

ARL Strengthening Teamwork for Robust Operations in Novel Groups (STRONG)

W911NF-19-S-0001

Amendment #6

The purpose of this modification is to issue Cycle 4 of the ARL STRONG Program. This modification includes the topic updates as well as administrative changes to the FOA. Please be sure to read the modification to its entirety. Proposals are due in grants.gov by 3:00pm (local time in North Carolina, USA) on 16 May 2022. An email receipt will be provided to each Applicant for each Proposal submission received. Applications submitted after the closing date and time will not be considered or evaluated by the Government

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FUNDING OPPORTUNITY OVERVIEW

1. Federal Awarding Agency Name

U.S. Army Research Laboratory, 2800 Powder Mill Road, Adelphi, MD 20783-1197

Issuing Acquisition Office

U.S. Army Contracting Command – Aberdeen Proving Ground, Research Triangle Park (RTP) Division, 800 Park Office Drive, Suite #4229, Research Triangle Park, NC 27709

2. Research Opportunity Title

Strengthening Teamwork for Robust Operations in Novel Groups (STRONG)

3. Announcement Type

Amendment: Cycle 4 updates - *SEE SECTION A.4*

4. Funding Opportunity Number

W911NF-19-S-0001 (The same FOA number from the first cycle will be used throughout all cycles of the program, but will be amended at the beginning of each cycle to topic area descriptions and other relevant program updates.)

5. Catalog of Federal Domestic Assistance (CFDA) Number(s)

12.630 - "Basic, Applied, and Advanced Research in Science and Engineering"

6. STRONG Website: <https://www.arl.army.mil/strong>

7. Key Dates:

The following is a summary of the events and dates associated with this Cycle under the overall STRONG Funding Opportunity Announcement (FOA):

<u>EVENT</u>	<u>ESTIMATED DATE/TIMEFRAME</u>
Opportunity released	April 2022
Opportunity Webinar	20 April 2022
Deadline for Questions on Funding Opportunity	5 May 2022
Proposals due for Cycle 4	16 May 2022
Cycle 4 Awards	June 2022 (Expected)
Cycle 4 Innovation Summit	July/August 2022
Cycle 4 Follow On Presentations	January 2023

ARL Strengthening Teamwork for Robust Operations in Novel Groups (STRONG)

A. PROGRAM DESCRIPTION

1. Background

The future vision for the U.S. Army includes teams of humans and intelligent agents working together to accomplish missions. The U.S. Army Research Laboratory (ARL) has established a 10-year (FY19-FY29) collaborative program, Strengthening Teamwork for Robust Operations in Novel Groups (STRONG), structured under eight annual program cycles (i.e., Cycles 1-8; FY19-FY26) with the overall goal of developing the foundation for enhanced teamwork within heterogeneous human-intelligent agent teams. This collaborative venture will bring together diverse, multidisciplinary expertise to support scientific breakthroughs relevant to specific and critical scientific questions that must be addressed to enable this future vision.

STRONG focuses directly on coordination and cooperation in human-agent teams via individualized and adaptive systems. The 10-year program has a specific long-term goal *to identify and implement the fundamental research necessary to develop individualized, adaptive technologies that promote effective teamwork in novel groups of humans and intelligent agents*. Prior to submitting, Applicants should review Decostanza et al. (2018) *Enhancing Human-Agent Teaming with Individualized, Adaptive Technologies: A Discussion of Critical Scientific Questions* (<https://brain.ieee.org/brain-storm/enhancing-human-agent-teaming/>), which provides the initial vision and discussion of the scientific questions underlying the STRONG program, as well as Metcalf et. al. (2021) *Systemic Oversimplification Limits the Potential for Human-AI Partnership* which describes re-envisioning human machine teaming paradigms to enable success in problem spaces that are un-accessible to either humans or machine intelligence alone (<https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=9425540>).

Collaboration: STRONG addresses a critical objective within a broader Army goal to enable effective integration of Artificial Intelligence / Machine Learning (AI/ML) in the battlefield. This program has been developed in coordination with other related ARL-funded collaborative efforts (see descriptions of ARL collaborative alliances at <https://www.arl.army.mil/www/default.cfm?page=93>) and shares a common vision of highly collaborative academia-industry-government partnerships. However, with the rapid pace of technological change and the scientific community's nascent understanding of and empirical evidence for human-agent teaming, STRONG will implement a novel, synergistic approach/structure. Annual Cycles will be explicitly structured to foster the greatest degree of collaboration and knowledge sharing to optimally leverage or combine findings from each effort awarded under each cycle and directly tie with internal ARL research programs. This structure is intended to more effectively and efficiently achieve the overall goals of the STRONG program by preventing unnecessary duplication or silos of information, findings, or other relevant outcomes from ARL investments (internal and external). In other words, the success of STRONG requires a multidisciplinary, collaborative effort that *synergistically views every new funded effort as a network of research or "building block" to grow and support an ecosystem of high-quality, innovative researchers actively sharing knowledge and collaboratively addressing scientific gaps critical to the Department of Defense*. Given this novel approach, Government researchers and program managers will be taking a more active role to support rapid integration of findings and cohesion within the research ecosystem.

Support Infrastructure: Each Cycle will require Recipient participation in an annual *Innovation Summit Series* to foster active collaboration, as detailed below. In addition to general updates, a dedicated *STRONG website* (<https://www.arl.army.mil/strong>) will maintain a regularly updated knowledge bank of ARL research priorities, programs and contacts; previously funded research summaries, products and contacts; and other relevant information specific to STRONG.

2. Cycle Structure

STRONG will be executed through a series of eight annual program cycles (i.e., Cycles 1-8; FY19-FY26) with the following format: (1) 12 month seedling awards structured as individual cooperative agreements to each awardee; (2) required awardee participation in the annual Innovation Summit Series to foster *novel collaborations*; and (3) potential 3-year extension of a seedling award executed as an Option under the original cooperative agreement.

Enhanced Research Program funding from ARL or Other Government Agencies (OGAs) may become available during a cycle which provides a mechanism for growth and enhancement within STRONG. A proposal should not include any discussion of the Enhanced Research Program. Recipients receiving a CA will be notified and provided details if the opportunity for Enhanced Research Program funding becomes available during their award period of performance.

a) *Annual Cycle Seedling Announcements:*

- The FOA will be amended annually with “Cycle updates” to identify a new problem statement, topic, and other necessary changes for that specific Cycle.
 - **SEE SECTION A.4.a FOR THIS YEAR’S CYCLE TOPIC**
- Each annual Cycle will begin with a call for “seedling” proposals with funding provided to those Recipients selected under a cooperative agreement (CA).
- Total number of seedling Recipients and funding per Recipient may vary from year to year at the discretion of the Government based on annual Cycle changes or requirements.
- Each Cycle topic will be focused on addressing a different scientific area within the scope of the broad research aims of STRONG, with all Cycles designed to ultimately converge on the **specific long-term program goal** noted above.
- Cycle topics will be carefully chosen based on both program achievements from the previous year and on scientific advancements by the broader research community.
- Prior to the final submission date of each Cycle (see Event Timeline above), ARL will host an opportunity webinar on to provide detailed information and question-answer opportunities. A link to the annual webinar will be posted on the STRONG Program website at <https://www.arl.army.mil/strong>.
- Publications and seedling abstracts from each awardee under previously completed Cycles will be shared on <https://www.arl.army.mil/strong> for all future applicants to review.
- Proposals from junior investigators (e.g., students, research fellows, and early-career researchers with less than 5 years past reception of their PhD or less than 5 years’ experience within the primary field of their organization) are appropriate under this opportunity.

b) *Innovation Summit Series:*

- Seedling Recipient participation by at least one team member in each meeting of the Innovation Summit Series under the Recipient’s awarded Cycle will be REQUIRED.
 - **SEE SECTION A.4.b FOR THIS YEAR’S TENTATIVE AGENDA**
- Seedling presentation: Recipients will be expected to demonstrate their scientific principles and approach to the community, providing evidence of progress toward scientific breakthroughs that support the criticality of the particular concept or approach to the specific topic.
- Active collaboration: Recipients will be expected to coordinate their future research plans with complimentary ongoing or planned efforts executed by other Recipients and government researchers within their designated Cycle. Regular communication between seedling Recipients and government researchers to develop awareness of relevant ARL-internal research programs is encouraged prior to, during, and after the Innovation Summit Series. Connections to broader ARL programs, other service labs or other Government agencies is also encouraged. Lastly, *novel connections to and collaborations with the commercial sector*

is strongly encouraged.

