered, as long as there is a transformative science problem to be investigated and whose solution may open new ways of thinking about the phenomena that are being studied. For example, fluid dynamics and plasma dynamics are notably absent in the topics above, yet remain core areas of high importance for their potential applications. All issues regarding information, e.g. its availability, security, capacity and speed, are of critical interest to all conventional domains of warfare, and if not already addressed in other topics, may possibly be relevant here. However, emerging areas of conflict rely on subtle forms of information dominance, via content manipulation and pre-designed triggering of psychological, social or economic responses at various scales; these are also potential opportunities for far-reaching and fundamentally innovative research approaches. Other subjects may be proposed under this category as well, including topics that are completely new and appear under-represented in the DoD's research enterprise, as long as PIs can ensure that they propose to conduct fundamental and transformative research, and can reasonably argue that it may lead to potential benefits in the long term for issues pertinent to National Defense.

B. FEDERAL AWARD INFORMATION

1. Funding Amount and Duration

It is anticipated that awards will be made in the form of grants to U.S. institutions of higher

education (universities). It is anticipated an individual maximum award value will be $3 million for five (5) years, with the actual amount contingent on availability of funds, the specific topic, and the scope of the proposed work.

There is no guarantee that any of the proposals submitted in a particular scientific area will be recommended for funding, and more than one proposal may be recommended for funding for a particular area. The Government reserves the right to select for negotiation all, some, one, or none of the proposals received in response to this announcement.

2. Pre-Award

An institution may, at its own risk and without prior approval, incur obligations and expenditures to cover costs up to 90 days before the beginning date of the initial budget period of a new or renewal award if such costs: 1) are necessary to conduct the project, and 2) would be allowable under the grant, if awarded, without prior approval.

All pre-award costs are incurred at the recipient's risk. The DoD Research and Engineering Enterprise (USD (R&E)) and ONR are under no obligation to reimburse such costs, if for any reason the institution does not receive an award or if the award is less than anticipated and inadequate to cover such costs.

3. Peer Reviews

In the case of proposals funded as basic research, the DoD may utilize peer reviewers from academia, industry, and Government agencies to assist in the periodic appraisal of performance under the awards, following the process outlined under ONR Instruction 3966.1A. Peer reviewers who are not U.S. Government employees will be required to sign nondisclosure agreements before receiving full or partial copies of proposals and reports submitted by the basic research performers. These periodic program reviews monitor technical performance of funded basic research efforts. Applicants to this program may include travel costs for the Principal Investigator (PI) to attend the program reviews.

C. ELIGIBILITY INFORMATION

1. Eligible Institutions

Only accredited U.S. institutions of higher education (universities) with doctoral degree-granting programs are eligible to apply. DoD institutions are not eligible to apply.

Grants to a university may be terminated if the principal investigator (PI) severs connections with the university or is unable to continue active participation in the research. Grants to a university may also be terminated if the university severs connections with the PI.

Historically Black Colleges and Universities (HBCUs) and Minority Institutions (MIs) are encouraged to submit proposals. However, no portion of this FOA will be set aside for HBCU and MI participation.

Non-profit and for-profit organizations may collaborate on proposed research and may receive

VBFF funds via sub-award or subcontract, but Universities must perform the majority of the proposed work and receive the majority of funds. Although collaborators are allowed, the VBFF is a single-investigator award and the proposal and management plan should reflect this intent. It is expected that the fraction of the budget paid to collaborators would amount to no more than 20% of the total requested funding over the entire 5 years space of the proposed research. There is no restriction on unpaid collaborators. While expenses related to equipment purchase or assembly are not given a fixed limit, excessively large budgets dedicated to that purpose will require exceptional justification, and may otherwise be viewed as detrimental to the purposes of the program, as described in Section II.A.

Government agencies, DoD or other government laboratories and Federally Funded Research and Development Centers (FFRDCs), as well as foreign institutions may collaborate on proposed research but may not receive VBFF funds, directly or via sub-award.

2. Eligible Individuals

Faculty with tenure at the time of proposal submission, with a record of substantial scientific contributions and the skills, knowledge, and resources necessary to conduct the proposed research as the principal investigator (PI), are invited to submit an application. The PI must be a U.S. citizen or permanent resident. Applicants can have a dual-appointment with other domestic or foreign Universities, as well as non-eligible institutions such as a Government agency or laboratory or FFRDC. In such cases, the time dedicated to the effort by the PI, and the associated salary, must be fully accounted for by the employing and eligible University, and reflected in the submitted management and budget plans. Applicants will be required to guarantee their eligibility at the time of proposal submission.

3. Other Eligibility Criteria

- Number of Applications: The PI may submit only one (1) application in response to this FOA. There is no limit to the number of applications that an institution may submit.

- Number of PIs: Only one (1) PI may be designated on the application. While collaborations are encouraged, co- PIs are not permitted. The lead investigator must direct the work. A collaboration may be achieved at the PI's institution or via a subaward to another institution that must satisfy the eligibility requirements and constraints described above. If the PI envisions the need for such a collaboration, or more than one collaboration, the PI must explain how the proposed team fits the single PI structure, and must include in the proposal letters from the collaborators that indicate their commitment to supporting the proposed research, including manpower availability, equipment usage and/or co-funding if applicable.

- Resubmissions: Applicants invited to submit full proposals who have submitted Recommendation Letters (see Sections D.6) for the VBFF program in a prior year must obtain and submit new letters. Previously submitted letters will not be retrieved. Documents dated prior to the posting date of this FOA will not be accepted.

D. APPLICATION AND SUBMISSION INFORMATION

1. Application and Submission Process

The application process is completed in three stages:

(a) Online Registration via AcquTrak https://acqupass.noblis.org/ApplyVBFF (**REQUIRED**).

(b) White Paper and Supporting Documentation submission via AcquTrack(https://acqupass.noblis.org/ApplyVBFF) (**REQUIRED**).

(c) Full Proposal submission (via grants.gov) (by invitation only) and Confidential Letters of Recommendation (**REQUIRED**) via email.

If an Applicant does not register and submit a White paper and Supporting Documentation before the due dates and times, the Applicant will not be eligible to participate in the remaining Full Proposal submission process and is not eligible for funding.

2. AcquTrak Online Registration

The AcquTrak Online Registration portal opens on 29 June 2020. All applicants must register on the AcquTrak website by 11:59 pm Eastern Time on 02 September 2020. Each applicant must provide the following information at the time of registration:

- PI's name, title, department, educational institution, phone number, and e-mail address.
- Title of the PI's proposed research topic.
- Technical subject category most appropriate for the proposed research from the list in Section II. A. Program Description. The applicant has the opportunity to also indicate on the white paper or full proposal a secondary category (and only one), in the case of a multi-disciplinary project.

IMPORTANT NOTE: Applicants who registered at the AcquTrak website in a prior competition must re-register for this competition. Usernames and passwords used to submit previous applications will not be retrieved

3. Content and Format of White Paper, Proposal Package, and Supporting Documentation

White Papers Supporting Documentation, and Full Proposals submitted under this FOA are expected to be unclassified; classified proposals are not permitted.

All proposal submissions will be protected from unauthorized disclosure in accordance with applicable law and DoD and Department of Navy (DON) regulations. Applicants are expected to appropriately mark each page of their submission that contains proprietary information.

IMPORTANT NOTE: Titles given to the White Papers/Full Proposals should be descriptive of the work they cover and not be merely a copy of the title of this solicitation.

Individual PIs must submit a Cover Page, Abstract, Basic Research Statement, White Paper, and Curriculum Vitae (CV). All documents MUST be submitted in PDF format in compliance with the guidelines below. When submitting the documents, the PI must upload the Cover Page, Abstract, Basic Research Statement, White Paper and CV as one PDF file.

4. Marking of White Papers and Full Proposals

ONR will make every effort to protect any proprietary information submitted in white papers and full proposals. Any proprietary information included in application materials must be identified. If the application includes such information, mark the white paper or full proposal as follows:

(a) Include a cover page with the following legend: “The following contains proprietary/privileged information that (name of applicant) requests not be released to persons outside the Government, except for purposes of review and evaluation, or pre and post award administration.”

