Broad Agency Announcement

Advanced Plant Technologies (APT)

BIOLOGICAL TECHNOLOGIES OFFICE

HR001118S0005

November 21, 2017

TABLE OF CONTENTS

PART I: OVERVIEW INFORMATION

- **Federal Agency Name** – Defense Advanced Research Projects Agency (DARPA), Biological Technologies Office (BTO)
- **Funding Opportunity Title –** Advanced Plant Technologies (APT)
- **Announcement Type –** initial announcement
- **Funding Opportunity Number –** HR001118S0005
- **Catalog of Federal Domestic Assistance Numbers (CFDA) – 12.910 Research and Technology Development**
- **Dates**
  - Posting Date – **November 21, 2017**
  - Proposal Abstract Due Date and Time – **January 11, 2018, 4:00 PM ET**
  - Proposal Due Date and Time/BAA Closing – **February 21, 2018, 4:00 PM ET**
  - Proposers Day – December 12, 2017

https://www.fbo.gov/spg/ODA/DARPA/CMO/DARPA-SN-18-05/listing.html

- **Concise description of the funding opportunity –** The goal of the DARPA Advanced Plant Technologies (APT) program is to create the foundations for engineering plant varieties able to receive a variety of stimuli and produce measurable signals as output ("stimulus-response"). APT will rigorously explore the feasibility of using engineered plant varieties as independent biosensors.
- **Anticipated individual awards** – Multiple awards are anticipated.
- **Types of instruments that may be awarded** – Procurement contract, grant, cooperative agreement or other transaction.
- **Agency contact**
  - Points of Contact
    The BAA Coordinator for this effort may be reached at:
    APT@darpa.mil
    DARPA/BTO
    ATTN: HR001118S0005
    675 North Randolph Street
    Arlington, VA 22203-2114

PART II: FULL TEXT OF ANNOUNCEMENT

1. Funding Opportunity Description

This publication constitutes a Broad Agency Announcement (BAA) as contemplated in Federal Acquisition Regulation (FAR) 6.102(d)(2) and 35.016 and 2 CFR § 200.203. Any resultant award negotiations will follow all pertinent law and regulation, and any negotiations and/or awards for procurement contracts will use procedures under FAR 15.4, Contract Pricing, as specified in the BAA.

The Defense Advanced Research Projects Agency (DARPA) is soliciting innovative research proposals to enable the development of advanced plant technologies for the detection of environmental threats. Respondents to this BAA must propose research that leads to groundbreaking advancements in robust plant-based sensing and reporting of specific stimuli. Specifically excluded is research that primarily results in incremental improvements to the existing state of practice.

1.1. PROGRAM OVERVIEW

The goal of the APT program is to control and direct plant physiology to detect chemical, biological, radiological, and/or nuclear threats, as well as electromagnetic signals. Plant sensors developed under the program will sense specific stimuli and report these signals with a remotely recognized phenotype (e.g., modified reflectance, morphology, phenology, etc.). Modern plant biotechnology holds significant promise for addressing a range of Department of Defense (DoD) needs; plants are easily deployed, self-powering, and ubiquitous in the environment, and the combination of these native abilities with specifically engineered sense-and-report traits will produce sensors occupying new and unique operational spaces. The long-term success of engineered plant sensors requires the ability to ensure plant survivability for months or years in a natural environment subject to stresses not present in a laboratory environment. Meeting both the sensor and survivability technical goals of the APT program will require a combination of plant genomics emerging technologies, precision gene editing tools, and novel methods for engineering new sensing capabilities and physiological responses. Proposing teams should include experts in diverse fields including plant physiology, gene editing, biochemistry, modelling, phenotyping, remote sensing, and plant ecology.

1.2. TECHNICAL APPROACH & SCHEDULE

The APT program will create novel plant-based sensors that sense and report DoD-relevant stimuli. These stimuli should be related to human activities (e.g., intentional or accidental chemical or biological release) and not be a natural function of the plant. Engineered plant responses must be distinguishable from background plant phenotypes. Proposers should explore sense-and-report traits that overcome drawbacks associated with currently deployed, non-plant sensors and consider the creation of systems capable of concurrently sensing multiple (>3) stimuli with separate identifiable response traits for each.

Classes of DoD-relevant stimuli include: biological agents (e.g., spores, virus, bacteria, toxins), chemicals (e.g., organic, inorganic), and radiative signals (e.g., EM, RF, particle

decay). Substitute stimuli that are similar to but less toxic/dangerous than existing national security threats, and that are equally difficult to detect, are preferred.

Plant sensor platforms developed in the APT program must be based on non-model plants that have the ability to persist for long periods without being affected by normal variation in outdoor conditions (e.g., climate, native biota). Proposals relying solely on model systems, such as *Arabidopsis* and *Nicotiana*, will be considered non-responsive to this BAA. Despite this emphasis on robustness in the environment, there will be no environmental release of any developed plant sensors and all research will occur in secure biocontainment that will progress from small (e.g., benchtop) to large (e.g., greenhouse) scale over the life of the program.

To accomplish the above program goals, proposers will leverage state-of-the-art plant gene alteration techniques towards three specific and complementary technical objectives:

1. **Identify, test, and integrate genetic components for plant sensing and reporting.** Proposers will engineer sense-and-report traits into plants by designing and engineering the appropriate gene sequences and pathways for sensor and signal transduction components and for the production of response phenotypes.

2. **Tailor plant resource collection and allocation to support sense-and-report traits.** Proposers will modify the genetics of the plant chassis to ensure sensing and reporting capabilities by collecting energy, nutrients, water, and other potentially limiting substrates that negatively affect the plant's ability to sense and report target stimuli.

3. **Ensure long-term sense-and-report capability by engineering plants to be robust in intended environments.** Proposers will modify the plant chassis for robustness in the environment, by enhancing interactions with other species of plants, insects, and microbes, without disruption to native ecological communities.

The targeted stimulus modalities, response phenotypes, and other innovative traits must be clearly identified in the proposal and the choices sufficiently aligned with the overall program goal of producing a robust plant-based sensor platform.

The proposed research must describe the design, implementation, and evaluation of the plant-based sensor platforms over three sequential 6, 18, and 24 month phases, respectively, totaling 48 months altogether. Each component of the technical approach (Table 1) must build towards overall program success, and progress towards the program goal will be assessed at the end of each phase (Section 1.4) through a workshop (Phase I) and demonstrations (Phases II and III).