- Multi-year Extension Option: Recipients that wish to apply for up to a 3-year Extension Option will be expected to present their proposed project to an evaluation panel at a virtual/in-person hybrid event that will be scheduled in January 2023.

c) Multi-year Extension Option:

- Recipients of a seedling CA under the annual Cycle are eligible for consideration to receive funding (see Table 1) for an optional extension of up to 3 years at the conclusion of the seedling award. The period of the performance of the option will be based on the research and available funding.
- In addition to active collaboration during the Innovation Summit Series as noted above, explicit reference to any connection, extension potential, or refute of prior Cycle efforts is expected, where applicable. In other words, *demonstrable knowledge of prior and current STRONG efforts is expected.*

3. Deliverables / Research Products

Given the cyclical and collaborative nature of STRONG, awardees are encouraged to share research products (e.g., databases and algorithms/code) whenever possible with ARL and fellow awardees in order to contribute to the collective S&T advancement of the STRONG program and the human-agent teaming research community and ecosystem. Creative ideas to enable enduring and multiplicative benefits (e.g., government and commercial) of the research conducted under STRONG is highly encouraged. Additionally, the intent is to leverage past work to promote greater return on investment (ROI) for government investments under each award. ARL will maintain a central repository for all such STRONG deliverables, and as appropriate, these deliverables will be shared on the STRONG website.

a) Required seedling deliverables:

- Prior to 1st Summit meeting: Seedling Research Summary/Plan (publicly releasable, 1/2pg target)
- End of seedling award: Final Seedling Research Report (publicly releasable, 1-2pg max)

b) Required extension deliverables:

- 1 month post modification notification: Proposed Research Summary/Abstract (public releasable, 1/2pg target)
- Annually for extension period of performance: Annual Research Report & Summit presentation (public releasable, 1-2pg max)

c) Additional project-specific deliverable examples are below and will be determined at award time:

- Annotated databases
- Algorithms developed/used
- Testbed description, including access if possible
- Any other relevant research product

4. Cycle 4 Updates

a) **Topic: Abstracting the brain's sub-architectures to enable rapid adaptation and reconfiguration in future human machine teams**

Overview: The 10-year STRONG program has a **specific long-term goal** to identify and implement the fundamental research necessary to develop individualized, adaptive technologies that promote effective teamwork in novel groups of humans and intelligent agents. Cycle 4 of STRONG focuses on the question of how the functionality of algorithms underlying intelligent systems influences the performance of mixed human-intelligent agent teams within complex, dynamic tasks that require adaptation. Specifically, Cycle 4 asks 1) if machine learning embedding high resolution mammalian sub-architecture neuro-mimicry is associated with more effective human-intelligent agent interactions than other forms of machine learning; 2) if embedding high-resolution mammalian sub-architectures other than visual processing (e.g., *spatial reasoning* neuro-mimicry) into human-guided machine learning can outperform deep learning for non-visual processing tasks (e.g., *spatial reasoning* tasks) that require adaptation; and 3) how mammalian brain sub-architecture neuro-mimicry based machine learning can be integrated with humans to enhance performance on complex, dynamic tasks that require team adaptation. Cycle 4 “Seedlings” are expected to demonstrate the potential to answer one or more of these three questions. Cycle 4 “Multi-Year Options” are expected to address all three questions within the multidisciplinary, collaborative “building block” approach of the STRONG program.

Background:

Neuro-mimicry: Human behavior is flexible and adaptive across perspectives and contexts in ways that current machine intelligence is not (Metcalf, et al 2021). In order to create this flexible and adaptive behavior the human brain contains thousands of sub-architectures each representing the world in divergent and yet intertwined ways (Hawkins, 2019). Traditional deep learning networks that form the foundation for many current human machine teaming paradigms are based on a high-resolution mimicry of one of these sub-architectures, i.e. the mammalian visual system (Hassabis 2017). Given this, it is perhaps unsurprising that while deep learning networks have had great success in some areas such as image recognition, they have fallen short in non-visual processing tasks, e.g., under conditions where they are required to flexibly adapt to novelty or when faced with open ended problem spaces with poorly defined criterion of success (Hassabis 2017). It remains an open question if high-resolution neuro-mimicry of other mammalian sub-architectures can improve performance on the tasks those networks enable within the brain. One example of another sub-architecture that has the potential for such neuro-mimicry is the spatial reasoning system. The mammalian brain's ability to simultaneously construct multiple spatial representations of the world (from body and motor centric representations to higher level representations like grid and place cells) is a critical factor underlying human flexibility and adaptability (Nau, et al, 2018). Because humans have constant online access to a wide variety of spatial representations, their brains are able to quickly adapt and reconfigure to changing conditions by choosing the appropriate intertwined set of mappings. Early evidence suggests mimicking the spatial reasoning system may be beneficial for machine intelligence, i.e., emerging evidence from embedding mathematical spaces similar to those used in the mammalian spatial reasoning system into machine intelligence points to improved performance (e.g., reduced machine training time, improve generality; Love, 2020). Further, there have been significant recent advances in our understanding of how the brain creates these computational spaces, which computational spaces the brain uses, and how the brain's multiple spatial reasoning sub-architectures interact, all of which can potentially be capitalized on to improve the performance of human machine teams under novel and changing conditions (Chadhuri et. Al. 2019). Taken together, these advancements are providing a high-resolution understanding of mammalian spatial reasoning sub-architectures and creating the potential to pursue unique machine learning approaches.

Human-Intelligent Agent Teaming: The algorithms underlying the capabilities of machine intelligence directly impact not only their own performance but also the effectiveness of their integration with human teammates. Over the past two decades, a plethora of research has focused on human-system

integration approaches () to improve issues underlying team performance (e.g., human-agent trust, system usability). For instance, in order to make deep learning networks less of a black box, networks can be trained, organized, and designed with the specific purpose of making their function more transparent to the human user (Ras et. Al. 2022). However, these approaches often are associated with a commiserate reduction in overall efficacy of the deep learning network. Here we posit that deep networks with embedded high-resolution features from brain sub-architectures, such as the spatial reasoning system, may be more implicitly understandable because their underlying computations are more ‘human’ like, eliminating the need to build in specific design features to explicitly make their inner workings explicable. It remains an open question whether similarities between human and machine algorithms will also extend beyond technology performance to have significant influences on human-machine integration..

STRONG Collaborations and Adaptive Performance: The STRONG efforts envision creating future teams of humans and intelligent agents that are able to tackle complex, open ended, and context dependent problem spaces that are inaccessible to either humans or machine intelligence alone (see Decostanza et al. 2018, Metcalfe et. al. 2021). Critical to the success of these future teams will be their ability to adapt to changing conditions and context in real time. The STRONG program focuses on an approach wherein machine intelligence will need to adapt and work in concert with humans who have *significant task domain knowledge* but minimal to no specialized training in understanding and training machine intelligence. One technique that has shown great promise in allowing for humans with minimal to no specialized training to adapt the machine intelligence they are teaming with is human guided machine learning (e.g., see Warnell et. al. 2018; Waytowich et al 2018). Techniques like human guided machine learning allows for humans to interact with machine intelligence in an active way, which allow for new roles for human and machine intelligence to be explored.