(b) Clearly mark each page containing the proprietary/privileged information with the legend: "Use or disclosure of data contained on this page is subject to the restriction on the cover page of this document."

However, applicants should be aware that under the Freedom of Information Act (FOIA) requirements, proprietary information contained in white papers and proposals (marked or unmarked) may still potentially be subject to release.

It is the applicant’s responsibility to notify ONR of proposals containing proprietary information and to identify the relevant portions of their proposals that require protection. The entire proposal (or portions thereof) without protective markings or otherwise identified as requiring protection will be considered to be furnished voluntarily to ONR without restriction and will be treated as such for all purposes.

It is the intent of ONR to treat all white papers and full proposals as though they contain privileged information before the award and to disclose their contents only for the purpose of evaluation. White papers may also be disclosed to reviewers for training purposes in future competitions.

5. White Paper and Supporting Documentation

Individual PIs must submit a Cover Page, Abstract, Basic Research Statement, White Paper, and Curriculum Vitae (CV). All documents must be submitted in PDF format in compliance with the guidelines below. When submitting the documents, the PI must upload the Cover Page, Abstract, Basic Research Statement, White Paper and CV as one PDF file.

White paper documents must be submitted in the following format:

- Paper Size – 8.5 x 11 inch paper
- Margins - 1 inch
- Spacing –single space
- Font – Times New Roman, 12 point

White paper documents should include the following:

(a) Cover page: Include the PI's name and university. Include a protective legend for proprietary information, if applicable.

(b) Abstract (not to exceed 300 words): Describe the research objective, technical approaches, and anticipated outcome of the specific research. A non-proprietary version of the abstract must be submitted without other restrictions. The non- proprietary abstract must be a version that is releasable to the public under the Freedom of Information Act without changes.

(c) Basic Research Statement (one (1) page limit, single-sided): Describe how the proposed research meets the DoD definition of basic research provided Section II. A. Program Description of this announcement. Describe the extraordinary outcomes that may be achieved as a result of the proposed project.

(d) Subject Research: Identify anticipated human or animal subject research (where applicable).

(e) White paper (three (3) page limit, single-sided): Describe the basic scientific or technical research to be undertaken. Describe the technical approach. Summarize the state of the field and describe what is innovative about the proposed approach. Assuming a successful completion of the course of investigation, what results, new knowledge, or insights might it afford compared to alternate approaches other researchers in this field have taken. Include approximate yearly costs for the project. Reference citations are not required but may be included within the three-page limit, and can be inserted as footnotes.

(f) PI's Curriculum Vitae (CV) (no page limit) -The CV should include relevant experience, publications, and funding received in the area of interest, and any previous involvement and experiences with the DoD. List all previous DoD funding including project titles within the last eight years.

Do not include proprietary information in the Cover Page, Abstract, or CV. Include appropriate markings on each page of the Basic Research Statement and White Paper that contains proprietary information or other restrictions.

When submitting the White Paper and Supporting Documentation, the PI must provide the title of the proposed research project, contact information (name, e-mail address, and phone number) for the Sponsored Programs Office at the university, and indicate whether he or she is a US citizen or permanent resident and a tenured faculty. In addition, the PI must select one or two (primary and secondary) scientific subject categories considered most appropriate for the proposed research from

the list given in Section II. A. Program Description If more than one, the PI must clearly indicate which is primary and which is secondary. This category designation will assist VBFF staff in assigning applications to appropriate reviewers. However, this assignment is ultimately done at the discretion of the VBFF Program Manager and according to the content of the submission, in order to obtain the most accurate technical evaluations from the expert panels.

The White Papers and Supporting Documentation must be submitted to AcquTrak (https://acqupass.noblis.org/ApplyVBFF) no later than 11:59 p.m. Eastern Time on 04 September 2020. Persons submitting the White Papers and Supporting Documentation must register on the website by 11:59 pm Eastern Time on 02 September 2020. Under normal circumstances, the submission process could take several minutes depending on the network connection and the size of the file being submitted. The applicant is responsible for allowing enough time to complete the online form, upload the documents and press the submit button before the deadline. An e-mail confirmation will be sent to the applicant upon receipt of the submission. . The applicant is strongly encouraged to allow sufficient time prior to the deadline, and to keep the confirmation emails. In case of technical difficulties, the applicant should send an email tocshelp@noblis.org, describing the situation. Even though all attempts will be made to assure that the site is available and functional, it is the ultimate responsibility of the applicants to plan their submission well in advance in order to avoid circumstances in which the site is not available or slow, due to high service demands.

Documents submitted after the deadline or found to be non-compliant will not be reviewed.

Evaluation of the white paper will be issued via email notification. A white paper may be considered, upon examination by the VBFF staff, to be non-responsive to the goals and intent of the VBFF program, and may not be subject to further, detailed technical review. Any Applicant whose white paper was identified as having insufficient technical merits, or as being non-responsive and/or without particular value to the DoD, is ineligible to submit a full proposal under this FOA.

6. Full Proposal Package and Letters of Recommendation

A. Full Proposal Packages will only be accepted from PIs invited to submit full proposals. Proposal packages must be submitted electronically to Grants.gov (http://www.grants.gov/) no later than 11:59 p.m. Eastern Time on 15 January 2021.

Confidential Letters of Recommendation must be submitted to ONR via e-mail to Paula Barden at paula.barden.ctr@navy.mil no later than 11:59 p.m. Eastern Time on 15 January 2021.

Full Proposal Package – Format

The full proposal package will consists of several forms described below, and attachments which include a cover page, project abstract, project narrative, list of personal references, letters of support from collaborators (if applicable), and a Summary Chart. All proposal documents created by the PI must be written in the following format:
:
• Paper Size – 8.5 x 11 inch paper
• Margins – 1 inch (excluding the Summary Chart)
• Spacing – single spaced (excluding the Summary Chart)
• Font – Times New Roman, 12 point
• PI's name and institution in header or footer

• Appropriate markings on each page that contains proprietary or confidential information (see Section II. D. 4. Marking of White Papers and Full Proposals)
• PDF file type – Files that are attached to the forms must be in ADOBE portable document format (.pdf).

Full Proposal Package – Content

The following information must be completed as follows in the SF 424 located in the application package to ensure the application is directed to the correct individual for review.

Required Forms

(1) SF-424 Form (RESEARCH & RELATED) (Mandatory)

The SF-424 (R&R) form must be used as the cover page for all proposals. Complete all required fields in accordance with the "pop-up" instructions on the form and the following instructions for specific fields. Please complete the SF-424 first, as some fields on the SF-424 are used to auto-populate fields on other forms.
The completion of most fields is self-explanatory with the exception of the following special instructions:

- Field 3 - Date Received by State: The Date Received by State and the State Application Identifier are not applicable to research. Leave blank.

- Field 4a - Federal Identifier: Enter "N00014".

- Field 4b - Agency Routing Number: Enter 032 [Joan Cleveland].

Applicants who fail to provide an Agency Routing Number may receive a notice that their proposal is rejected.

- Field 4c - Previous Grants.gov Tracking ID: If this submission is for a Changed/Corrected Application, enter the Grants.gov tracking number of the previous proposal submission; otherwise, leave blank.

- Field 7 - Type of Applicant: Complete as indicated. If the organization is a Minority Institution, select "Other" and under "Other (Specify)" note that the institution is a Minority Institution (MI).

- Field 9 - Name of Federal Agency: List the Office of Naval Research as the reviewing agency. This field is pre-populated in Grants.gov.

- Field 16 - Is Application Subject to Review by State Executive Order 12372 Process? Choose "No". Check "Program is Not Covered by Executive Order 12372."

- Field 17 – Certification: All awards require some form of certifications of compliance with national policy requirements. By checking the "I agree" box in field 17, and attaching the representation to Field 18 of the SF424 (R&R) as part of the electronic proposal submitted via Grants.gov, the Grant Applicant is providing the certification on lobbying required by 32

CFR Part 28 and representation regarding an unpaid delinquent tax liability or a felony conviction under any federal law – DoD appropriations.