Table 1: Summary APT Program Structure and Technical Overview

Phase I ***6 Months /*** **Laboratory**	**Phase II** ***18 Months /*** **Greenhouse**	**Phase III** ***24 Months /*** **Greenhouse**
• Identify genomic alterations necessary for engineered sense-and-report phenotype • Identify and select underlying resource collection and allocation strategy to support sense-and-report phenotype • Identify local ecological interactions supporting environmental stability of sense-and-report capability • Produce predictive models for plant sense-and-report performance and select design strategy based on outcome	• Genetically modify plants for sensing, reporting, resource management, and ecology traits consistent with program objectives • Implement multiple rounds of design-build-test (DBT) cycles to achieve desired performance and trait outcomes • Challenge altered plants with treatments (e.g., chemical and environmental stimuli) to assess performance and stability under simulated real-world conditions	• Integrate all engineered plant traits into a single plant chassis • Characterize APT plants' sense-and-report performance • Phenotype plants in complex simulated environments
Workshop	**Phase II Demonstration**	**Phase III Demonstration**
• Presentation of comprehensive strategy for creating a robust plant-based sensor of DoD-relevant stimuli, supported by laboratory data and model results	• Modified plants with functioning sensing, reporting, resource management, and ecology traits consistent with program objectives	• Modified plants able to dependably sense DoD-relevant stimuli in an operational environment simulation

1.3. PROGRAM MILESTONES, METRICS & DELIVERABLES

The Government provides the following program milestones, metrics, and deliverables to determine progress toward the program goal. Although the following minimum milestones, metrics, and deliverables are specified, the Government identifies these to bound the effort while

affording the maximum flexibility, creativity, and innovation in proposing solutions to the stated problems.

Proposals must address all key technical milestones during the period of performance. A minimal set of milestones, metrics, and deliverables is given in Tables 3-5 and proposers must define additional quantitative and qualitative success criteria and milestones unique to their approach. Proposers must clearly and uniquely itemize tasks needed to accomplish planned milestones and deliverables.

Phase I (6 Months)

During Phase I proposers will rapidly identify specific genetic components to enable robust sense-and-report plant capabilities. Because plant sense-and-report physiology requires novel resource demands, enhanced resource management via genetic engineering must also be addressed. Modified plant sensors must persist for the life of the plant without degrading the environment, so plants must also be designed to optimize their ecological interactions. Resource and ecology traits should not enhance the plant beyond background rates of primary production, and are intended only to provision the plant chassis with the conditions necessary to ensure consistent sense-and-report capability.

During Phase I, proposers must completely develop their proposed plan and identify and address all project risks. The sensing capability must advance the state of the art by employing pathway-level modifications. Sensing must be generalizable and valid for distinct stimuli (Table 2). Sensing must be coupled to responses such as growth pattern, reflectance, or temperature change.

Table 2: Minimal source stimulus concentrations for relevant sensing receptors.

Source	Subclass[A]	Stimulus threshold[B]
Biological	Spores	25,000 per m^3
	Viruses	1 TCID50[*]
	Bacteria	50 cfu[**]/mL
	Toxin	1 µg/L or kg
Chemical	Organic	0.001 mg/L
	Inorganic	0.01 mg/L
EM Radiation	(Near) Visible	1 lux
Radioactive decay	All	30 millirems/yr

[*] Tissue Culture Infectious Dose 50%
[**] Colony forming units
[A] Categories are notional to frame the scope of the effort.
[B] The metrics are given as envisioned competencies and are meant to be illustrative, not prescriptive. Proposers must design rigorous sensory capabilities based on their proposed system.

Proposers must outline a specific, integrated plan to curate and leverage genomic information for optimal sensing, reporting, resource management, and ecology trait design and discovery. Sense-and-report capabilities may divert resources from positive ecological interactions therefore negative outcomes must be limited to promote survivability. The feasibility of all planned genetic modifications must be clearly established by previous or newly generated empirical results.

In addition, proposers must develop predictive mathematical and/or conceptual model(s) to predict the interaction of all proposed traits. Model results should also be used to evaluate project risks and determine appropriate risk mitigation strategies in Phases II and III.

In a Phase I concluding workshop performing teams will present their comprehensive strategy for creating robust plant-based sensors of DoD-relevant stimuli, supported by laboratory data and model results generated during the phase. The end-of-phase report documenting this strategy must identify all planned engineered plant chassis genetic elements, validate target gene functionality, and provide predictive model results to support projected outcomes.

Table 3: Minimally-required Phase I milestones, metrics and deliverables.

Milestones	Metrics	Deliverables
• Identify and curate genomic information for desired sense-and-report capability • Identify and curate genomic information for resource and ecology traits in support of sense-report capability • Experimentally validate activity/role of identified genes and pathways • Establish the feasibility of proposed genetic alterations using established or novel molecular methods	• Successful *in vitro* expression of 3+ stimulus (sensing) genetic pathways • Successful induction of 3+ remotely-detectable response signals (reporting) in plant • Successful induction of 1 enhanced resource management trait to support sense-and-report objectives • Successful induction of 1 enhanced ecological interaction trait to support sense-and-report objectives	• Comprehensive strategy for developing a robust plant sensor and reporter of DoD-relevant stimuli with laboratory confirmation of feasibility • Mathematical and/or conceptual model(s) to capture impact of proposed plant resource management strategy and ecological interactions on sense-and-report capability **Phase I report (month 6):** • End-of-phase report documenting model results and chosen genetic elements to be engineered into the plant chassis

Phase II (18 months)

During Phase II proposers will implement the strategy developed in Phase I and design, build, and test (DBT) individual plant sensor components. Proposers will focus and develop their capabilities in genetic modification, physiology optimization, and phenotype validation during this phase. DBT cycle genetic modifications and experiments will produce desired sensing, reporting, resource, and/or ecology traits. For each DBT cycle, intermediate quantitative metrics for evaluating progress must be identified by the proposer. DBT cycles should include treatments (e.g., Table 2 stimuli concentrations) demonstrating engineered traits that support the target sense-and-report capabilities. DBT cycles must also include phenotype analysis and quantitative assessment of molecular trait regulators. Phase II analytical results must be compared to Phase I model predictions.

It is anticipated that multiple concurrent DBT cycles will occur in order to meet all minimally-required (Table 4) and proposer-defined success criteria for Phase II.

At the end of Phase II, proposers will demonstrate that genetically-modified plants have isolated, functional traits consistent with program objectives. These plants will be used to demonstrate the foundational capabilities that will later be combined into integrated plant sensors in Phase III.

Table 4: Minimally-required Phase II milestones, metrics and deliverables.

Milestones	Metrics	Deliverables
• Produce plants with gene network alterations resulting in desired sense-and-report capability • Produce plants with supportive resource management and ecology traits for sensor role • Complete DBT cycle(s) for individual functioning sensing, reporting, resource management, and ecology traits	• Sensory trait-related gene expression change >2σ above normalized control • Verified function with stimulus treatment at minimum target concentration (Table 2 or equivalent) • Induced plant response trait produces unambiguous quantitative difference from wildtype • Level of gene expression and production of phenotype matching model predictions	• Genetically-modified plants with individual functioning sensing, reporting, resource management, and ecology traits consistent with program objectives growing in a controlled greenhouse environment • Annotated genomes of all modified plants **Phase II report (month 24):** • End-of-phase demonstration report documenting the sensing trait and reporting trait functionality

Phase III (24 Months)

During Phase III proposers will integrate individual sensing, reporting, resource management, and ecology traits demonstrated in Phase II into integrated plant sensors. Proposers will select the most successful individually developed sensing, reporting, resource, and ecology traits tested during Phase II. These individual traits will be combined into integrated plant sensors that will continue to be optimized and evaluated throughout Phase III.