Cycle 4 Goals and Questions:

In support of the collaborative “building block” approach of the STRONG program, the Cycle 4 call focuses on abstracting the brain’s sub-architectures within the context of human-guidable machine learning. This contextualization is specifically aimed to enable the science to integrate with that of previous and future STRONG calls. Cycle 4 “Seedlings” are expected to demonstrate the potential to answer one or more of the following three primary questions (**bolded**), while Cycle 4 “Multi-Year Options” are expected to address all three primary questions (**bolded**). Sub-questions are included to help inspire thought but do *not* need to be addressed specifically.

- **Is machine learning with an embedded high resolution mammalian sub-architecture neuro-mimicry associated with more effective human-intelligent agent interactions than other forms of machine learning?**
 - For example, as discussed above, deep learning embeds a high resolution mammalian neuro-mimicry of the visual processing sub-architecture. Can human-deep learning-based agent interactions outperform other forms of machine learning across a range of strictly visual processing tasks? Are human-deep learning-based agent interactions more resilient to individual human differences than other forms of machine learning across a range of strictly visual processing tasks? Do human-deep learning-based agent interactions improve human’s understanding, predictability of, and/or trust in agent behavior more than other forms of machine learning that are performing at the same levels or above?
- **Does embedding high-resolution mammalian sub-architectures other than visual processing (e.g., *spatial reasoning* neuro-mimicry) into human-guided machine learning outperform deep learning for non-visual processing tasks (e.g., *spatial reasoning* tasks) that require adaptation?**
 - For example, as discussed above, the mammalian brain’s spatial reasoning system creates a cohesive world view out of hundreds of related sub maps that are complimentary but not redundant (Hawkins 2019). Can a high-resolution spatial reasoning sub-architecture be embedded in a machine learning instantiation that is compatible with human-guided learning?

Does this spatial-reasoning sub-architecture-based human-guided machine learning outperform deep learning-based human-guided machine learning across a range of strictly spatial reasoning tasks that require adaptation (and vice versa on strictly visual processing tasks that require adaptation)? Here “outperform” is used broadly to include decreased times to complete tasks, increased accuracy; avoidance of catastrophic errors; decreased resource requirements to complete task, etc ...

- **Can mammalian brain sub-architecture neuro-mimicry-based machine learning can be integrated within teams of humans and agents to enhance overall performance on complex, dynamic tasks that require team adaptation?**
 - For example, can human-guided deep learning-based agents and human-guided spatial-reasoning neuro-mimicry-based agents be combined with humans with significant task knowledge, to outperform other forms of human-agent teams on tasks that require all three of visual processing, spatial reasoning, and adaptation? Does the integration of human-guided deep learning-based agents and/or human-guided spatial-reasoning neuro-mimicry-based agents improve performance on tasks that require the dynamic or “on-the-fly” reconfiguration of the roles of humans and agents teams? Does the integration of human-guided deep learning-based agents and/or human-guided spatial-reasoning neuro-mimicry-based agents improve performance on tasks where human team members are replaced over trials?

b) Innovation Summit Series

The following description is intended to provide a general overview of this Cycle’s activities for planning purposes, but it does not constitute a finalized plan by the Government. The official Innovation Summit Series agenda will be announced to Recipients when finalized. Potential activities may include: teaching seminars mixing academic, industry, and Army perspectives, focused on innovative practices and successful transition (e.g. military, business start-up); Army science planning and strategy development; Hack-a-thons with quick-solution challenges and mixed teams; brainstorming of research applications and development of transitions; or development of scientific demonstrations and an Industry Day (a day of demonstrations targeted toward industry stakeholders designed to develop multiple transition pathways). Summit activities are intended to foster active collaboration with ARL researchers and other members of the research ecosystem with the specific aim to encourage collaborative planning and development of follow-on (Option) proposals.

Given the current uncertainty related to COVID-19, the summit dates and structure (e.g., in-person, virtual, hybrid) will be determined at a later date, with ample notice given to seedling Recipients and other participants. Fortunately, we have had success with a full in-person summit (Cycle 1, 2019) and two full virtual summits (Cycles 2 and 3, 2020, and 2021).

Notional Activity Outline occurring in the July-August 2022 timeframe:

ORIENTATION & OVERVIEWS - (PIs or representative required)

- Introduction to Army science mission, planning and strategy
- Demonstrations of initial concept and approach from current Cycle Seedling Awardees
- Presentations from prior Cycle Option Awardees as appropriate
- Industry Perspective: presentations and brainstorming on shared research challenges and gaps impacting both military and commercial sectors. Identify unique collaboration opportunities and/or multiple paths for research transition

COLLABORATION / TEAM-BUILDING & RESEARCH – (junior/student participation required with guidance by senior/PI)

- Facilitated activities to support new collaborations and new ideas for those interested in the Option effort

- Opportunity for development of junior investigators to link into the ecosystem of researchers working on questions relative to Army priorities
- Hack-a-thon focused on experimental paradigms
- Dedicated time to interact with and discuss collaboration options with ARL scientists and specific ARL research programs
- Independent break-out sessions for research planning

*Notional Activity Outline occurring in the **January 2023 timeframe:***

PROPOSED FOLLOW ON OPTION EFFORTS

- Presentation of proposed follow on efforts (approximately 1 hour with questions) open to collaborators and government only.
- White papers for Follow-On efforts due.

C. References

- Chadhuri, R., Gercek, B., Pandey, B., Peyrache, A., Fiete, I. ‘The intrinsic attractor manifold and population dynamics of a canonical cognitive circuit across waking and sleep’ *Nature Neuroscience* 22, 1512-1520 (2019)
- DeCostanza, A., Marathe, A., Bohannon, A., Evans, A., Palazzolo, E., Metcalf, J., McDowell, K. (2018) *Enhancing Human-Agent Teaming with Individualized, Adaptive Technologies: A Discussion of Critical Scientific Questions* in IEEE Brainstorming
- Hassabis, D., Kumaran, D., Summerfield, C., Botvinick, M., ‘Neuroscience-inspired artificial intelligence’, *Neuron* 96, 245-259 (2017)
- Hawkins, J. ‘A Thousand Brains: A New Theory of Intelligence’ (2021) Basic Books
- Love, E., Fillipenko, B., Maroulas, V., Carlsson G. ‘Topological Deep Learning’ in Topological Convolutional Neural Networks. Eds.: Allen G., Mukerjee, S., Nadler, B., arXiv:2101.05778v2
- Metcalfe, J., Perelman, B., Boothe, D., McDowell, K., ‘Systemic Oversimplification Limits the Potential for Human-AI Partnership’ *IEEE Access*, May, (2021)
- Nau, M., Julian, J., Doeller, C. ‘How the Brain’s Navigation System Shapes our Visual Experience’ *Trends in Cognitive Science* Vol. 22, No. (2018)
- Ras, G., Xie, N., van Gerven, M., Doran, D., Explainable Deep Learning: A Field Guide for the Uninitiated’ *Journal of Artificial Intelligence Research* 73, 329-396 (2022)
- Warnell, G., Waytowich, N., Lawhern, V., Stone, P. ‘Deep tamer: Interactive agent shaping in high dimensional state spaces’ *Proceedings of the AAAI* 32,(2018)
- Waytowich, W., Goecks, V., Lawhern, V. ‘Cycle-of-learning for autonomous systems from human interaction’ *Proceedings of the AAAI* 32 (2018)

B. FEDERAL AWARD INFORMATION

Multiple CAs will be awarded from this FOA. The Applicants selected for award will be notified by the Grants Officer or his/her designee telephonically or via email. The CA award is not official until the Recipient has received the award signed by the Grants Officer.