(2) R&R Form: Project Abstract Form (Mandatory)
The project abstract must identify the problem and objectives, technical approaches, anticipated outcome of the effort, if successful, and impact on DoD capabilities. Use only characters available on a standard QWERTY keyboard. Spell out all Greek letters, other non-English letters, and symbols. Graphics are not allowed and there is a 4,000 character limit including spaces.

Do not include proprietary or confidential information. The project abstract must be marked by the applicant as "Approved for Public Release." Abstracts of all funded projects will be posted on the public DTIC website: https://dodgrantawards.dtic.mil/grants.

(3) R&R Form: Research and Related Other Project Information (Mandatory)

- Fields 1 and 1a - Human Subject Use: Each proposal must address human subject involvement in the research by completing Fields 1 and 1a of the R&R Other Project Information form. For proposals containing activities that include or may include "research involving human subjects" as defined in DoDI 3216.02, prior to award, the Applicant must submit the documentation under "Use of Human Subjects in Research" (Section II. H. 6.).

- Fields 2 and 2a – Vertebrae Animal Use: Each proposal must address animal use protocols by addressing Fields 2 and 2a of the R&R Other Project Information form. If animals are to be utilized in the research effort proposed, the Applicant must submit the documents described under "Use of Animals" (Section II. H. 6.).

- Fields 4a through 4d - Environmental Compliance: Address these fields and briefly indicate whether the intended research will result in environmental impacts outside the laboratory, and how the applicant will ensure compliance with environmental statutes and regulations.

  Federal agencies making grant or cooperative agreement awards and recipients of such awards must comply with various environmental requirements. The National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. Sections 4321-4370 (a), requires that agencies consider the environmental impact of "major Federal actions" prior to any final agency decision. With respect to those awards which constitute "major Federal actions," as defined in 40 CFR 1508.18, federal agencies may be required to comply with NEPA and prepare an environmental impact statement (EIS), even if the agency does no more than provide grant funds to the recipient.

  Questions regarding NEPA compliance should be referred to the technical point of contact. Most research efforts funded by ONR will, however, qualify for a categorical exclusion from the need to prepare an EIS. Navy instructions/regulations provide for a categorical exclusion for basic and applied scientific research usually confined to the laboratory, if the research complies with all other applicable safety, environmental and natural resource conservation laws.

- Field 7 – Project Abstract: Leave Field 7 blank; complete Form SF424, Project Abstract.

- Field 8 – Project Narrative: Describe clearly the project, including the objective and approach to be performed, keeping in mind the evaluation criteria. Attach the entire Project Narrative to R&R Other Project Information form in Field 8. To attach a Project Narrative in Field 8 click on "Add Attachment" and attach the technical proposal as a single PDF file. (Save the file as "Technical Proposal," as typing in the box is prohibited).

  The Project Narrative should describe the research in sections as described below:

  Cover Page: This must include the words "Technical Proposal" and the following:

  (a) FOA Number: N00014-20-S-F006;
  (b) Title of Application;
  (c) Identity of prime Applicant and complete list of subawards, if applicable;
  (d) Technical contact (name, address, phone/fax, electronic mail address);
  (e) Administrative/business contact (name, address, phone/fax, electronic mail address);
  (f) Verification of tenure: yes/no
  (g) Dual appointments (if applicable).
  (h) Proposed period of performance (identify both the base period and any options, if included);
  (i) Total proposed budget.

Table of Contents: An alphabetical/numerical listing of the sections within the proposal, including corresponding page numbers.

- Project Narrative - *Statement of Objectives (one page limit)*. Summarize the actual research to be completed, including goals and objectives, on one page titled Statement of Objectives. This statement of objectives may be incorporated into the award instead of the entire technical proposal. Active verbs should be used in this statement (for example, "conduct" research into a topic, "investigate" a problem, "determine" to test a hypothesis). It should not contain proprietary information.

- Project Narrative - *Research Effort (15-page limit for this section, excluding list of references).* Describe the basic scientific or technical concepts that will be investigated, giving the complete research plan. Describe the technical approach and what is innovative about the proposed approach. How does the proposed approach compare to alternate approaches other researchers in this field have taken? Given the successful completion of the five-year course of investigation, what results, new knowledge, or insights, might it afford?

- Project Narrative – *Management Approach (no page limit).* Describe the overall management approach and provide rationale for participation of key team members. Describe the planned relationships with any subawardees or collaborators. This is a single PI award; if there are subawardees or collaborators, explain how the proposed team fits the single PI structure. If appropriate, briefly describe anticipated schedule.

- Project Narrative – *Principal Investigator (PI) Time (no page limit).* PI time is required, since a high level of PI engagement is critical to the success of this program. The full proposal should include an approximate budget several trips per year to VBFF-related activities, which

include attending program reviews (1/year – mandatory), interacting with service lab researchers, and participating in DoD-organized workshops. List the estimate of time the principal investigator and other senior professional personnel will devote to the research. This shall include information pertaining to other commitments of time, such as sabbatical or extended leave; and proportion of time to be devoted to this research and to other research. State the number of undergraduate students, graduate students, and postdoctoral researchers for whom each senior staff member is responsible. If the principal investigator or other key personnel is currently engaged in research under other auspices, or expects to receive support from other agencies for research during the time proposed for VBFF support, state the title of the other research, the proportion of time to be devoted to it, the amount of support, name of agency, dates, etc. Send any changes in this information as soon as they are known. Submit a short abstract (including title, objectives, and approach) of that research and total amount of support for both current and pending research projects.

- Project Narrative – *Facilities (no page limit)*. Describe facilities available for performing the proposed research and any additional facilities or equipment the organization proposes to acquire at its own expense. Indicate government-owned facilities or equipment already possessed that will be used. Reference the facilities grant and/or contract number or, in the absence of a facilities grant/contract, the specific facilities or equipment and the number of the award under which they are accountable.

- *Project Narrative – Special Test Equipment (no page limit)*. List special test equipment or other property required to perform the proposed research. Segregate items to be acquired with award funds from those to be furnished by the Government. When practical, give a description or title and estimated cost of each item. When information on individual items is unknown or not available, group the items by class and estimate the values. In addition, state why it is necessary to acquire the property with award funds. Justify the need for each equipment item. Additional facilities and equipment will not be provided unless the research cannot be completed by any other practical means. Include the proposed life expectancy of the equipment and whether it will be integrated with a larger assemblage or apparatus. If so, state who owns the existing apparatus.

(4) R&R Form: Research & Related Budget

The applicant must use the Grants.gov forms from the application package template associated with the BAA on the Grants.gov web site located at https://www.grants.gov/. If options are proposed, the budget must provide the pricing information for the option periods; failure to include the proposed costs for the option periods will result in the options not being included in the award.

Estimate the total research project cost. Categorize funds by year. Provide separate annual budgets for each of the five years of the VBFF award. For planning purposes, assume that grants will start between June and September 2021.

A separate Adobe .pdf document should be included in the application that provides appropriate budget justification and/or supporting documentation for each element of cost proposed, clearly explaining the need for each item. This document shall be attached under Section K. “Budget Justification” of the Research and Related Budget form. Click “Add Attachment” to attach.
The itemized budget should include the following:

• Direct Labor – Individual labor categories or persons, with associated labor hours and unburdened direct labor rates. Provide escalation rates for out years.

• Administrative and Clerical Labor – Salaries of administrative and clerical staff are normally indirect costs (and included in an indirect cost rate). Direct charging of these costs may be appropriate when a major project requires an extensive amount of administrative or clerical support significantly greater than normal and routine levels of support. Budgets proposing direct charging of administrative or clerical salaries must be supported with a budget justification which adequately describes the major project and the administrative and/or clerical work to be performed.

• Fringe Benefits and Indirect Costs (F&A, Overhead, G&A, etc.) – The proposal should show the rates and calculation of the costs for each rate category. If the rates have been approved/negotiated by a Government agency, provide a copy of the memorandum/agreement. If the rates have not been approved/negotiated, provide sufficient detail to enable a determination of allowability, allocability and reasonableness of the allocation bases, and how the rates are calculated. Additional information may be requested, if needed. If composite rates are used, provide the calculations used in deriving the composite rates.