Proposers should use Table 4 metrics to choose the best performing sensing and reporting traits for integration. The efficacy of a single sense-and-report pair is the main success criterion for Phase III; however, generalizable and modular frameworks allowing flexible sense-and-report capability are also highly valuable.

The plant sensor's ability to survive and operate independently will be challenged in complex simulated greenhouse environments. Proposers must evaluate the plant sensor performance during at least two sequential simulations designed to assess sense-and-report performance in real-world conditions. Greenhouse simulations must include multiple organisms that are major components of the typical ecosystem that the plant chassis species is embedded within. Greenhouse simulations should be designed to evaluate the combined effects of climate and species interactions on plant sensor efficacy. Greenhouse simulations should also assess and minimize any negative effects of engineered plants on their deployed environment.

Proposers must evaluate plant sensor capability by exposing sensors to target stimuli and measure responses to demonstrate high sensor specificity and sensitivity (Table 5). Proposers should further analyze sensor phenotypes to ensure plant quality and performance over time.

At the end of Phase III, proposers must demonstrate the functionality of genetically-modified plants using a pressure test experiment with stimulus application(s) in a final complex environment experiment. The end-of-program report should thoroughly document a dependable plant sensor in a realistic scenario.

Table 5: Minimally-required Phase III milestones, metrics, and deliverables

Milestones	Metrics	Deliverables
• Integration of sensing, response, resource management, and ecology traits into a plant sensor • Test plant sensors in complex environment challenge to reliably detect performer-defined DoD-relevant stimuli (see Section 1.2) • Test plant sensors survivability in complex environments	• Expose plant for 1+ sense-and-report use with less than 5% positive/negative occurrence at levels outlined in Table 2 (or equivalent for specific chosen stimulus) • > 95% of plant sensors survive complex greenhouse simulations for >2 months after growth to mature plant • Complex environment must consist of multiple organisms accurately representing a plant sensor real-world scenario	**Mid-phase report (month 36):** • Present performance outcomes of the sensors during environment simulation(s) • Present results from sense-and-report exposure(s) for analysis **Final report (month 48):** • End-of-phase demonstration illustrating successful sensing and reporting of DoD-relevant stimuli (see Section 1.2)

1.4. PROGRAM DEMONSTRATIONS

To demonstrate that program goals are being met, proposers must describe evaluations at the end of each phase. Phase I will conclude with a workshop during which proposers will present a comprehensive strategy for creating a robust plant-based sensor, based on laboratory data and model results generated during the phase. Demonstrations at the end of Phase II and III will be used as a standard to assess successful phase outcomes and completion. A government team will ensure reproducibility of demonstration experiments by validating data, verifying reproducibility of results, and further testing performer-reported capabilities. During each end-of-phase demonstration, proposing teams should anticipate further coordination with government subject matter experts for the addition of supplementary stimuli, visualization of response traits, and testing of plant robustness.

Phase II Demonstration (at 24 months/end of Phase II, small enclosure scale)

Proposers must demonstrate performance of the target stimulus, response, resource, and ecology traits through pressure test experiments. Plant sensors must be verified by stimulus application at ≥3 strengths/intensities including minimum thresholds (e.g., Table 2 or equivalent). Response phenotypes must be confirmed by inducing the response gene and observing response phenotypes, with an unambiguous quantitative response trait change when compared to wildtype. Resource and ecology trait tests must occur at ≥3 treatment quantities, and demonstrate trait support for the sense-and-report phenotype of the Phase III integrated plant sensor platform; for example, if an expected requirement of a sense-and-report capability is a 20% increase in nitrogen demand over wildtype plants, a resource trait providing this additional 20% nitrogen must be demonstrated. Importantly, resource and ecology treatments must not exceed background rates of environmental variation since these traits act in support of the plant's sensor function. The stimulus, response, resource, and ecology traits must work in a controlled experimental greenhouse to achieve 75% of expected model outcomes from Phase I. Observable trait responses must be accompanied by quantitative molecular characterization (e.g., measurement of gene expression), with a change in trait-related gene expression of >2σ above normalized control, and all measured and relevant molecular concentrations must be congruent with model predictions.

Phase III Demonstration (at 48 months/end of Phase III, large greenhouse scale)

Proposers must demonstrate successful integrated plant sensor functionality by detecting and reporting trace stimuli strengths/intensities in an enclosed greenhouse environment mimicking potential plant sensor deployment ecosystems (e.g., grassland, desert, urban). Stimulus treatment strengths/intensities must be at detection limits within 10% of a currently deployed non-plant sensor platform or hazardous threshold. The complex ecological community in which the mature sensor plants will be embedded must include at least ten naturally co-occurring plant, insect, and/or microbial species representing competitive, predator/parasitic, and mutualistic functional classes. Microclimatic enclosure conditions (i.e., temperature range, humidity) must be within 25% of average daily values representative of the mimicked environment. Reporting phenotypes must be detectable from at least 3 meters above the plant canopy for no later than 12 hours post stimulus exposure. Plant sensor specificity and sensitivity must meet or exceed 95%. The government may have additional evaluation criteria that will be established by the Program Manager based on the unique characteristics of proposed plant sensors.

1.5. GENERAL REQUIREMENTS

Regardless of the specific approach, proposers to the APT program must address each of the following features:

Proposing Teams

It is expected that proposals will involve multidisciplinary teams that include expertise from multiple complementary disciplines (e.g., synthetic biology, sensor technology, plant genomics and ecology).

Specific content, communications, networking, and team formation are the sole responsibility of the proposer teams. Proposer teams must submit a single, integrated proposal led by a single Program Integrator/Manager or prime contractor that addresses all program Phases, as applicable.

DARPA will hold a Proposers Day (see Section 8, Other Information) to facilitate the formation of proposer teams with the expertise necessary to meet the goals of the program and enable sharing of information among interested proposers through the DARPA Opportunities Page and the Proposers Day registration website.

Data Sharing

DARPA anticipates that a large amount of data will be generated under this program by each performer and that the analyses and validation will be strengthened by compiling and integrating information across all performers. Performers are strongly encouraged to establish the appropriate agreements to enable collaboration and data sharing. DARPA encourages sharing of pre-existing data including those generated through funding by other sources, although this is not a requirement of the program.

Biocontainment and Biosafety

The APT program will be conducted in appropriate biocontainment facilities in accordance with USDA-APHIS regulations and will not support any proposals that include uncontained experiments and environmental release of such organisms.