CAs for Institutions of Higher Education and nonprofit organizations are primarily governed by the following:

- Federal statutes
- Federal regulations
- 2 CFR Part 200, as modified and supplemented by DoD's interim implementation found at 2 CFR Part 1103

CAs for For-Profit Recipients are primarily governed by the following:

- Federal statutes
- Federal regulations
- 32 CFR Part 34

The following websites may be accessed to obtain an electronic copy of the governing regulations and guidance:

- FAR, DFARS, and AFARS: <https://www.acquisition.gov/>
- Code of Federal Regulations: <http://www.ecfr.gov>
- DoD Research and Development General Terms and Conditions September 2021
- ACC-APG-RTP Division Assistance, Research General Terms and Conditions dated January 2022

Core Funding Cycles:

	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	Proposal Submissions
Cycle 1	B	O	O	O								DEC 2018
Cycle 2		B	O	O	O							SEP 2019
Cycle 3			B	O	O	O						SEP 2020
Cycle 4				B	O	O	O					SEP 2021
Cycle 5					B	O	O	O				SEP 2022
Cycle 6						B	O	O	O			SEP 2023
Cycle 7							B	O	O	O		SEP 2024
Cycle 8								B	O	O	O	SEP 2025

Note: B is for Base (“seedling”) period of Cooperative Agreement; O indicates 3-yr Option.

Funding for seedling project efforts will not exceed \$100,000 per award. Award of approximately 10 seedling CAs is expected during this Cycle. Funding for a Multi-year Option beyond the seedling CA is expected to be larger in scope, with an estimated budget ranging between \$350,000 and \$500,000 per year, per award. Multiple seedling Recipients are encouraged to collaboratively propose an extension effort. Seedling Recipients may include new entities as subawardees that were not part of the initial seedling under a proposed 3-year Option. Any discussion about options is only applicable for those Seedling Recipients who receive an option.

Enhanced Research Program funding from ARL or Other Government Agencies (OGAs) may become available during a cycle which provides a mechanism for growth and enhancement within STRONG. A proposal should not include any discussion of the Enhanced Research Program. Recipients receiving a

CA will be notified and provided details if the opportunity for Enhanced Research Program funding becomes available during their award period of performance.

Award Instrument: This Funding Opportunity is expected to result in the award of multiple “seedling” cooperative agreements (CA) during each Cycle as defined at 31 U.S.C. 6305 for the execution of the program. The CA is used to enter into a relationship:

- a. The principal purpose of which is to transfer a thing of value to the Recipient to carry out a public purpose of support or stimulation authorized by a law or the United States, rather than to acquire property or services for the Federal Government’s direct benefit or use.
- b. Substantial involvement is expected between the Federal Government and the Recipient when carrying out the activity contemplated by the CA.
- c. No fee or profit is allowed

Structure of Award: The CAs will consist of an initial 12-month Base award that will be executed and considered a “seedling” CA. Each seedling CA will provide for the potential for exercising an option, adding up to three more years to the base award, as outlined in the table above. This proposed additional effort may be scoped for one to three years based on its objectives and available funding, will be collaboratively developed with input from Government scientists during the period of performance of the seedling CA, **and will be presented in the January 2023 time frame for Cycle 4.**

Proposal Submission: The application process consists of proposal submissions from applicants for each Cycle under this FOA. Applicants should note there are page limitations and other requirements associated with the submission process. Submissions in connection with this FOA are due by the date and time specified below. FOA amendments for future topics will include the submission requirements for those submissions. The Government’s decision to award a seedling CA will be based upon the evaluation results of the proposal submission.

Period of Performance: The CA Awards made as a result of this FOA will provide for a period of performance of one year, with the potential exercise an option period for up to three additional years at the discretion of the Government.

Place of Performance: There is no limitation on the place of performance, except an application must address planned Recipient team member participation during the Innovation Summit Series described above. The locations and other pertinent information for the summit will be posted on STRONG Program website at <https://www.arl.army.mil/strong>.

Collaboration: Collaboration is expected as described in Section A.1.

Funding: This FOA is issued subject to the availability of funds. ARL has submitted the requisite documents to request funding for the period covered by the program. However, Applicants are reminded this request is subject to Presidential, Congressional and Departmental approval. Funding levels specified in this FOA are estimated funding levels and are for proposal preparation purposes only; actual funding levels of the CAs will be updated annually as part of the federal appropriation process.

Profit/Fee: Profit/fee is not permitted under the CA.

Cost Sharing: Cost sharing is not required under this FOA.

Opportunity Webinar: ARL will host an opportunity webinar on (see Event timeline above). A link to

the webinar will be posted on the STRONG Program website at <https://www.arl.army.mil/strong>.

Contact Information. Outside of questions posed at the Opportunity Webinar, all questions or comments concerning this FOA shall be submitted to the Government through the STRONG Program website at <https://www.arl.army.mil/strong>. Comments or questions submitted should be concise and to the point. In addition, the relevant part and paragraph of the FOA to which a comment or question pertains must be referenced. Responses to non-proprietary questions received will be posted to the STRONG Program website under the "General Information/Questions & Answers" section for the benefit of all interested parties. All clearly identified and marked proprietary questions submitted will be responded to via an individual email response, not posted to the STRONG Program website. Applicants are encouraged to submit questions as early as possible. The deadline for submission of questions which will be answered under this FOA is listed in Event timeline above. Any answers provided to questions do not change the requirements of this FOA. Future amendments to this FOA, including new cycle topics, will be issued via an amended FOA posted in grants.gov.

C. ELIGIBILITY INFORMATION

1. Eligible Applicants

It is our goal for the program to include a diverse group of Applicants with varied long-term interests. Participants may be institutions of higher education, for-profit, or non-profit organization. Federally Funded Research and Development Centers (FFRDC) may propose as well, with effort as allowed by their sponsoring agency and in accordance with their sponsoring agency policy. Proposals may consist of teams from any combination of organizations (*e.g.*, prime and subawardees), but this is not a requirement for award and award will only be made to a single entity. For each Cycle, only those Applicants awarded a seedling CA will be eligible for consideration of a 3-year option period for that Cycle as a prime during the follow on presentations that will occur in the January 2023 timeframe; however, if desired, a Recipient of a seedling CA can include new sub-awardees in their white paper and follow on presentation. All eligible Applicants may submit an application for future topics under future cycles.

2. Cost Sharing or Matching

Cost sharing is not required under this Funding Opportunity.

D. APPLICATION AND SUBMISSION INFORMATION

The application process consists of a single Proposal stage. Applicants will receive feedback regarding their proposal **ONLY IF IT IS SELECTED FOR AWARD**, in order to improve the proposal and ensure alignment of the proposed research with Government goals. Applicants with **non-selected proposals will be notified of their non-selection, but will not receive feedback.**

1. Address to Request Application Package

This Funding Opportunity may be accessed from the following: Grants.gov (www.grants.gov). Amendments, if any, to this FOA will be posted to these websites when they occur. Interested parties are encouraged to periodically check these websites for updates and amendments.

2. Content and Format of Application Submission

The following information is for those wishing to respond to the FOA:

Grants.gov Application Submission and Receipt Procedures

This section provides the application submission and receipt instructions for DoD program applications. Please read the following instructions carefully and completely.

DoD is participating in the Grants.gov initiative to provide the grant community with a single site to find and apply for grant funding opportunities. For this funding opportunity, DoD requires applicants to submit their applications online through Grants.gov. This funding opportunity may be found on Grants.gov by going to the Grants.gov Search Grants screen and entering the funding opportunity number for this FOA, W911NF-19-S-0001, in the Funding Opportunity search box. You can also search for the CFDA Number 12.630

How to Register to Apply through Grants.gov

1. *Instructions:* Read the instructions below about registering to apply for DoD funds. 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.