• Travel – The proposed travel cost must include the following for each trip: the purpose of the trip, origin and destination if known, approximate duration, the number of travelers, and the estimated cost per trip must be justified based on the organizations historical average cost per trip or other reasonable basis for estimation. Such estimates and the resultant costs claimed must conform to the applicable Federal cost principals.

• Subawards/Subcontracts – Provide a description of the work to be performed by the subrecipient/subcontractor. For each subaward, a detailed budget is required to be submitted by the subrecipient(s). A proposal and any supporting documentation must be received and reviewed before the Government can complete its cost analysis of the proposal. ONR's preferred method of receiving subcontract information is for this information to be included with the Prime's proposal. However, a subcontractor's budget can be provided via email directly to the Program Officer at the same time the prime proposal is submitted. The email should identify the proposal title, the prime Applicant and that the attached proposal is a subcontract.

• Consultants – Provide a breakdown of the consultant’s hours, the hourly rate proposed, and any other proposed consultant costs, a copy of the signed Consulting Agreement or other documentation supporting the proposed consultant rate/cost, and a copy of the consultant’s proposed statement of work if it is not already separately identified in the prime contractor’s proposal.

• Materials & Supplies – Provide an itemized list of all proposed materials and supplies including quantities, unit prices, and the basis for the estimate (e.g., quotes, prior purchases, catalog price lists).

• Recipient Acquired Equipment or Facilities – Equipment and/or facilities are normally furnished by the Recipient. If acquisition of equipment and/or facilities is proposed, a justification for the purchase of the items must be provided. Provide an itemized list of all equipment and/or facilities costs and the basis for the estimate (e.g., quotes, prior purchases, catalog price lists). Allowable items normally are limited to research equipment not already available for the project. General purpose equipment (i.e., equipment not used exclusively for research, scientific or other technical activities, such as personal

computers, laptops, office equipment) should not be requested unless they will be used primarily or exclusively for the project. For computer/laptop purchases and other general purpose equipment, if proposed, include a statement indicating how each item of equipment will be integrated into the program or used as an integral part of the research effort.

• Other Direct Costs – Provide an itemized list of all other proposed other direct costs such as Graduate Assistant tuition, laboratory fees, report and publication costs, and the basis for the estimate (e.g., quotes, prior purchases, catalog price lists).

• Fee/Profit – Fee/profit is unallowable under assistance agreements at either the prime or subaward level but may be permitted on subcontracts issued by the prime awardee.

(5) Research and Related (R&R) Senior/Key Person Profile (Expanded)
To evaluate compliance with Title IX of the Education Amendments of 1972 (20 U.S.C. A § 1681 Et.Seq.), the Department of Defense is collecting certain demographic and career information to be able to assess the success rates of women who are proposed for key roles in applications in STEM disciplines. In addition, the National Defense Authorization Act (NDAA) for FY 2019, Section 1286, directs the Secretary of Defense to protect intellectual property, controlled information, key personnel, and information about critical technologies relevant to national security and limit undue influence, including foreign talent programs by countries that desire to exploit United States' technology within the DoD research, science and technology, and innovation enterprise.

The R&R Senior/Key Person Profile (Expanded) form will be used to collect the following information for all senior/key personnel, including Project Director/Principal Investigator and Co-Project Director/Co-Principal Investigator, whether or not the individuals' efforts under the project are to be funded by the DoD:

- Degree Type and Degree Year fields as the source for career information.
- A list of all current projects the individual is working on, in addition to any future support the individual has applied to receive, regardless of the source.
- Title and objectives of the other research projects.
- The percentage per year to be devoted to the other projects.
- The total amount of support the individual is receiving in connection to each of the other research projects or will receive if other proposals are awarded.
- Name and address of the agencies and/or other parties supporting the other research projects.
- Period of performance for the other research projects.

Additional senior/key persons can be added by selecting the "Next Person" button. Note that, although applications without these fields completed may pass Grants.gov edit checks, if ONR receives an application without the required information, ONR may determine that the application is incomplete and may cause it to be returned without further review. DoD reserves the right to request further details from the applicant before making a final determination on funding the effort.

Page limits for attachments:

• PI Curriculum Vitae (no page limit)

• Key Personnel Curricula Vitae (three (3) page limit each)

(6) Research and Related Personal Data (Mandatory)

This form will be used by DoD as the source of demographic information, such as gender, race, ethnicity, and disability information for the Project Director/Principal Investigator and all other persons identified as Co-Project Director(s)/Co-Principal Investigator(s). Each application must include this form with the name fields of the Project Director/Principal Investigator and any Co-Project Director(s)/Co-Principal Investigator(s) completed; however, provision of the demographic information in the form is voluntary. If completing the form for multiple individuals, each Co-Director/Co-Principal Investigator can be added by selecting the "Next Person" button. The demographic information, if provided, will be used for statistical purposes only and will not be made available to merit reviewers. Applicants who do not wish to provide some or all of the information should check or select the "Do not wish to provide" option.

NOTE: The Government Accountability Office, in its report GAO-16-14, WOMEN IN STEM RESEARCH: Better Data and Information Sharing Could Improve Oversight of Federal Grant-making and Title IX Compliance, December 3, 2015, recommended that the Department of Defense collect certain demographic and career information to be able to assess the success rates of women who are proposed for key roles in applications in science, technology, engineering, or mathematics disciplines. To enable this assessment, each application must include the following forms completed as indicated.

(7) Attachments Form

• List of References: Identify and list three (and only three) persons who have been asked to submit confidential letters of recommendation. Also, provide the name, e-mail address, phone number, and professional relationship with these persons. Refer back to Section D.6 for instructions on the submission of these letters. No more than three letters will be forwarded to evaluators.

• Letters of support: Include letters of support from proposed collaborators or sub-awardees (see Section D.6).

• Summary Chart: (one (1) page limit, single-sided). A completed summary chart in quad format should be submitted with the full proposal. This chart will include: (1) objectives; (2) technical approach; (3) anticipated DoD benefit; and (4) budget.

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7. Grants.gov Application Submission and Receipt Procedures

A. **Grants.gov Application Submission and Receipt Procedures**

NOTE: White Papers must **not** be submitted through the Grants.gov application process. For instructions, see Section II. D. 2. AcquTrak Online Registration

How to Register to Apply through Grants.gov

1. *Instructions:* Applicants should read the registration instructions carefully and prepare the information requested before beginning the registration process. Reviewing and assembling the required information before beginning the registration process will alleviate last-minute searches for required information.

   The registration process can take up to four weeks to complete. Therefore, registration should be done in sufficient time to ensure it does not impact your ability to meet required application submission deadlines.

   If individual applicants are eligible to apply for this grant funding opportunity, refer to: https://www.grants.gov/web/grants/applicants/registration.html.

   Organization applicants can find complete instructions here: https://www.grants.gov/web/grants/applicants/organization-registration.html.

(a) *Obtain a DUNS Number*: All entities applying for funding, including renewal funding, must have a Data Universal Numbering System (DUNS) number from Dun & Bradstreet (D&B). Applicants must enter the DUNS number in the data entry field labeled "Organizational DUNS" on the SF-424 form.

For more detailed instructions for obtaining a DUNS number, refer to: https://www.grants.gov/web/grants/applicants/organization-registration/step-1-obtain- duns-number.html.

(b) *Register with SAM*: In addition to having a DUNS number, organizations applying online through Grants.gov must register with the System for Award Management (SAM). All organizations must register with SAM in order to apply online. Failure to register with SAM will prevent your organization from applying through Grants.gov.

For more detailed instructions for registering with SAM, refer to: https://www.grants.gov/web/grants/applicants/organization-registration/step-2-register- with-sam.html.