Controlled Unclassified Information (CUI)

To prevent the release of sensitive technical information certain aspects of proposals may be considered CUI and may require safeguarding or dissemination controls, pursuant to and consistent with applicable law, regulations, and government-wide policies.

The following applied military technical information could be considered Controlled Technical Information (CTI) by DARPA:

- Plant Sensing: Performance specifications and data of upper and lower limits of detection for chemical and/or biological agents banned by international treaty (e.g., Biological Weapons Convention) or related to specific national security threats.
- Plant Reporting: Performance specifications and data of plant response profiles using commercial or military detection platforms.

Proposals that produce any such information must deliver a detailed risk mitigation plan to DARPA (see 4.2.2. Proposal Format Section II: I). Performers must partition potentially sensitive tasks from non-sensitive research efforts. All performers (prime contractor and

subcontractor) desiring public release of project information that may contain CTI as defined above must submit a request for public release from DARPA's Public Release Center (DARPA/PRC) in accordance with their contractual requirements.

Technology Transfer

Proposers must include an APT Technology Transfer Plan. Proposers must provide information regarding the types of partners (e.g., government, private industry) that will be pursued and submit a timeline with incremental milestones toward successful engagement. If awarded, DARPA must be included in the development of potential technology transfer relationships. If the Technology Transfer Plan includes the formation of a start-up company then a business development strategy must also be provided.

Other requirements

Performers are expected to attend semi-annual program reviews to provide scientific and technical updates to the selected performers on the APT program on progress towards their milestones and scientific goals, and to summarize outstanding challenges and limitations that must still be overcome to achieve the overarching goals of the program.

2. Award Information

2.1. GENERAL AWARD INFORMATION

Multiple awards are possible. The amount of resources made available under this BAA will depend on the quality of the proposals received and the availability of funds.

The Government reserves the right to select for negotiation all, some, one, or none of the proposals received in response to this solicitation and to make awards without discussions with proposers. The Government also reserves the right to conduct discussions if it is later determined to be necessary. If warranted, portions of resulting awards may be segregated into pre-priced options. Additionally, DARPA reserves the right to accept proposals in their entirety or to select only portions of proposals for award. In the event that DARPA desires to award only portions of a proposal, negotiations may be opened with that proposer. The Government reserves the right to fund proposals in phases with options for continued work, as applicable. The Government reserves the right to request any additional, necessary documentation once it makes the award instrument determination. Such additional information may include but is not limited to Representations and Certifications (see Section 6.2.3., "Representations and Certifications"). The Government reserves the right to remove proposers from award consideration should the parties fail to reach agreement on award terms, conditions, and/or cost/price within a reasonable time, and the proposer fails to timely provide requested additional information. Proposals identified for negotiation may result in a procurement contract, grant, cooperative agreement, or other transaction, depending upon the nature of the work proposed, the required degree of interaction between parties, whether or not the research is classified as Fundamental Research, and other factors.

Proposers looking for innovative, commercial-like contractual arrangements are encouraged to consider requesting Other Transactions. To understand the flexibility and options associated with Other Transactions, consult http://www.darpa.mil/work-with-us/contract-management#OtherTransactions.

In all cases, the Government contracting officer shall have sole discretion to select award instrument type, regardless of instrument type proposed, and to negotiate all instrument terms and conditions with selectees. DARPA will apply publication or other restrictions, as necessary, if it determines that the research resulting from the proposed effort will present a high likelihood of disclosing performance characteristics of military systems or manufacturing technologies that are unique and critical to defense. Any award resulting from such a determination will include a requirement for DARPA permission before publishing any information or results on the program. For more information on publication restrictions, see the section below on Fundamental Research.

2.2. FUNDAMENTAL RESEARCH

It is DoD policy that the publication of products of fundamental research will remain unrestricted to the maximum extent possible. National Security Decision Directive (NSDD) 189 defines fundamental research as follows:

> 'Fundamental research' means basic and applied research in science and engineering, the results of which ordinarily are published and shared broadly within the scientific community, as distinguished from proprietary research and from industrial development, design, production, and product utilization, the results of which ordinarily are restricted for proprietary or national security reasons.

As of the date of publication of this BAA, the Government expects that program goals as described herein may be met by proposers intending to perform fundamental research and proposers not intending to perform fundamental research or the proposed research may present a high likelihood of disclosing performance characteristics of military systems or manufacturing technologies that are unique and critical to defense. Based on the nature of the performer and the nature of the work, the Government anticipates that some awards will include restrictions on the resultant research that will require the awardee to seek DARPA permission before publishing any information or results relative to the program.

Proposers should indicate in their proposal whether they believe the scope of the research included in their proposal is fundamental or not. While proposers should clearly explain the intended results of their research, the Government shall have sole discretion to select award instrument type and to negotiate all instrument terms and conditions with selectees. Appropriate clauses will be included in resultant awards for non-fundamental research to prescribe publication requirements and other restrictions, as appropriate. This clause can be found at http://www.darpa.mil/work-with-us/additional-baa.

For certain research projects, it may be possible that although the research being performed by the awardee is restricted research, a subawardee may be conducting fundamental research. In

those cases, it is the awardee's responsibility to explain in their proposal why its subawardee's effort is fundamental research

3. Eligibility Information

3.1. ELIGIBLE APPLICANTS

All responsible sources capable of satisfying the Government's needs may submit a proposal that shall be considered by DARPA.

3.1.1. Federally Funded Research and Development Centers (FFRDCs) and Government Entities

FFRDCs

FFRDCs are subject to applicable direct competition limitations and cannot propose to this BAA in any capacity unless they meet the following conditions: (1) FFRDCs must clearly demonstrate that the proposed work is not otherwise available from the private sector. (2) FFRDCs must provide a letter on official letterhead from their sponsoring organization citing the specific authority establishing their eligibility to propose to Government solicitations and compete with industry, and their compliance with the associated FFRDC sponsor agreement's terms and conditions. This information is required for FFRDCs proposing to be awardees or subawardees.

Government Entities

Government Entities (e.g., Government/National laboratories, military educational institutions, etc.) are subject to applicable direct competition limitations. Government entities must clearly demonstrate that the work is not otherwise available from the private sector and provide written documentation citing the specific statutory authority and contractual authority, if relevant, establishing their ability to propose to Government solicitations.

Authority and Eligibility

At the present time, DARPA does not consider 15 U.S.C. § 3710a to be sufficient legal authority to show eligibility. While 10 U.S.C.§ 2539b may be the appropriate statutory starting point for some entities, specific supporting regulatory guidance, together with evidence of agency approval, will still be required to fully establish eligibility. DARPA will consider FFRDC and Government entity eligibility submissions on a case-by-case basis; however, the burden to prove eligibility for all team members rests solely with the proposer.

3.1.2. Non-U.S. Organizations

Non-U.S. organizations and/or individuals may participate to the extent that such participants comply with any necessary nondisclosure agreements, security regulations, export control laws, and other governing statutes applicable under the circumstances.