Organizations must have a active System for Award Management (SAM) registration and Grants.gov account to apply for grants. Creating a Grants.gov account can be completed online in minutes, but SA registrations may take additional time. Therefore, an organization's registration should be done in sufficient time to ensure it does not impact the entity's ability to meet required application submission deadlines.

Complete organization instructions can be found on Grants.gov here:

<https://www.grants.gov/web/grants/applicants/organization-registration.html>

- a. *Register with SAM:* All organizations applying online through Grants.gov must register with the System for Award Management (SAM). Failure to register with SAM will prevent your organization from applying through Grants.gov. SAM registration must be renewed annually. 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>
- b. *Create a Grants.gov Account:* The next step is to register an account with Grants.gov. Follow the on-screen instructions or refer to the detailed instructions here: <https://www.grants.gov/web/grants/applicants/registration.html>
- c. *Add a Profile to a Grants.gov Account:* A profile in Grants.gov corresponds to a single applicant organization the user represents (i.e., an applicant) or an individual applicant. If you work for or consult with multiple organizations and have a profile for each, you may log in to one Grants.gov account to access all of your grant applications. To add an organizational profile to your Grants.gov account, enter the UEI Number for the organization in

the UEI field while adding a profile. For more detailed instructions about creating a profile on Grants.gov, refer to: <https://www.grants.gov/web/grants/applicants/registration/add-profile.html>

- d. *EBiz POC Authorized Profile Roles*: After you register with Grants.gov and create an Organization Applicant Profile, the organization applicant's request for Grants.gov roles and access is sent to the EBiz POC. The EBiz POC will then log in to Grants.gov and authorize the appropriate roles, which may include the Authorized Organization Representative (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 assigned the AOR role. For more detailed instructions about creating a profile on Grants.gov, refer to: <https://www.grants.gov/web/grants/applicants/registration/authorize-roles.html>
 - e. *Track Role Status*: To track your role request, refer to: <https://www.grants.gov/web/grants/applicants/registration/tracking-role-status.html>
2. *Electronic Signature*: When applications are submitted through Grants.gov, the name of the organization applicant with the AOR role that submitted the application is inserted into the signature line of the application, serving as the electronic signature. The EBiz POC **must** authorize people who are able to make legally binding commitments on behalf of the organization as a user with the AOR role; **this step is often missed, and it is crucial for valid and timely submissions.**

How to Submit an Application to DoD 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/workspace-overview.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 to work on the application together, complete all the required forms online or by downloading PDF versions, and check for errors before submission. The Workspace progress bar will display the state of your application process as you apply. As you apply using Workspace, you may click the blue question mark icon near the upper-right corner of each page to access context-sensitive help.
 - 1) *Adobe Reader*: If you decide not to apply by filling out webforms you can download individual PDF forms in Workspace. 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 UEI Number. 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 Submission:* After successfully submitting a workspace application, a Grants.gov Tracking Number (GRANTXXXXXXXX) is automatically assigned to the application. The number will be listed on the Confirmation page that is generated after submission. Using the tracking number, access the Track My Application page under the Applicants tab or the Details tab in the submitted workspace.

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 you are applying for.

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 DoD with tracking your issue and understanding background information on the issue.

Application forms and instructions will be available at Grants.gov. To access these materials, go to <http://www.grants.gov>, select "Apply for Grants", and then select "Download an Application Package." Enter the FOA number, W911NF-19-S-0001.

Applicants must complete the mandatory forms and any optional forms (e.g., SF-LLL Disclosure of Lobbying Activities) in accordance with the instructions on the forms and the additional instructions below. The required fields should be completed in accordance with the "pop-up" instructions on the forms. To activate the instructions, turn on the "Help Mode" (icon with the pointer and question mark at the top of the form). Files that are attached to the forms must be in Adobe Portable Document Form (PDF) unless otherwise specified in this announcement.

The following formatting rules apply for the file attachments:

- Paper size when printed – 8.5 x 11 inch paper

- Margins – 1 inch
- Spacing – Single
- Font – No Smaller than Times New Roman, 12 point

Form: SF 424 (R&R) (Mandatory) – Complete this form first to populate data in other forms. Authorized Organization Representative (AOR) usernames and passwords serve as “electronic signatures” when your organization submits applications through Grants.gov. By using the SF 424 (R&R), applicants are providing the certification required by 32 CFR Part 28 regarding lobbying.

Form: Research & Related Other Project Information - Complete questions 1 through 6 and attach files.

- **Project Summary/Abstract (Field 7 on the form)** - The Project Summary should be a brief summary of the content of the application. It shall include a title, the research team (include roles, expertise, affiliations), designation of Junior Investigator or Senior Investigator derivation, and a brief abstract articulating the project objectives. **The project summary/abstract must not exceed 1 page and will not be evaluated as it is primarily for documentation purposes.**
- **Project Narrative (Field 8 on the form)** - Chapters and Numbers of pages – Field 7 is to contain the chapters set forth below and may not exceed the stipulated page counts for those chapters. Pages in excess of the page limits may be removed for the evaluation of the application. All chapters set forth below should be in a single PDF file. For those chapters with specified page limitations, any pages submitted beyond the specified amount for a chapter will not be reviewed or evaluation.
 - **Chapter 1: Technical Component.** The pages included in Chapter 1 are to be numbered. Applicants are advised that Chapter 1 **will not exceed 8 pages**, utilizing one side of the page. Tables that extend beyond one page (fold out tables) will only count as one page. Pages provided in excess of the prescribed 8 pages will not be evaluated.
 - **Proposed Effort (approximately 4 pages):** This section of Chapter 1 should include an overview of the research strategy to be employed to advance the state-of-the-art in advanced preparation for a future teaming environment with fluid, mutual adaptation between humans and agents that leads to enhanced team performance over time and tasks; a short description and justification for annual research goals of the proposed effort; and a short technical discussion stating the background and objectives of the proposed research, the overall technical approaches to be pursued. This technical discussion should include a proposed breakdown of research tasks and short description of the technical approaches for each task. The Proposed Effort should include the specific research questions and/or hypotheses to be tested, and what specific tasks will be performed by the research team to test them, as well as justification for why these are the appropriate measures. Technical Proposals must also include a brief summary of how this research addresses the broader needs of the program, as summarized in the program description above.
 - **Proposed Innovation Summit Series Participation and Collaboration Development (approximately 1 pages):** Must include the plan for participation in the Innovation Summit Series. Collaboration with US Army Research Lab or other Government research personnel is highly encouraged, as well as cross-connection with other Program participants. Include a plan to foster communication and collaboration across government, academic, and

industry partners, through planned participation in the Innovation Summit Series and other methods for developing multi-disciplinary collaborations throughout performance under the seedling CA. Proposals should also focus on the plan for development of collaborations to propose a follow-on option effort.

- **Participant(s) roles, qualifications and bio-sketches (approximately 1 pages):** Must include the names, primary role/availability, and brief biographies of individuals involved with the research. Include plans for junior investigator development and mentorship of less experienced personnel (mentoring plan).
- **Proposed timeline (approximately 0.5 page):** An estimated timeline of tasks to be completed during the 12-month period, including (1) components to be completed at the home institution(s) and (2) components planned during the Summit series.
- **Chapter 2: Cost Component.** The pages included in Chapter 2 will be numbered and Chapter 2 does not have a page limitation. Cost Application must include a budget for the 12 month period of performance. The cost portion of the application will contain cost estimates sufficiently detailed for meaningful evaluation, to include Summit series participation. Budget justification may also be attached in this chapter. Before award it must be established that an approved accounting system and financial management system exist.