(c) *Create a Grants.gov Account*: The next step in the registration process is to create an account with Grants.gov. Applicants must know their organization's DUNS number to complete this process. Completing this process automatically triggers an email request for applicant roles to the organization's E-Business Point of Contact (EBiz POC) for review. The EBiz POC is a representative from your organization who is the contact listed for SAM. To apply for grants on behalf of your organization, you will need the Authorized Organizational Representative (AOR) role.

For more detailed instructions about creating a profile on Grants.gov, refer to: https://www.grants.gov/web/grants/applicants/organization-registration.html.

(d) *Authorize Grants.gov Roles*: After creating an account on Grants.gov, the EBiz POC receives an email notifying them of your registration and request for roles. The EBiz POC

will then log in to Grants.gov and authorize the appropriate roles, which may include the AOR role, thereby giving you permission to complete and submit applications on behalf of the organization. You will be able to submit your application online any time after you have been approved as an AOR.

For more detailed instructions about creating a profile on Grants.gov, refer to: https://www.grants.gov/web/grants/applicants/organization-registration.html.

e) *Track Role Status*: To track your role request, refer to: https://www.grants.gov/web/grants/applicants/registration/track-role-status.html.

2. *Electronic Signature*: When applications are submitted through Grants.gov, the name of the organization's AOR that submitted the application is inserted into the signature line of the application, serving as the electronic signature. The EBiz POC **must** authorize individuals who are able to make legally binding commitments on behalf of the organization as an AOR; **this step is often missed and it is crucial for valid and timely submissions.**

How to Submit an Application to ONR via Grants.gov

Grants.gov applicants can apply online using Workspace. Workspace is a shared, online environment where members of a grant team may simultaneously access and edit different webforms within an application. For each funding opportunity announcement (FOA), you can create individual instances of a workspace.

Below is an overview of applying on Grants.gov. For access to complete instructions on how to apply for opportunities, refer to: https://www.grants.gov/web/grants/applicants/apply-for-grants.html.

a. *Create a Workspace*: Creating a workspace allows you to complete it online and route it through your organization for review before submitting.

b. *Complete a Workspace*: Add participants to the workspace, complete all the required forms, and check for errors before submission.

1. *Adobe Reader*: If you decide not to apply by filling out webforms you can download individual PDF forms in Workspace so that they will appear similar to other Standard or ONR forms. The individual PDF forms can be downloaded and saved to your local device storage, network drive(s), or external drives, then accessed through Adobe Reader.

NOTE: Visit the Adobe Software Compatibility page on Grants.gov to download the appropriate version of the software at: https://www.grants.gov/web/grants/applicants/adobe-software-compatibility.html.

2. *Mandatory Fields in Forms:* In the forms, you will note fields marked with an asterisk and a different background color. These fields are mandatory fields that must be completed to successfully submit your application.

3. *Complete SF-424 Fields First*: The forms are designed to fill in common required fields across other forms, such as the applicant name, address, and DUNS number. To trigger this feature, an applicant must complete the SF-424 information first. Once it is completed, the information will transfer to the other forms.

c. *Submit a Workspace*: An application may be submitted through workspace by clicking the Sign and Submit button on the Manage Workspace page, under the Forms tab. Grants.gov recommends submitting your application package at least 24-48 hours prior to the close date to provide you with time to correct any potential technical issues that may disrupt the application submission.

d. *Track a Workspace*: After successfully submitting a workspace package, a Grants.gov Tracking Number (GRANTXXXXXXXX) is automatically assigned to the package. The number will be listed on the Confirmation page that is generated after submission.

For additional training resources, including video tutorials, refer to: https://www.grants.gov/web/grants/applicants/applicant-training.html.

Applicant Support: Grants.gov provides applicants 24/7 support via the toll-free number 1-800-518-4726 and email at support@grants.gov. For questions related to the specific grant opportunity, contact the number listed in the application package of the grant for which you are applying.

If you are experiencing difficulties with your submission, it is best to call the Grants.gov Support Center and get a ticket number. The Support Center ticket number will assist the ONR with tracking your issue and understanding background information on the issue.

Timely Receipt Requirements and Proof of Timely Submission

a. *Online Submission.* All applications must be received by 11:59 pm Eastern time on the due date established. Proof of timely submission is automatically recorded by Grants.gov. An electronic date/time stamp is generated within the system when the application is successfully received by Grants.gov. The applicant AOR will receive an acknowledgement of receipt and a tracking number (GRANTXXXXXXXX) from Grants.gov with the successful transmission of their application. Applicant AORs will also receive the official date/time stamp and Grants.gov Tracking number in an email serving as proof of their timely submission.

When ONR successfully retrieves the application from Grants.gov, and acknowledges the download of submissions, Grants.gov will provide an electronic acknowledgment of receipt of the application to the email address of the applicant with the AOR role. Again, proof of timely submission shall be the official date and time that Grants.gov receives your application.

Applications received by Grants.gov after the established due date for the program will be considered late and will not be considered for funding by ONR.

Applicants using slow internet, such as dial-up connections, should be aware that transmission can take some time before Grants.gov receives your application. Again, Grants.gov will provide either an error or a successfully received transmission in the form of an email sent to the applicant with the AOR role. The Grants.gov Support Center reports that some applicants end the transmission because they think that nothing is occurring during the transmission process. Please be patient and give the system time to process the application.

b. *Proposal Receipt Notices*. After a proposal is submitted through Grants.gov, the Authorized Organization Representative (AOR) will receive a series of three emails. It is extremely important that the AOR watch for and save each of the emails. You will know that your proposal has reached ONR when the AOR receives email Number 3. You will need the Submission Receipt Number (email Number 1) to track a submission. The three emails are:

Number 1 – The applicant will receive a confirmation page upon completing the submission to Grants.gov. This confirmation page is a record of the time and date stamp that is used to determine whether the proposal was submitted.

Number 2 – The applicant will receive an email indicating that the proposal has been validated by Grants.gov within two days of submission (This means that all of the required fields have been completed). After an institution submits an application, Grants.gov generates a submission receipt via email and also sets the application status to “Received.” This receipt verifies the Application has been successfully delivered to the Grants.gov system. Next, Grants.gov verifies the submission is valid by ensuring it does not contain viruses, the opportunity is still open, and the applicant login and applicant DUNS number match. If the submission is valid, Grants.gov generates a submission validation receipt via email and sets the application status to “Validated.” If the application is not validated, the application status is set to "Rejected." The system sends a rejection email notification to the institution, and the institution must resubmit the application package. Applicants can track the status of their application by logging in to Grants.gov.

Number 3 – The third notice is an acknowledgment of receipt in email form from ONR within ten days from the proposal due date, if applicable. The email is sent to the authorized representative for the institution. The email for proposals notes that the proposal has been received and provides the assigned tracking number.

*****IMPORTANT NOTE: THE AOR MUST SIGN THE APPLICATION SUBMISSION THEMSELVES OR PROVIDE WRITTEN APPROVAL AUTHORIZING SOMEONE ELSE TO SIGN ON THEIR BEHALF.*****

3. Significant Dates and Times Schedule of Events

Schedule of Events		
Event	**Date**	**Time**
AcquTrak website opens for registration and submission	29 June 2020	
Deadline for Questions regarding White Paper and Documents*	14 August 2020	11:59 PM Eastern Time

AcquTrak website closes for registration	02 September 2020	11:59 PM Eastern Time
Deadline for submitting White Paper and supporting Documentation	04 September 2020	11:59 PM Eastern Time
Notification of Invitation for Full Proposal	06 November 2020†	
Deadline for Questions regarding Full Proposal and Documents*	08 January 2021	11:59 PM Eastern Time
Deadline for submitting Full Proposal and supporting Documents	15 January 2021	11:59 PM Eastern Time
Notification of Award	26 March 2021†	
Start Date of Grant	01 June – 30 September 2021†	

* Questions submitted after the Q&A deadline will not be answered.

† These dates are estimates as of the date of this announcement.

E. APPLICATION REVIEW INFORMATION

1. Evaluation Criteria

The VBFF program seeks to invest in basic research and to identify challenging fundamental scientific areas of investigation that may have potential for long term benefit to DoD. Proposed research should describe cutting-edge efforts on basic scientific problems. White papers deemed to be applied research, as opposed to basic research, will not advance to the proposal stage of the competition.