3.2. ORGANIZATIONAL CONFLICTS OF INTEREST

FAR 9.5 Requirements

In accordance with FAR 9.5, proposers are required to identify and disclose all facts relevant to potential OCIs involving the proposer's organization and *any* proposed team member (subawardee, consultant). Under this Section, the proposer is responsible for providing this disclosure with each proposal submitted to the BAA. The disclosure must include the proposer's, and as applicable, proposed team member's OCI mitigation plan. The OCI mitigation plan must include a description of the actions the proposer has taken, or intends to take, to prevent the existence of conflicting roles that might bias the proposer's judgment and to prevent the proposer from having unfair competitive advantage. The OCI mitigation plan will specifically discuss the disclosed OCI in the context of each of the OCI limitations outlined in FAR 9.505-1 through FAR 9.505-4.

Agency Supplemental OCI Policy
In addition, DARPA has a supplemental OCI policy that prohibits contractors/performers from concurrently providing Scientific Engineering Technical Assistance (SETA), Advisory and Assistance Services (A&AS) or similar support services and being a technical performer. Therefore, as part of the FAR 9.5 disclosure requirement above, a proposer must affirm whether the proposer or *any* proposed team member (subawardee, consultant) is providing SETA, A&AS, or similar support to any DARPA office(s) under: (a) a current award or subaward; or (b) a past award or subaward that ended within one calendar year prior to the proposal's submission date.

If SETA, A&AS, or similar support is being or was provided to any DARPA office(s), the proposal must include:

- The name of the DARPA office receiving the support;
- The prime contract number;
- Identification of proposed team member (subawardee, consultant) providing the support; and
- An OCI mitigation plan in accordance with FAR 9.5.

Government Procedures
In accordance with FAR 9.503, 9.504 and 9.506, the Government will evaluate OCI mitigation plans to avoid, neutralize or mitigate potential OCI issues before award and to determine whether it is in the Government's interest to grant a waiver. The Government will only evaluate OCI mitigation plans for proposals that are determined selectable under the BAA evaluation criteria and funding availability.

The Government may require proposers to provide additional information to assist the Government in evaluating the proposer's OCI mitigation plan.

If the Government determines that a proposer failed to fully disclose an OCI; or failed to provide the affirmation of DARPA support as described above; or failed to reasonably provide additional information requested by the Government to assist in evaluating the proposer's OCI mitigation plan, the Government may reject the proposal and withdraw it from consideration for award.

3.3. COST SHARING/MATCHING

Cost sharing is not required; however, it will be carefully considered where there is an applicable statutory condition relating to the selected funding instrument. Cost sharing is encouraged where

there is a reasonable probability of a potential commercial application related to the proposed research and development effort.

For more information on potential cost sharing requirements for Other Transactions for Prototype, see http://www.darpa.mil/work-with-us/contract-management#OtherTransactions

4. Application and Submission Information

4.1. ADDRESS TO REQUEST APPLICATION PACKAGE

This announcement, any attachments, and any references to external websites herein constitute the total solicitation. If proposers cannot access the referenced material posted in the announcement found at http://www.darpa.mil, contact the administrative contact listed herein.

4.2. CONTENT AND FORM OF APPLICATION SUBMISSION

All submissions, including abstracts and proposals must be written in English with type not smaller than 12 point font. Smaller font may be used for figures, tables, and charts. Copies of all documents submitted must be clearly labeled with the DARPA BAA number, proposer organization, and proposal title/proposal short title.

4.2.1. Proposal Abstract Format

Proposers are strongly encouraged to submit an abstract in advance of a proposal to minimize effort and reduce the potential expense of preparing an out of scope proposal. DARPA will respond to abstracts providing feedback and indicating whether, after preliminary review, there is interest within BTO for the proposed work. DARPA will attempt to reply within 30 calendar days of receipt. Proposals may be submitted irrespective of comments or feedback received in response to the abstract. Proposals are reviewed without regard to feedback given as a result of abstract review. For (abstract and) proposal submission dates, see Part I., Overview Information. Submissions received after these dates and times may not be reviewed.

The abstract is a concise version of the proposal comprising a maximum of **6** pages including all figures, tables, and charts. The (optional) submission letter is not included in the page count. All pages shall be formatted for printing on 8-1/2 by 11 inch paper with font size not smaller than 12 point. Smaller font sizes may be used for figures, tables, and charts.

Submissions must be written in English.

The page limit does NOT include:
1. Official transmittal letter (optional);
2. Cover sheet;
3. Executive summary slides;
4. Resumes; and
5. Bibliography (optional)

Abstracts must include the following components:

A. Cover Sheet (does not count towards page limit): Include the administrative and technical points of contact (name, address, phone, fax, email, lead organization). Also include the BAA number, title of the proposed project, primary subcontractors, estimated cost, duration of the project, and the label "ABSTRACT."

B. Goals and Impact: Clearly describe what is being proposed and what difference it will make (qualitatively and quantitatively), including brief answers to the following questions:

1. What is the proposed work attempting to accomplish or do?
2. How is it done today? And what are the limitations?
3. What is innovative in your approach and how does it compare to SOA?
4. What are the key technical challenges in your approach and how do you plan to overcome these?
5. Who will care and what will the impact be if you are successful?
6. How much will it cost and how long will it take?

C. Executive Summary Slides (does not count towards page limit): Provide a summary in PowerPoint that effective and succinctly conveys the information requested in the slide template provided as **Attachment 1** to the BAA posted at https://www.fbo.gov. Use of this template is required.

D. Technical Plan: Outline and address all technical challenges inherent in the approach and possible solutions for overcoming potential problems. This section should provide appropriate specific milestones (quantitative, if possible) at intermediate stages of the project to demonstrate progress, and a brief plan for accomplishment of the milestones.

1. Provide the class of stimuli, potential stimuli capabilities envisioned, and why they are feasible.
2. Describe the plant physiological response(s) and possible plant phenotype detection platform(s) which are distinctive to the approach.
3. Define the supportive resource and ecology plant traits and how these attributes contribute to stimulus-response use.
4. Describe how the proposed plant modification is unique and in line with the program outcome.
5. Provide a detailed plan for identifying, monitoring, and measuring off-target effects. Identify anticipated off-target effects in Phase III demonstrations. Incorporate genetic biosecurity strategy and plant reproductive limitations.
6. Propose additional appropriate qualitative and quantitative metrics specific to the approach. Outline additional intermediary milestones at no greater than 6 month increments to demonstrate progress and a brief plan for their accomplishment.

D. Management and Capabilities: It is expected that proposals will involve multidisciplinary teams that include expertise from multiple complementary disciplines (e.g., synthetic biology, plant genomics and ecology). To ensure optimal outcomes proposing teams must include at least one team member with expertise in the proposed operational environments for the experiments planned for the second half of Phase III.

Provide a brief summary of expertise of the team, including subcontractors and key personnel.