For all applications, the budget details should include:

a. *Direct Labor*: Show the current and projected salary amounts in terms of man-hours, man- months, or annual salary to be charged by the personnel performing under this agreement either by personnel or position. State the number of man-hours used to calculate a man-month or man-year. For each person or position, provide the following information:

i. The basis for the direct labor hours or percentage of effort (e.g., historical hours or estimates);

ii. The basis for the direct labor rates or salaries. Labor costs should be predicted upon current labor rates or salaries. These rates may be adjusted upward for forecast salary or wage cost-of-living increases that will occur during the agreement period. The cost application should separately identify the rationale applied to base salary/wage for cost-of- living adjustments and merit increases. Each must be fully explained;

iii. The portion of time to be devoted to the requirements of the agreement;

iv. The total annual salary charged to the agreement; and

v. Any details that may affect the salary during the project, such as plans for leave and/or remuneration while on leave.

b. *Fringe Benefits and Indirect Costs (Overhead, G&A, and Other)*: The most recent rates, dates of negotiation, the base(s) and periods to which the rates apply must be disclosed and a statement included identifying whether the proposed rates are provisional or fixed. If the rates have been negotiated by a Government agency, state when and by

which agency. A copy of the negotiation memorandum should be provided. If negotiated forecast rates do not exist, applicants must provide sufficient detail to enable a determination to be made that the costs included in the forecast rate are allocable according to applicable cost provisions. Applicants' disclosure should be sufficient to permit a full understanding of the content of the rate(s) and how it was established. At a minimum, the submission should identify:

- i. All individual cost elements included in the forecast rate(s);
- ii. Basis used to prorate indirect expenses to cost pools, if any;
- iii. How the rate(s) was calculated;
- iv. Distribution basis of the developed rate(s);
- v. Basis on which the overhead rate is calculated, such as "salaries and wages" or "total costs;" and
- vi. The period of the applicant's FY.

c. Permanent Equipment: If facilities or equipment are required, a justification why this property should be purchased with Government funds must be submitted. State the organization's inability or unwillingness to furnish the facilities or equipment. Applicants must provide an itemized list of permanent equipment showing the cost for each item. Permanent equipment is any article or tangible nonexpendable property having a useful life of more than one year and an acquisition cost of \$5,000 or more per unit. The basis for the cost of each item of permanent equipment included in the budget must be disclosed, such as:

- i. Vendor Quote: Show name of vendor, number of quotes received and justification, if intended award is to other than lowest bidder.
- ii. Historical Cost: Identify vendor, date of purchase, and whether or not cost represents lowest bid. Include reason(s) for not soliciting current quotes.
- iii. Engineering Estimate: Include rationale for quote and reason for not soliciting current quotes.

If applicable, the following additional information shall be disclosed in the applicant's cost application:

- iv. Special test equipment to be fabricated by the Recipient for specific requirements in the agreement.
- v. Standard equipment to be acquired and modified to meet specific requirements, including acquisition and modification costs, listed separately.
- vi. Existing equipment to be modified to meet specific research requirements, including modification costs. Do not include equipment the organization will purchase with its funds if the equipment will be capitalized for Federal income tax purposes. Proposed permanent equipment purchases during the final year of an award shall be limited and fully justified.

vii. Grants and cooperative agreements may convey title to an eligible institution for permanent equipment purchased with project funds. At the discretion of the Contracting/Grants Officer, the agreement may provide for retention of the title by the Government or may impose conditions governing the equipment conveyed to the organization per the governing laws and regulations.

d. Travel: Forecasts of travel expenditures (domestic and foreign) that identify the destination (if known) and the various cost elements (airfare, mileage, per diem rates, etc.) must be submitted. The costs should be in sufficient detail to determine the reasonableness of such costs. Allowance for air travel normally will not exceed the cost of round-trip, economy air accommodations. Specify the type of travel and its relationship to the requirements of the agreement.

e. Participant Support Costs: This budget category refers to costs of transportation, per diem, stipends, and other related costs for participants or trainees (but not employees) in connection with DoD-sponsored conferences, meetings, symposia, training activities, and workshops. Generally, indirect costs are not allowed on participant support costs. The number of participants to be supported should be entered in the parentheses on the budget form. These costs should also be justified in the budget justification page(s) attached to the cost application.

f. Materials, Supplies, and Consumables: A general description and total estimated cost of expendable equipment and supplies are required. The basis for developing the cost estimate (vendor quotes, invoice prices, engineering estimate, purchase order history, etc.) must be included. If possible, provide a material list.

g. Publication, Documentation, and Dissemination: The budget may request funds for the costs of preparing, publishing, or otherwise making available to others the findings and products of the work conducted under an agreement, including costs of reports, reprints, page charges, or other journal costs (except costs for prior or early publication); necessary illustrations, cleanup, documentation, storage, and indexing of data and databases; and development, documentation, and debugging of software.

h. Consultant Costs: Applicants normally are expected to utilize the services of their own staff to the maximum extent possible in managing and performing the project's effort. If the need for consultant services is anticipated, the nature of proposed consultant services should be justified and included in the technical application narrative. The cost application should include the names of consultant(s), primary organizational affiliation, each individual's expertise, daily compensation rate, number of days of expected service, and estimated travel and per diem costs.

i. Computer Services: The cost of computer services, including computer-based retrieval of scientific, technical, and educational information, may be requested. A justification/explanation based on the established computer service rates at the proposing organization should be included. The budget also may request costs, which must be shown to be reasonable, for leasing automatic data processing equipment. The purchase of computers or associated hardware and software should be requested as items of equipment.

j. Subawards (Subcontracts or Subgrants): A precise description of services or materials that are to be awarded by a subaward must be provided. For subawards totaling \$10,000 or more, provide the following specific information:

- i. A clear description of the work to be performed;
- ii. If known, the identification of the proposed subawardee and an explanation of why and how the subawardee was selected or will be selected;
- iii. The identification of the type of award to be used (cost reimbursement, fixed price, etc.);
- iv. Whether or not the award will be competitive and, if noncompetitive, rationale to justify the absence of competition; and
- v. A detailed cost summary.

k. *ODCs*: Itemize and provide the basis for proposed costs for other anticipated direct costs such as communications, transportation, insurance, and rental of equipment other than computer related items. Unusual or expensive items must be fully explained and justified.

1. *Profit/Fee*: Profit/fee is not allowed for the Recipient of or subaward to an assistance instrument, where the principal purpose of the activity to be carried out is to stimulate or support a public purpose (i.e., to provide assistance), rather than acquisition (i.e., to acquire goods and services for the direct benefit of the Government). A subaward is an award of financial assistance in the form of money, or property in lieu of money, made under a DoD grant or cooperative agreement by a Recipient to an eligible subrecipient. The term includes financial assistance for substantive program performance by the Subrecipient of a portion of the program for which the DoD grant or cooperative agreement was made. It does not include the Recipient's procurement of goods and services needed to carry out the program.

- **Bibliography and Reference Cited (Field 9 on the form)** – Attach a listing of applicable publications cited in above sections.
- **Facilities and Other Resources (Field 10 on the form)** - The applicant is to provide a description of any facilities planned to be used for the project, whether at the home institution, a partner facility, or during the Innovation Summit Series. A note of support guaranteeing access to these facilities on behalf of their primary management should also be included. Attach this information at Field 10.
- **Equipment (Field 11 on the form)** - The applicant is to include a listing of equipment available to support the application. Any Government equipment necessary for performance is to be clearly identified. Attach this information at Field 11.
- **Other Attachments (Field 12 on the form)** are as follows:

Attached the completed certifications.