Subject to funding availability, white papers and proposals deemed to be basic research will be evaluated under the following criteria:

- Scientific and technical merits of the proposed research.
  - This program should be oriented toward research that may lead to extraordinary outcomes such as: revolutionizing entire disciplines, creating entirely new fields, or disrupting accepted theories and perspectives.
  - The proposed research should focus on developing a deep understanding of fundamental phenomena and on innovations that may enable revolutionary advances in scientific knowledge.

- The principal investigator's qualifications, ability to perform the proposed work, and the overall management approach.
  - The PI should have a record of substantial scientific contributions.

- Potential relationship of the proposed research to the DoD mission, including the relevance of the proposed project to the Vannevar Bush Faculty Fellowship program objectives and priorities.
  - Proposed research should investigate new and unique approaches that may enable revolutionary concepts that are critical to the future success of DoD.
  - Evolutionary improvements to the existing state of practice or near term tactical

improvements are not relevant for this program.
  - Education and training of outstanding student and post-doctoral researchers are program objectives. The proposal should have a description of how this is to be accomplished.

- The reasonableness of proposed costs.
  - Is the PI's proposed effort commensurate with the scope of project?
  - Is the number of graduate students and post-docs adequate to perform the proposed project?
  - Is there sufficient travel budget for program activities?
  - Is there proper justification for large capital equipment?

Letters of recommendation (up to three (3)) submitted in the proposal package can be used to help evaluate the principal investigator's qualifications and abilities. The U.S. Government does not guarantee an award in each research area. Further, be advised that as funds are limited, otherwise meritorious proposals may not be funded.

All, some, one, or none of the applicants may be contacted after the full proposal review process by phone by the Director of the Basic Research Office, USD (R&E) to clarify certain aspects of their proposed research efforts.

2. Evaluation Panel

White papers and proposals submitted under this FOA are evaluated through a peer or scientific review process. Evaluation will use merit-based competitive procedures according to Department of Defense Grant and Agreement Regulations (DoDGARs) citation of 32 C.F.R Sec 22.315. White papers and proposals will be evaluated by Government personnel and Non-Government reviewers. Non-Government reviewers will include university faculty and staff researchers. Each reviewer is required to sign a conflict-of-interest and confidentiality statement attesting that the reviewer has no known conflicts of interest, and that application and evaluation information will not be disclosed outside the evaluation panel. The names and affiliations of reviewers are not disclosed.

White papers that best fulfill the evaluation criteria will be identified by members of the white paper evaluation panels and recommended to the Assistant Secretary of Defense for Research & Engineering (USD (R&E)). USD (R&E) will invite individual PIs to submit full proposals. Feedback on white papers will only be provided to those invited to submit a full proposal.

Proposals that best meet the evaluation criteria will be recommended for funding. The Government reserves the right to select and fund for award all, some, one, or none of the proposals in response to this announcement.

Employees of commercial firms under contract to USD (R&E) and ONR may be used to process white papers and proposals. By submitting a proposal, applicants consent to allowing access to their proposals by these support contractors, their support contracts include nondisclosure agreements prohibiting contractor employees from disclosing any information submitted by other contractors.

3. General Information Regarding the Review and Selection Process

In accordance with Office of Management and Budget (OMB) guidance in parts 180 and 200 of Title 2, CFR, it is DoD policy that DoD Components must report and use integrity and performance information in the Federal Awardee Performance and Integrity Information System (FAPIIS), or any successor system designated by OMB, concerning grants, cooperative agreements, and TIA's as follows:

If the total Federal share will be greater than the simplified acquisition threshold on a Federal award under a notice of funding opportunity (see 2 CFR 200.88 Simplified Acquisition Threshold):

a. The Federal awarding agency, prior to making a Federal award with a total amount of Federal share greater than the simplified acquisition threshold, will review and consider any information about the applicant that is in the designated integrity and performance system accessible through SAM (currently FAPIIS) (see 41 U.S.C. 2313);

b. An applicant, at its option, may review information in the designated integrity and performance systems accessible through SAM and comment on any information about itself that a Federal awarding agency previously entered and is currently in the designated integrity and performance system accessible through SAM;

c. The Federal awarding agency will consider any comments by the applicant, in addition to the other information in the designated integrity and performance system, in making a judgment about the applicant's integrity, business ethics, and record of performance under Federal awards when completing the review of risk posed by applicants as described in 2 CFR 200.205 Federal awarding agency review of risk posed by applicants.

F. FEDERAL AWARD ADMINISTRATION INFORMATION

1. Unique Entity Identifier and System for Award Management (SAM)

System for Award Management (SAM): All Applicants submitting proposals or applications must:

a. Be registered in the SAM prior to submission;

b. Maintain an active SAM registration with current information at all times during which it has an active Federal award or an application under consideration by any agency; and

c. Provide its DUNS number in each application or proposal it submits to the agency.

SAM may be accessed at https://www.sam.gov

2. Federal Award Notices

a. Applicants whose proposals are recommended for award may be contacted by a Contract or Grant specialist to discuss additional information required for award. This may include representations and certifications, revised budgets or budget explanations, certificate of current cost or pricing data, subcontracting plan for small businesses, and/or other information as applicable to the proposed award.

The notification e-mail must not be regarded as an authorization to commit or expend funds. The Government is not obligated to provide any funding until a Government Contracting Officer or Grants Officer, as applicable, signs the award document.
The award document signed by the Contracting Officer or Grants Officer is the official and authorizing award instrument.

b. Office of Naval Research (ONR) award/modification documents are only available via the Department of Defense (DoD) Electronic Document Access System (EDA) within the Wide Area Workflow e-Business Suite (https://Piee.eb.mil/).

EDA is a Web-based system that provides secure online access, storage and retrieval of awards and modifications to DoD employees and vendors.

ONR creates an award notification profile for every award.

For grants, the notification profile will use the email addresses from the Application for Federal Assistance, SF424, to notify the recipient of an award. ONR recommends that organizations provide a global business address for their entity in Field 5 (Application Information) of the SF424. ONR is using the following three email addresses entered by the grantee on the SF424 application to create the EDA notification profile:

i. Applicant Information (Field 5 - Email)
ii. Project Director / Principal Investigator (Field 14 - Email)
iii. Authorized Representative (Field 19 - Email)

For all other awards, the notification profile will use the email address from the Business Point of Contact to notify the recipient of an award.

***IMPORTANT*:** In some cases, EDA notifications are appearing in recipients' Junk Email folder. If you are experiencing issues receiving EDA notifications, please check your junk email. If found, please mark EDA notifications as "not junk." If you do not currently have access to EDA, you may complete a self-registration request as a “Vendor” via https://Piee.eb.mil/ following the steps below:

1. Click "Accept"
2. Click "Register" (top right)
3. Click "Agree"
4. In the "What type of user are you?" drop down, select "Vendor"
5. Select the systems you would like to access (iRAPT at a minimum)
6. Complete the User Profile and follow the site instructions

Allow five business days for your registration to be processed. EDA will notify you by email when your account is approved.

To access awards after your registration has been approved, log into https://Piee.eb.mil/, select "EDA", select either EDA location, Select "Contracts", select your search preference, enter the Contract Number (or, if applicable, enter the Grant Number in the Contract Number field), and select "View".

Registration questions may be directed to the EDA help desk toll free at 866-618-5988, commercial at 801-605-7095, or via email at disa.ogden.esd.mbx.cscassig@mail.mil (Subject: EDA Assistance).

3. Reporting

If the Federal share of any Federal award may include more than $500,000 over the period of performance, the post award reporting requirements, Award Term and Condition for Recipient Integrity and Performance Matters (2 U.S.C. 200 Appendix XII), is applicable as follows:

a. Reporting of Matters Related to Recipient Integrity and Performance

(1) General Reporting Requirement. If the total value of your currently active grants, cooperative agreements, and procurement contracts from all Federal awarding agencies exceeds $10,000,000 for any period of time during the period of performance of this Federal award, then you as the recipient during that period of time must maintain the currency of information reported to the System for Award Management (SAM) that is made available in the designated integrity and performance system (currently the Federal Awardee Performance and Integrity Information System (FAPIIS)) about civil, criminal, or administrative proceedings described in paragraph 2 of this award term and condition. This is a statutory requirement under section 872 of Public Law 110-417, as amended (41 U.S.C. 2313). As required by section 3010 of Public Law 111-212, all information posted in the designated integrity and performance system on or after April 15, 2011, except past performance reviews required for Federal procurement contracts, will be publicly available.