Provide a description of the team's organization including how the technical objectives will run congruently and will be integrated for the end of program demonstration. All teams should identify a Program Integrator/Manager to lead and coordinate the effort between the principal investigators of each technical team. The program Integrator/Manager can be a principal investigator of a subsidiary team or an oversite entity. The end of phase I and III demonstrations are events and will generate data that establishes the performing group's capabilities. The end of phase II demonstration is not an event but will only generate data that establishes the performing group's capabilities. There will be presentations of team accomplishments to the other performing teams and the government at mid-phase and end of phase PI meetings.

Include a description of the team's organization including roles and responsibilities. Describe the organizational experience in this area, existing intellectual property required to complete the project, and any specialized facilities to be used as part of the project. List Government-furnished materials or data assumed to be available. If desired, include a brief bibliography with links to relevant papers, reports, or resumes of key performers. Do not include more than two resumes as part of the abstract. Resumes count against the abstract page limit.

E. Cost and Schedule: Provide a cost estimate for resources over the proposed timeline of the project, broken down by phase and major cost items (e.g., labor, materials, etc.). Include cost estimates for each potential subcontractor (may be a rough order of magnitude).

4.2.2. Proposal Format

All full proposals must be in the format given below. Proposals shall consist of two volumes: 1) **Volume I, Technical and Management Proposal**, and 2) **Volume II, Cost Proposal.** All pages shall be printed on 8-1/2 by 11 inch paper with type not smaller than 12 point. Smaller font may be used for figures, tables and charts. The page limitation for full proposals includes all figures, tables, and charts. Volume I, Technical and Management Proposal, may include an attached bibliography of relevant technical papers or research notes (published and unpublished) which document the technical ideas and approach upon which the proposal is based. Copies of not more than three (3) relevant papers may be included with the submission. The bibliography and attached papers are not included in the page counts given below. The submission of other supporting materials along with the proposals is strongly discouraged and will not be considered for review. **The maximum page count for Volume I is 42 pages.** A submission letter is optional and is not included in the page count. Volume I should include the following components:

NOTE: Non-conforming submissions that do not follow the instructions herein may be rejected without further review.

a. Volume I, Technical and Management Proposal

Section I. Administrative

A. Cover Sheet (LABELED "PROPOSAL: VOLUME I"):

1. BAA number (HR001118S0005);
2. Lead organization submitting proposal (prime contractor);
3. Type of organization, selected from among the following categories: "LARGE BUSINESS," "SMALL DISADVANTAGED BUSINESS," "OTHER SMALL BUSINESS," "HBCU," "MI," "OTHER EDUCATIONAL," OR "OTHER NONPROFIT";
4. Proposer's reference number (if any);
5. Other team members (if applicable) and type of business for each;
6. Proposal title;
7. Technical point of contact (Program Manager or Principle Investigator) to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax, e-mail;
8. Administrative point of contact (Contracting Officer or Grant Officer) to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax, e-mail;
9. Award instrument requested: cost-plus-fixed-free (CPFF), cost-contract—no fee, firm-fixed-price, grant, cooperative agreement, other transaction, or other type (specify);
10. Place(s) and period(s) of performance ;
11. Proposal validity period;
12. Total funds requested from DARPA, and the amount of cost share (if any); AND
13. Date proposal was submitted.

Information on award instruments is available at http://www.darpa.mil/work-with-us/contract-management.

B. Official Transmittal Letter.

C. Executive Summary Slides: Provide a five-slide summary in PowerPoint that effectively and succinctly conveys, using descriptive language and graphics, the main technical objectives, unique aspects to the technical approach, key personnel, and major milestones to accomplish the proposed project. The slide template is provided as **Attachment 2**. Use of this template is required.

Section II. Detailed Proposal Information

A. Executive Summary: Provide a synopsis of the proposed project, including answers to the following questions:

1. What is the proposed work attempting to accomplish or do?

2. How is it done today, and what are the limitations?
3. What is innovative in your approach?
4. What are the key technical challenges in your approach and how do you plan to overcome these?
5. Who or what will be affected and what will be the impact if the work is successful?
6. How much will it cost, and how long will it take?

B. Goals and Impact: Clearly describe what the team is trying to achieve and the difference it will make (qualitatively and quantitatively) if successful. Describe the innovative aspects of the project in the context of existing capabilities and approaches, clearly delineating the uniqueness and benefits of this project in the context of the state of the art, alternative approaches, and other projects from the past and present. Describe how the proposed project is revolutionary and how it significantly rises above the current state of the art. Describe the deliverables associated with the proposed project and any plans to commercialize the technology, transition it to a customer, or further the work.

C. Technical Plan: Outline and address technical challenges inherent in the approach and possible solutions for overcoming potential problems. This section should provide appropriate measurable milestones (quantitative if possible) at intermediate stages of the program to demonstrate progress, and a plan for achieving the milestones. The technical plan should demonstrate a deep understanding of the technical challenges and present a credible (even if risky) plan to achieve the program goal. Discuss mitigation of technical risk.

D. Management Plan: Provide a summary of expertise of the team, including any subcontractors, and key personnel who will be doing the work. Resumes count against the proposal page count. Identify a Program Integrator/Manager to coordinate day-to-day activities, serve as a primary point-of-contact for the project, and integrate team inputs. Provide a clear description of the team's organization including an organization chart that includes, as applicable: the programmatic relationship of team members; the unique capabilities of team members; the task responsibilities of team members, the teaming strategy among the team members; and key personnel (e.g., expertise in the proposed operational environments) with the amount of effort to be expended by each person during each year. Provide a detailed plan for coordination including explicit guidelines for interaction among collaborators/subcontractors of the proposed effort. Include risk management approaches. Describe any formal teaming agreements that are required to execute this program

E. Capabilities: Describe organizational experience in relevant subject area(s), existing intellectual property, specialized facilities, proposed operational environments for the experiments planned for the second half of Phase III, and any Government-furnished materials or information. Discuss any work in closely related research areas and previous accomplishments. Descriptions of any specialized facilities to be used as part of the project should include size and scale that will enable the proposed activities, the extent of access to these facilities, and all biological containment, biosafety, and certification requirements. List all permits necessary for organisms and biotechnology described in the proposal. If any relevant permits are currently in use then list the expiration date and describe the reapplication plan as it relates to the program milestones.

F. Statement of Work (SOW): The SOW should provide a detailed task breakdown, citing specific tasks and their connection to the interim milestones and program metrics. Each Phase of the program should be separately defined. The SOW must not include proprietary information. It is encouraged, though not required, to use the SOW template provided as **Attachment 3**.

For each task, provide:

- A description of the approach to be taken that includes metrics, methods, and an assessment plan.
- Identification of the primary organization responsible for task execution (prime contractor, subcontractor(s), consultant(s), by name).
- A measurable milestone(s), deliverable(s), demonstration(s), or other event/activity that signify task completion.
- A definition of all deliverables (e.g., data, reports, software) to be provided to the Government in support of the proposed tasks.