1. **FORM: SF-424 Research & Related Senior/Key Person Profile (Expanded) (Mandatory)** – The Degree Type and Degree Year fields on the Research and Related Senior/Key Person Profile (Expanded) form will be used by DoD as the source for career information. In addition to the required fields on the form, applicants must complete these two fields for all individuals that are identified as having the project role of PD/PI or Co-PI on the form. Additional senior/key persons can be added by selecting the “Next Person” button

2. **FORM: SF-424 (R&R) 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-Project 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.
3. **SF-LLL – Disclosure of Lobbying Activities.** If applicable, attach a complete SF- LLL at Field 11 of the R&R Other Project Information form. Applicability: 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 cooperative agreement, you must complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying."
4. Complete the **Representations under DoD Assistance Agreements: Appropriations Provisions on Tax Delinquency and Felony Convictions** (this can be found under National Policy Requirements)

3. Submission Dates and Times

Proposals are due in grants.gov by 3:00pm (local time in North Carolina, USA) on **16 May, 2022**. An email receipt will be provided to each Applicant for each Proposal submission received. Applications submitted after the closing date and time will not be considered or evaluated by the Government.

Application Receipt Notices

Grants.gov: After an application is submitted to Grants.gov, the AOR will receive a series of three emails from Grants.gov. The first two emails will be received within 24 to 48 hours after submission. The first email will confirm time of receipt of the application by the Grants.gov system and the second will indicate that the application has either been successfully validated by the system prior to transmission to the grantor agency or has been rejected due to errors. A third email will be received once the grantor agency has confirmed receipt of the application. Reference https://www.grants.gov/help/html/help/GetStarted/Get_Started.htm from the Grants.gov User Guide for information on how to track your application package.

For the purposes of this FOA, an applicant's application is not considered received by the Government until the AOR receives email #3.

APPLICATION REVIEW / EVALUATION INFORMATION

The following represents the evaluation criteria for this FOA:

Factor 1: Scientific Merit and Relevance: Evaluation of this factor will concentrate on the overall

scientific and technical merit, creativity, innovation, and flexibility of the proposed research in light of the current state-of-the-art of STRONG-relevant scientific topics, and the expected outcomes based on the timeline of execution. The scientific merit will be evaluated with regard to the specific research area to be addressed in this FOA. Evaluation of this factor will also concentrate on the long-term relevance of the proposed research and the likelihood the proposed research will address scientific challenges and research barriers facing the Army and commercial sectors, in addition to STRONG specific relevance.

Factor 2: Experience and Qualifications of Scientific Staff and Junior Investigator Development: Evaluation of this factor will concentrate on the qualifications, capabilities, availability, proposed level of effort, and experience of both the Applicant's key research personnel (individually and as a whole), their relevant past accomplishments, and their ability to achieve the proposed technical objectives. Plans for junior investigator development and mentorship of less experienced personnel will be an evaluation factor. Key personnel are expected to be substantially and meaningfully engaged in the research and the proposed level of effort for key personnel reflected in the proposal should be commensurate with and demonstrate such engagement. The extent to which the Applicant's proposed facilities and equipment will contribute to the accomplishment of the proposed research will be evaluated, including the nature, quality, relevance, availability, and access to state-of-the-art research facilities and equipment.

Factor 3: Collaboration / Ecosystem support: Evaluation of this factor will concentrate on the Applicant's strategies, plans and experience in fostering collaborative research and managing collaborative research programs as set forth in this FOA. Evaluation of this factor will include evidence of previous successful collaborative efforts, plans for participation at the Innovation Summit Series, the Applicant's commitment and plans for collaboration within the program and the synergistic value of the collaborations among researchers and government scientists. Of particular interest are the Applicant's plans for creative ideas or approaches to sharing and transition of research products (e.g., datasets, code/algorithms, models) that *create enduring collaborative potential and strengthen the overall innovation ecosystem amongst government, academic, and industry partners.*

Factor 4: Cost: While this area will not be weighted, evaluation of this area will consider cost realism, cost reasonableness, and affordability within funding constraints. The Government may make adjustments to the cost of the total proposed effort as deemed necessary to reflect what the effort should cost. These adjustments will consider the task undertaken and approach proposed. These adjustments may include upward or downward adjustments to proposed labor hours, labor rates, quantity of materials, price of materials, overhead rates and G&A, etc.

Review and Selection Process

All timely and compliant Proposal submissions will be evaluated in accordance with the evaluation criteria set forth above by an evaluation panel of qualified scientists and managers from the Government. The evaluation panel will provide recommendations for award to the decision maker for the Government. The decision maker will make decisions concerning award selection. The Government reserves the right not to make an award should no acceptable Proposal be submitted.

No other material outside of a Proposal will be provided to, or considered by, those evaluating proposals. An initial review of the proposals will be conducted to ensure compliance with the requirements of this FOA. Failure to comply with the requirements of the FOA may result in a proposal not being evaluated and receiving no further consideration for award.

Proposals that are timely and in compliance with the requirements of the FOA will be evaluated in accordance with merit based, competitive procedures. These procedures will include evaluation factors that will be evaluated using an adjectival and color rating system as follows:

OUTSTANDING (blue): The proposal is evaluated as outstanding for this factor. The proposal includes **one or more significant strengths that are not offset by weaknesses.**

GOOD (purple): The proposal is evaluated as good for this factor. The proposal includes **some strengths that are not offset by weaknesses.**

ACCEPTABLE (green): The proposal is evaluated as acceptable for this factor. **Any strengths and weaknesses in the proposal balance out.**

MARGINAL (yellow): The proposal is evaluated as marginal for this factor. While the proposal **may or may not contain some strengths, and strengths are more than offset by any weakness or weaknesses.**

UNACCEPTABLE (red): The proposal is evaluated as unacceptable for this factor. While the proposal **may or may not contain some strengths, and strengths are offset by any significant weakness or weaknesses.**

Recipient Qualification

The Grants Officer is responsible for determining a Recipient's qualification prior to award. In general, a Grants Officer will award grants or CAs only to qualified Recipients that meet the standards at 32 CFR 22.415. To be qualified, a potential Recipient must:

- (1) Have the management capability and adequate financial and technical resources, given those that would be made available through the grant or cooperative agreement, to execute the program of activities envisioned under the grant or cooperative agreement;
- (2) Have a satisfactory record of executing such programs or activities (if a prior Recipient of an award);
- (3) Have a satisfactory record of integrity and business ethics; and
- (4) Be otherwise qualified and eligible to receive a grant or cooperative agreement under applicable laws and regulations (see 32 CFR 22.420(c)).

Applicants are requested to provide information with proposal submission to assist the Grants Officer's evaluation of Recipient qualification.

In accordance with 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 TIAs as follows:

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

- (5) 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);

(6) 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;

(7) 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.

E. AWARD ADMINISTRATION INFORMATION

Award Notices

Should your Proposal be selected for award, you will be contacted telephonically or via email by the Grants Officer or his/her representative to discuss additional information required for award. This may include representations and certifications, revised budgets or budget explanations, and other information as applicable to the proposed award. The anticipated start date will be determined at that time.

The award document signed by the Government Grants Officer is the official and authorizing award instrument.

Administrative and National Policy Requirements

- a. Each award under this announcement will be governed by the general award terms and conditions in effect at the time of the award that conform to DoD's implementation of OMB guidance applicable to financial assistance in 2 CFR part 200, "Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards." The DoD Research and Development General Terms and Conditions are located at <https://www.onr.navy.mil/Contracts-Grants/submit-proposal/grants-proposal/grants-terms-conditions>. These terms and conditions are incorporated by reference in this announcement.
- b. You must comply with all applicable national policy requirements. The key national policy requirements that may relate to an award under this FOA are included in the terms and conditions specified in paragraph 2.a above.
- c. By electronically signing the SF-424, the applicant affirms its agreement with the following certification.