(2) Proceedings About Which You Must Report. Submit the information required about each proceeding that:

a. Is in connection with the award or performance of a grant, cooperative agreement, or procurement contract from the Federal Government;

b. Reached its final disposition during the most recent five year period; and

c. Is one of the following:

(i) A criminal proceeding that resulted in a conviction, as defined in paragraph 5 of this award term and condition;

(ii) A civil proceeding that resulted in a finding of fault and liability and payment of a monetary fine, penalty, reimbursement, restitution, or damages of $5,000 or more;

(iii) An administrative proceeding, as defined in paragraph 5. of this award term and condition, that resulted in a finding of fault and liability and your payment of either a monetary fine or penalty of $5,000 or more or reimbursement, restitution, or damages in excess of $100,000; or

(iv) Any other criminal, civil, or administrative proceeding if:

(a) It could have led to an outcome described in paragraph 2.c.(i), (ii), or

(b) of this award term and condition;

(c) It had a different disposition arrived at by consent or compromise with an acknowledgment of fault on your part; and

(d) The requirement in this award term and condition to disclose information about the proceeding does not conflict with applicable laws and regulations.

3. Reporting Procedures. Enter in the SAM Entity Management area the information that SAM requires about each proceeding described in paragraph 2 of this award term and condition. You do not need to submit the information a second time under assistance awards that you received if you already provided the information through SAM because you were required to do so under Federal procurement contracts that you were awarded.

4. Reporting Frequency. During any period of time when you are subject to the requirement in paragraph 1 of this award term and condition, you must report proceedings information through SAM for the most recent five-year period, either to report new information about any proceeding(s) that you have not reported previously or affirm that there is no new information to report. Recipients that have Federal contract, grant, and cooperative agreement awards with a cumulative total value greater than $10,000,000 must disclose semiannually any information about the criminal, civil, and administrative proceedings.

5. Definitions. For purposes of this award term and condition:

a. Administrative proceeding means a non-judicial process that is adjudicatory in nature in order to make a determination of fault or liability (e.g., Securities and Exchange Commission Administrative proceedings, Civilian Board of Contract Appeals proceedings, and Armed Services Board of Contract Appeals proceedings). This includes proceedings at the Federal and State level but only in connection with performance of a Federal contract or grant. It does not include audits, site visits, corrective plans, or inspection of deliverables.

b. Conviction, for purposes of this award term and condition, means a judgment or conviction of a criminal offense by any court of competent jurisdiction, whether entered upon a verdict or a plea, and includes a conviction entered upon a plea of nolo contendere.

c. Total value of currently active grants, cooperative agreements, and procurement contracts includes:

(i) Only the Federal share of the funding under any Federal award with a recipient cost share or match; and

(ii) The value of all expected funding increments under a Federal award and options, even if not yet exercised.

G. FEDERAL AWARDING AGENCY CONTACTS

VBFF Program Point of Contact:

Dr. Reginald G. Williams
Office of Naval Research
One Liberty Center - Suite 660
875 North Randolph Street
Arlington, VA 22203-1995
Email Address: reginald.g.williams@navy.mil

Business Point of Contact:

Ms. Vanessa Seymour
Office of Naval Research
One Liberty Center – Suite W1260
875 N. Randolph Street
Arlington, VA 22203-1995
Email Address: Vanessa.seymour@navy.mil

Questions concerning White Papers, Supporting Documentation should be submitted by 14 August 2020 to the VBFF program point of contact with a copy to the business point of contact.

Questions received after the deadlines may not be answered, and the due date for submission of application materials will not be extended.

Answers to substantive questions submitted in response to this FOA will be addressed in the form of an amendment and will be posted to one or more of the following web pages:

Grants.gov Webpage – http://www.grants.gov/

ONR Funding Opportunity Announcement (FOA) Webpage – https://www.onr.navy.mil/en/work-with-us/funding-opportunities/announcements

Applicants should be alert for any amendments that may modify the announcement.

H. OTHER INFORMATION

1. Federal Funding Accountability and Transparency Act of 2006

The Federal Funding Accountability and Transparency Act of 2006 (Public Law 109-282), as amended by Section 6202 of Public Law 110-252, requires that all agencies establish requirements for recipients reporting information on subawards and executive total compensation as codified in 2

CFR Part 170. Any company, non-profit agency or university that applies for financial assistance as either a prime or sub-recipient under this FOA must provide information in its proposal that describes the necessary processes and systems in place to comply with the reporting requirements identified in 2 CFR Part 170 Appendix A. Entities are required to meet reporting requirements unless an exception or exemption applies. Refer to 2 CFR Part 170, including Appendix A, for a detailed explanation of the requirements, exceptions, and exemptions.

2. Certification regarding Restrictions on Lobbying

Grant and Cooperative Agreement awards greater than $100,000, as well as OTAs not under 10 U.S.C. 2371b, require a certification of compliance with a national policy mandate concerning lobbying. Grant applicants shall provide this certification by electronic submission of SF424 (R&R) as a part of the electronic proposal submitted via Grants.gov (complete Block 17). The following certification applies likewise to each Cooperative Agreement and normal OTA applicant seeking federal assistance funds exceeding $100,000:

a. No Federal appropriated funds have been paid or will be paid by or on behalf of the applicant, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the Federal contract, grant, loan, or cooperative agreement, the applicant shall complete and submit Standard Form-LLL, “Disclosure Form to Report Lobbying,” in accordance with its instructions.
c. The applicant shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, title 31, U.S.C. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. Representation Regarding an Unpaid Delinquent Tax Liability or a Felony Conviction under any Federal Law - DoD Appropriations

All grant applicants are **required to complete** the "Representation Regarding an Unpaid Delinquent Tax Liability or a Felony Conviction under Any Federal Law – DoD Appropriations " found at https://www.onr.navy.mil/work-with-us/how-to-apply/submit-grant-application by checking the "I agree" box in Field 17 and attaching the representation to Field 18 of the SF424 (R&R) as part of the electronic proposal submitted via Grants.gov. The representation reads as follows:

(a) The applicant represents that it_____**is/ is not**_____a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

(b) The applicant represents that it_____**is/ is not**_____a corporation that was convicted of a felony criminal violation under any Federal law within the preceding 24 months. NOTE: If an applicant responds in the affirmative to either of the above representations, the applicant is ineligible to receive an award unless the agency suspension and debarment official (SDO) has considered suspension or debarment and determined that further action is not required to protect the Government's interests. The applicant therefore must provide information about its tax liability or conviction to the agency's SDO as soon as it can do so, to facilitate completion of the required consideration before award decisions are made.

4. Representation Regarding the Prohibition on Using Funds with Entities that Require Certain Internal Confidentiality Agreements

Agreement with the representation below will be affirmed by checking the "I agree" box in Field 17 of the SF424 (R&R) as part of the electronic proposal submitted via Grants.gov. The representation reads as follows:

By submission of its proposal or application, the applicant represents that it does not require any of its employees, contractors, or subrecipients seeking to report fraud, waste, or abuse to sign or comply with internal confidentiality agreements or statements prohibiting or otherwise restricting those employees, contractors, subrecipients from lawfully reporting that waste, fraud, or abuse to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information.

Note that, as applicable, the bases for this representation are the prohibition(s) as follow:
1. Section 743 of the Financial Services and General Government Appropriation Act, 2015 (Division E of the Consolidated and Further Continuing Appropriations Act, 2015, Pub. L. 113-235).