G. Schedule and Milestones: Provide a detailed schedule showing tasks (task name, duration, work breakdown structure element as applicable, performing organization), milestones, and the interrelationships among tasks. The task structure must be consistent with that in the SOW. Measurable milestones should be clearly articulated and defined in time relative to the start of the project.

H. APT Technology Transfer Plan: Provide information regarding the types of partners (e.g., government, private industry) that will be pursued and submit a timeline with incremental milestones toward successful engagement. The plan should include a description of how DARPA will be included in the development of potential technology transfer relationships. If the Technology Transfer Plan includes the

formation of a start-up company, a business development strategy must also be provided.

I. CUI Risk Mitigation Plan (Required for proposers who anticipate generating work that may be considered CUI in accordance with Section 1.5 "Controlled Unclassified Information"): Provide a detailed plan for how the organization and its subcontractors will meet CUI safeguarding requirements. The plan should provide a detailed strategy to protect CUI without unnecessarily compartmentalizing information flow within or among performer teams. This plan must describe safeguard procedures for generating sensitive program deliverables (e.g., models, cells, and plants with sense and report capabilities).

Section III. Additional Information (Note: Does not count towards page limit)

A resume or "biosketch" is required for key personnel.

A brief bibliography of relevant technical papers and research notes (published and unpublished) which document the technical ideas upon which the proposal is based. Copies of not more than three (3) relevant papers can be included in the submission.

a. Volume II, Cost Management Proposal

Cover Sheet (LABELED "PROPOSAL: VOLUME II"):

1. BAA number (HR001118S0005);
2. Lead Organization Submitting proposal;
3. Type of organization, selected among the following categories: "LARGE BUSINESS", "SMALL DISADVANTAGED BUSINESS", "OTHER SMALL BUSINESS", "HBCU", "MI", "OTHER EDUCATIONAL", OR "OTHER NONPROFIT";
4. Proposer's reference number (if any);
5. Other team members (if applicable) and type of business for each;
6. Proposal title;
7. Technical point of contact (Program Manager or Principal Investigator) to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), electronic mail (if available);
8. Administrative point of contact (Contracting Officer or Grant Officer) to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), and electronic mail (if available);
9. Award instrument requested: cost-plus-fixed-free (CPFF), cost-contract—no fee, cost sharing contract – no fee, or other type of procurement contract (*specify*), grant, cooperative agreement, or other transaction;
10. Place(s) and period(s) of performance;
11. Total proposed cost separated by basic award and option(s) (if any);

12. Name, address, and telephone number of the proposer's cognizant Defense Contract Management Agency (DCMA) administration office (*if known)*;
13. Name, address, and telephone number of the proposer's cognizant Defense Contract Audit Agency (DCAA) audit office (*if known*);
14. Date proposal was prepared;
15. DUNS number (http://www.dnb.com/duns-number.html);
16. Taxpayer ID number (https://www.irs.gov/Individuals/International-Taxpayers/Taxpayer-Identification-Numbers-TIN);
17. CAGE code (https://cage.dla.mil) for lead organization and subcontractors;
18. Proposal validity period

Note that nonconforming proposals may be rejected without review.

Proposers that do not have a Cost Accounting Standards (CAS) complaint accounting system considered adequate for determining accurate costs that are negotiating a cost- type procurement contract must complete an SF 1408. For more information on CAS compliance, see http://www.dcaa.mil/cas.html. To facilitate this process, proposers should complete the SF 1408 found at http://www.gsa.gov/portal/forms/download/115778 and submit the completed form with the proposal. To complete the form, check the boxes on the second page, then provide a narrative explanation of your accounting system to supplement the checklist on page one. For more information, see (http://www.dcaa.mil/preaward_accounting_system_adequacy_checklist.html).

The Government strongly encourages that tables included in the cost proposal also be provided in an editable (e.g., MS Excel) format with calculation formulas intact to allow traceability of the cost proposal numbers across the prime and subcontractors.

The Government requires that the proposer provide a detailed cost breakdown to include:

(1) Total program cost broken down by Phases (I, II and III) in Contractor Fiscal Year to include:
   i. Direct Labor – Including individual labor categories with associated labor hours and direct labor rates. If selected for award, be prepared to submit supporting documentation to justify labor rates. (i.e., screenshots of HR databases, comparison to NIH or other web-based salary database);
   ii. Consultants – If consultants are to be used, proposer must provide a copy of the consultant's proposed SOW as well as a signed consultant agreement or other document which verifies the proposed loaded daily / hourly rate, hours and any other proposed consultant costs (e.g., travel);
   iii. Indirect Costs – Including Fringe Benefits, Overhead, General and Administrative Expense, Cost of Money, Fee, etc. (must show base amount and rate), if available, provide current Forward Pricing Rate Agreement or Forward Pricing Rate Proposal. If not available, provide 2 years historical data to include pool and expense costs used to generate the rates. For academia, provide DHHS or ONR negotiated rate

package or, if calculated by other than a rate, provide University documentation identifying G&A and fringe costs by position;

iv. Travel – Provide the purpose of the trip, number of trips, number of days per trip, departure and arrival destinations, number of people, estimated rental car and airfare costs, and prevailing per diem rates as determined by gsa.gov, etc.; Quotes must be supported by screenshots from travel websites;

v. Other Direct Costs – Itemized with costs including tuition remission, animal per diem rates, health insurance/fee; back-up documentation is to be submitted to support proposed costs;

vi. Equipment Purchases – Itemization with individual and total costs, including quantities, unit prices, proposed vendors (if known), and the basis of estimate (e.g., quotes, prior purchases, catalog price lists, etc.); any item that exceeds $5,000 in total cost must be supported with back-up documentation such as a copy of catalog price lists or quotes prior to purchase (NOTE: For equipment purchases, include a letter stating why the proposer cannot provide the requested resources from its own funding), and;

vii. Materials – Itemization with costs, including quantities, unit prices, proposed vendors (if known), and the basis of estimate (e.g., quotes, prior purchases, catalog price lists, etc.); any item that exceeds $5,000 in total cost must be supported with back-up documentation such as a copy of catalog price lists or quotes prior to purchase.

(2) A summary of total program costs by major task;
(3) A summary of projected funding requirements by month;
(4) An itemization of any information technology (IT) purchase (including a letter stating why the proposer cannot provide the requested resources from its own funding), as defined in FAR Part 2.101;
(5) An itemization of Subcontracts. **All subcontractor cost proposal documentation must be prepared at the same level of detail as that required of the prime.** Subcontractor proposals should include Interdivisional Work Transfer Agreements (IWTA) or evidence of similar arrangements (an IWTA is an agreement between multiple divisions of the same organization);
(6) The source, nature, and amount of any industry cost-sharing. Where the effort consists of multiple portions which could reasonably be partitioned for purposes of funding, these should be identified as options with separate cost estimates for each;
(7) Identification of pricing assumptions of which may require incorporation into the resulting award instrument (e.g., use of Government Furnished Property/Facilities/Information, access to Government Subject Matter Expert/s, etc.);
(8) Any Forward Pricing Rate Agreement, DHHS or ONR rate agreement, other such approved rate information, or such documentation that may assist in expediting negotiations (if available); and
(9) Proposers with a Government acceptable accounting system who are proposing a cost-type contract, must submit the DCAA document approving the cost accounting system.