Certification Required for Grant and Cooperative Agreement Awards

The certification at Appendix A to 32 CFR Part 28 regarding lobbying is the only certification required at the time of application submission for a grant or cooperative agreement award. The certification is as follows:

"By signing and submitting an application that may result in the award of a grant exceeding \$100,000, the prospective awardee is certifying, to the best of his or her knowledge and belief that:

- (1) No federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, 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.
- (2) 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 employ of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit SF-LLL, "Disclosure of Lobbying Activities" in accordance with its instructions.
- (3) The undersigned 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, and loans, or 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. Code. Any person who fails the required certification shall be subject to a civil penalty or not less than \$10,000.00 and not more than \$100,000.00 for each failure.

d. Representations Required for Grant and Cooperative Agreement Awards

Appropriations Provisions on Tax Delinquency and Felony Convictions

Check either "is" or "is not" for each of these two representations, as appropriate for the proposing institution, include the AOR signature and point of contact information, and attach the representation page to Field 12 of the SF-424 Research & Related Other Project Information form. The page for these representations is provided with the application materials that are available for download at Grants.gov. Representations:

The applicant is () is not () a "Corporation" meaning any entity, including any institution of higher education, other nonprofit organization, or for-profit entity that has filed articles of incorporation. If the applicant is a "Corporation" please complete the following representations:

- (1) The applicant represents that it is () or 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 a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.
- (2) The applicant represents that it is () is not () a corporation that was convicted of a 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 should 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 considerations before award decisions are made.

OMB CONTROL NUMBER: 0704-0494

OMB EXPIRATION DATE: 11/30/2019

AGENCY DISCLOSURE NOTICE

The public reporting burden for this collection of information is estimated to average 5 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to the Department of Defense, Washington Headquarters Services, Executive Services Directorate, Directives Division, 4800 Mark Center Drive, East Tower, Suite 02G09, Alexandria, VA 22350-3100 [0704-0494]. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

Prohibition on Contracting with Entities that Require Certain Internal Confidentiality Agreements

Agreement with the representation below will be affirmed by checking the "I agree" box in block 17 of the SF-424 (R&R) as part of the electronic application submitted via Grants.gov. The representation reads as follows:

By submission of its 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: (1) the basis for this representation is a prohibition in Section 743 of the Financial Services and General Government Appropriations Act, 2015, Pub. L. 113- 235) on provision of funds through grants and cooperative agreements to entities with certain internal confidentiality agreements or statements; and (2) Section 743 states that it does not contravene requirements applicable to SF-312, Form 4414, or any other form issued by a Federal department or agency governing the nondisclosure of classified information.

Section 889 of the National Defense Authorization Act (NDAA) for Fiscal Year (FY) 2019

Section 889 of the National Defense Authorization Act (NDAA) for Fiscal Year (FY) 2019 (Public Law 115-232) prohibits the head of an executive agency from obligating or expending loan or grant funds to procure or obtain, extend, or renew a contract to procure or obtain, or enter into a contract (or extend or renew a contract) to procure or obtain the equipment, services, or systems prohibited systems as identified in section 889 of the NDAA for FY 2019.

(1) In accordance with 2 CFR 200.216 and 200.471, all awards that are issued on or after August 13, 2020, recipients and subrecipients are prohibited from obligating or expending loan or grant funds to:

1. Procure or obtain;
2. Extend or renew a contract to procure or obtain; or,
3. Enter into a contract (or extend or renew a contract) to procure or obtain equipment, services, or systems that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. As described in Public Law 115- 232, section 889, covered telecommunications equipment is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).

(a) For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).

(b) Telecommunications or video surveillance services provided by such entities or using such equipment.

(c) Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

(2) In implementing the prohibition under Public Law 115-232, section 889, subsection (f), paragraph (1), heads of executive agencies administering loan, grant, or subsidy programs shall prioritize available funding and technical support to assist affected businesses, institutions and organizations as is reasonably necessary for those affected entities to transition from covered communications equipment and services, to procure replacement equipment and services, and to ensure that communications service to users and customers is sustained.

(3) See Public Law 115-232, section 889 for additional information.

COVERED FOREIGN COUNTRY means the People's Republic of China.

e, **National Security:**

(1) This announcement requires that all current and pending research support, as defined by Section 223 of the FY21 National Defense Authorization Act must be disclosed annually, for all covered individuals identified in the proposal. Such disclosure will be updated annually during the performance of any research project selected for funding, and whenever covered individuals are added or identified as performing under the project.

(2) Any decision to accept a proposal for funding under this announcement will include full

reliance on the applicant's statements. Failure to report fully and completely all sources of project support and outside positions and affiliations may be considered a material statement within the meaning of the federal False Claims Act, and constitute a violation of law.

- (2) The funding agency will conduct a pre-award security review of any proposal selected for funding, and may impose additional security requirements on a resulting award, based on that review. Additional award requirements, where applicable, may include requirements for personnel or facility security clearances, additional background reporting on participants, including students and post graduate researchers, and/or imposition of citizenship requirements on participants. Offerors are advised that any significant national security risk identified may be a basis for the rejection of an otherwise awardable proposal.

F.AGENCY CONTACTS

All questions or comments concerning this FOA should be submitted on or before (see Event timeline above). Questions and comments should be concise and to the point. In addition, the relevant part and paragraph of the FOA must be referenced. Responses to non-proprietary questions received by the specified date will be posted to the STRONG website for the benefit of all interested parties. Should an Applicant have questions they believe are of a proprietary nature, the Applicant must clearly state so and identify and mark the proprietary information in the question when submitted. Answers to questions of a proprietary nature will be provided via email directly to the requestor of the question and not posted on the STRONG website.

G. OTHER – HUMAN SUBJECTS

Assistance Instruments:

- a. The Recipient must protect the rights and welfare of individuals who participate as human subjects in research under this award and comply with the requirements at 32 CFR part 219, Department of Defense Instruction (DoDI) 3216.02, 10 U.S.C. 980, and when applicable, Food and Drug Administration (FDA) regulations.
- b. The Recipient must not begin performance of research involving human subjects, also known as human subjects research (HSR), that is covered under 32 CFR part 219, or that meets exemption criteria under 32 CFR 219.101(b), until you receive a formal notification of approval from a DoD Human Research Protection Official (HRPO). Approval to perform HSR under this award is received after the HRPO has performed a review of the Recipient's documentation of planned HSR activities and has officially furnished a concurrence with the Recipient's determination as presented in the documentation.
- c. In order for the HRPO to accomplish this concurrence review, the Recipient must provide sufficient documentation to enable his or her assessment as follows:
 - i. If the HSR meets an exemption criteria under 32 CFR 219.101(b), the documentation must include a citation of the exemption category under 32 CFR 219.101(b) and a rationale statement.
 - ii. If the Recipient's activity is determined as "non-exempt research involving human subjects", the documentation must include:
 - Assurance of Compliance (i.e., Department of Health and Human Services Office for Human Research Protections (OHRP) Federal Wide Assurance (FWA)) appropriate for the scope of work or program plan; and
 - Institutional Review Board (IRB) approval, as well as all documentation reviewed by the IRB to make their determination.
- d. The HRPO retains final judgment on what activities constitute HSR, whether an exempt category applies, whether the risk determination is appropriate, and whether the planned HSR activities

- comply with the requirements in paragraph (a) of this section.
- e. The Recipient must notify the HRPO immediately of any suspensions or terminations of the Assurance of Compliance.
 - f. DoD staff, consultants, and advisory groups may independently review and inspect the Recipient's research and research procedures involving human subjects and, based on such findings, DoD may prohibit research that presents unacceptable hazards or otherwise fails to comply with DoD requirements.
 - g. Definitions for terms used in this article are found in DoDI 3216.02.