2. Section 101(a) of the Continuing Appropriation Act, 2016 (Pub. L. 114-53) and any subsequent FY2016 appropriations act that extends to FY2016 the same restrictions as are contained in section 743 of Division E, title VII of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub L. 113-235).

3. Pub. L. 114-223, Continuing Appropriations Act, 2017, or any other Act that extends to fiscal year 2017 funds the same prohibitions as contained in section 743, Division E, title VII, of the Consolidated Appropriations Act, 2016 (Pub. L. 114-113).

4. Any successor provision of law on making funds available through grants and cooperative agreements to entities with certain internal confidentiality agreements or statements.

The prohibitions stated above do not contravene requirements applicable to Standard Form 312, Form 4414, or any other form issued by a Federal department or agency governing the nondisclosure of classified information.

5. Code of Conduct

Applicants for grants, cooperative agreements, or other transaction agreements as applicable are required to comply with 2 CFR 200.318(c), Codes of Conduct, to prevent real or apparent conflicts of interest in the award and administration of any contracts supported by federal funds. This provision will be incorporated into all assistance instruments awarded under this FOA.

6. Requirements Concerning Live Organisms

a. Use of Animals:

If animals are to be utilized in the research effort proposed, the Applicant must submit a full Appendix or Abbreviated Appendix with supporting documentation (copies of IACUC Approval, IACUC Approved Protocol, and most recent USDA Inspection Report) prior to award. For assistance with submission of animal research related documentation, contact the ONR Animal Use Administrator at (703) 696-4046.

Guidance: https://www.onr.navy.mil/work-with-us/how-to-apply/compliance-protections/research-protections/recombinant-or-synthetic-nucleic-acid-molecules

b. Use of Human Subjects in Research:

1. You must protect the rights and welfare of individuals who participate as human subjects in research under this award and comply with the requirements of the Common Rule at 32 CFR part 219 and applicable provisions of DoD Instruction 3216.02, Protection of Human Subjects and Adherence to Ethical Standards in DoD-Supported Research (2011), the DON implementation of the human research protection program contained in SECNAVINST 3900.39D (or its replacement), 10 USC 980 “Limitation on Use of Humans as Experimental Subjects,” and when applicable, Food and Drug Administration (FDA) and other federal and state law and regulations.
b. For proposals containing activities that include or may include “research involving human subjects” as defined in DoDI 3216.02, prior to award, the Applicant must submit documentation of:

(i) Approval from an Institutional Review Board (IRB) (IRB-approved research protocol, IRB-approved informed consent document, and other material they considered); proof of completed human research training (e.g., training certificate or institutional verification of training for the Project Director / Principal Investigator, co-investigators); and the Applicant’s Department of Health and Human Services (DHHS)-issued Federalwide Assurance (FWA#),

(ii) Any claimed exemption under 32 CFR 219 101(b), including the category of exemption, supporting documentation considered by your institution in making the determination (e.g., protocol, data collection tools, advertisements, etc.). The documentation shall include a short rationale supporting the exemption determination. This documentation should be signed by the IRB Chair or IRB vice Chair, designated IRB administrator or official of the human research protection program.

(iii) Any determinations that the proposal does not contain activities that constitute research involving human subjects, including supporting documentation considered by your institution in making the determination. This documentation should be issued by the IRB Chair or IRB vice Chair, designated IRB administrator or official of the human research protection program.

c. Documentation must be submitted to the ONR Human Research Protection Official (HRPO), by way of the ONR Program Officer. If the research is determined by the IRB to be greater than minimal risk, you also must provide the name and contact information for the independent research monitor and a written summary of the monitors' duties, authorities, and responsibilities as approved by the IRB. For assistance with submission of human subject research related documentation, contact the ONR Human Research Protection Official (HRPO) at (703) 696-4046.

d. Research involving human subjects must not be commenced under any award or modification or any subcontract or grant subaward or modification until awardee receives notification from the Grants Officer that the HRPO has approved the assurance as appropriate for the research under the award or modification and that the HRPO has reviewed the protocol and accepted the IRB approval or determination for compliance with Federal, DoD and DON research protection requirements. See, DFARS 252.235-7004. Guidance:

https://www.onr.navy.mil/work-with-us/how-to-apply/compliance-protections/research-protections/Human-Subject-Research

3. Use of Recombinant DNA or Synthetic Nucleic Acid Molecules:

Proposals which call for experiments using recombinant or synthetic nucleic acid molecules must include documentation of compliance with NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules (NIH Guidelines), approval of the Institutional Biosafety Committee (IBC), and copies of the DHHS Approval of the IBC letter. Guidance:

https://www.onr.navy.mil/work-with-us/how-to-apply/compliance-protections/research-protections/recombinant-or-synthetic-nucleic-acid-molecules

7. Institutional Dual Use Research of Concern

As of September 24, 2015, all institutions and United States Government (USG) funding agencies subject to the United States Government Policy for Institutional Oversight of Life Sciences Dual Use Research of Concern must comply with all the requirements listed therein. If your research proposal directly involves certain biological agents or toxins, contact the cognizant Technical Point of Contact. U.S. Government Science, Safety, Security (S3) guidance may be found at https://www.phe.gov/s3/dualuse.

8. Department of Defense High Performance Computing Program

The DoD High Performance Computing Program (HPCMP) furnishes the DoD S&T and RDT&E communities with use-access to very powerful high performance computing systems. Awardees of ONR contracts, grants, and other assistance instruments may be eligible to use HPCMP assets in

support of their funded activities if ONR Program Officer approval is obtained and if security/screening requirements are favorably completed.

Additional information and an application may be found at https://www.hpc.mil/.

9. Project Meetings and Reviews

Individual program reviews between the sponsor and the performer may be held as necessary. Program status reviews may also be held to provide a forum for reviews of the latest results from experiments and any other incremental progress towards the major demonstrations. These meetings will be held at various sites throughout the country. For costing purposes, applicants must assume that 40% of these meetings will be at or near the government sponsor location and 60% at other contractor or government facilities. Interim meetings are likely, but these will be accomplished via video telephone conferences, telephone conferences, or via web-based collaboration tools.

10. Proprietary Information or Other Restrictions

When submitting the White Paper and Supporting Documentation, the PI must provide the title of the proposed research project, contact information (name, e-mail address, and phone number) for the Sponsored Programs Office at the university, and indicate whether he or she is a US citizen or permanent resident and a tenured faculty. In addition, the PI must select one or two (primary and secondary) scientific subject categories considered most appropriate for the proposed research from the list given in Section A.3. If more than one, the PI must clearly indicate which is primary and which is secondary. This category designation will assist VBFF staff in assigning applications to appropriate reviewers. However, this assignment is ultimately done at the discretion of the VBFF Program Manager and according to the content of the submission, in order to obtain the most accurate technical evaluations from the expert panels.

The White Papers and Supporting Documentation must be submitted to AcquTrak (https://acqupass.noblis.org/ApplyVBFF) no later than 11:59 p.m. Eastern Time on 04 September 2020. Persons submitting the White Papers and Supporting Documentation must register on the website by 11:59 pm Eastern Time on 02 September 2020. Under normal circumstances, the submission process could take several minutes depending on the network connection and the size of the file being submitted. The applicant is responsible for allowing enough time to complete the online form, upload the documents and press the submit button before the deadline. An e-mail confirmation will be sent to the applicant upon receipt of the submission. The applicant is strongly encouraged to allow sufficient time prior to the deadline, and to keep the confirmation emails. In case of technical difficulties, the applicant should send an email tocshelp@noblis.org, describing the situation. Even though all attempts will be made to assure that the site is available and functional, it is the ultimate responsibility of the applicants to plan their submission well in advance in order to avoid circumstances in which the site is not available or slow, due to high service demands.

Documents submitted after the deadline or found to be non-compliant will not be reviewed.

Evaluation of the white paper will be issued via email notification. A white paper may be considered, upon examination by the VBFF staff, to be non-responsive to the goals and intent of the VBFF program, and may not be subject to further, detailed technical review. Any Applicant whose white paper was identified as having insufficient technical merits, or as being non-responsive and/or without particular value to the DoD, is ineligible to submit a full proposal under this FOA.