4.2.3. Additional Proposal Information

Proprietary Markings

Proposers are responsible for clearly identifying proprietary information. Submissions containing proprietary information must have the cover page and each page containing such

information clearly marked with a label such as "Proprietary" or "Company Proprietary." NOTE: "Confidential" is a classification marking used to control the dissemination of U.S. Government National Security Information as dictated in Executive Order 13526 and should not be used to identify proprietary business information.

Unclassified Submissions

DARPA anticipates that submissions received under this BAA will be unclassified. However, should a proposer wish to submit classified information, an *unclassified* email must be sent to the BAA mailbox requesting submission instructions from the Technical Office PSO. If a determination is made that the award instrument may result in access to classified information, a SCG and/or DD Form 254 will be issued by DARPA and attached as part of the award.

Human Research Subjects/Animal Use

Proposers that anticipate involving Human Research Subjects or Animal Use must comply with the approval procedures detailed at http://www.darpa.mil/work-with-us/additional-baa.

Small Business Subcontracting Plan

Pursuant to Section 8(d) of the Small Business Act (15 U.S.C. § 637(d)) and FAR 19.702(a)(1), each proposer who submits a contract proposal and includes subcontractors might be required to submit a subcontracting plan with their proposal. The plan format is outlined in FAR 19.704.

Section 508 of the Rehabilitation Act (29 U.S.C. § 749d)/FAR 39.2

All electronic and information technology acquired or created through this BAA must satisfy the accessibility requirements of Section 508 of the Rehabilitation Act (29 U.S.C. § 749d)/FAR 39.2.

Grant Abstract

Per Section 8123 of the Department of Defense Appropriations Act, 2015 (Pub. L. 113-235), all grant awards must be posted on a public website in a searchable format. To comply with this requirement, proposers requesting grant awards must submit a maximum one (1) page abstract that may be publicly posted and explains the program or project to the public. The proposer should sign the bottom of the abstract confirming the information in the abstract is approved for public release. Proposers are advised to provide both a signed PDF copy, as well as an editable (e.g., Microsoft word) copy. Abstracts contained in grant proposals that are not selected for award will not be publicly posted.

Intellectual Property

All proposers must provide a good faith representation that the proposer either owns or possesses the appropriate licensing rights to all intellectual property that will be utilized under the proposed effort.

For Procurement Contracts

Proposers responding to this BAA requesting procurement contracts will need to complete the certifications at DFARS 252.227-7017. See http://www.darpa.mil/work-with-us/additional-baa

for further information. If no restrictions are intended, the proposer should state "none." The table below captures the requested information:

Technical Data Computer Software To be Furnished With Restrictions	Summary of Intended Use in the Conduct of the Research	Basis for Assertion	Asserted Rights Category	Name of Person Asserting Restrictions
(LIST)	(NARRATIVE)	(LIST)	(LIST)	(LIST)

For All Non-Procurement Contracts

Proposers responding to this BAA requesting a Grant, Cooperative Agreement, Technology Investment Agreement, or Other Transaction for Prototypes shall follow the applicable rules and regulations governing these various award instruments, but, in all cases, should appropriately identify any potential restrictions on the Government's use of any Intellectual Property contemplated under the award instrument in question. This includes both Noncommercial Items and Commercial Items. Proposers are encouraged to use a format similar to that described in the section above. If no restrictions are intended, then the proposer should state "NONE."

System for Award Management (SAM) and Universal Identifier Requirements

All proposers must be registered in SAM unless exempt per FAR 4.1102. FAR 52.204-7, "System for Award Management" and FAR 52.204-13, "System for Award Management Maintenance" are incorporated into this BAA. See http://www.darpa.mil/work-with-us/additional-baa for further information.

4.2.4. Submission Information

DARPA will acknowledge receipt of all submissions and assign an identifying control number that should be used in all further correspondence regarding the submission. DARPA intends to use electronic mail correspondence regarding HR001118S0005. Submissions may not be submitted by fax or e-mail; any so sent will be disregarded.

Submissions will not be returned. An electronic copy of each submission received will be retained at DARPA and all other non-required copies destroyed. A certification of destruction may be requested, provided the formal request is received by DARPA within 5 days after notification that a proposal was not selected.

For (abstract and) proposal submission dates, see Part I., Overview Information. Submissions received after these dates and times may not be reviewed.

For Proposers Submitting Proposal Abstracts or Full Proposals as Hard Copies/On CD-ROM:

Proposers must submit an original hardcopy and one (1) electronic copy of the abstract or proposal in PDF (preferred) on a CD-ROM to the mailing address listed in Part I. Each copy must be clearly labeled with HR001118S0005, proposer organization, technical point of contact, and proposal title (short title recommended).

Please note that submitters via hardcopy/CD-ROM will still need to visit https://baa.darpa.mil to register their organization concurrently to ensure the BAA office can verify and finalize their submission.

For Proposers Submitting Proposal Abstracts or Full Proposals Requesting Procurement Contracts or OTs through DARPA's BAA Submission Portal:

Abstracts and Full Proposals sent in response to HR001118S0005 may be submitted via DARPA's BAA Website (https://baa.darpa.mil). Visit the website to complete the two-step registration process. Submitters will need to register for an Extranet account (via the form at the URL listed above) and wait for two separate e-mails containing a username and temporary password. After accessing the Extranet, submitters may then create an account for the DARPA BAA website (via the "Register your Organization" link along the left side of the homepage), view submission instructions, and upload/finalize the abstract. Proposers using the DARPA BAA Website may encounter heavy traffic on the submission deadline date; it is highly advised that submission process be started as early as possible.

All unclassified concepts submitted electronically through DARPA's BAA Website must be uploaded as zip files (.zip or .zipx extension). The final zip file should be no greater than 50 MB in size. Only one zip file will be accepted per submission. Classified submissions and proposals requesting assistance instruments (grants or cooperative agreements) should NOT be submitted through DARPA's BAA Website (https://baa.darpa.mil), though proposers will likely still need to visit https://baa.darpa.mil to register their organization (or verify an existing registration) to ensure the BAA office can verify and finalize their submission.

Technical support for BAA Website may be reached at BAAT_Support@darpa.mil, and is typically available during regular business hours, (9:00 AM- 5:00 PM EST Monday – Friday).

Proposers using the DARPA BAA Website may encounter heavy traffic on the submission deadline date; it is highly advised that submission process be started as early as possible.

For Full Proposals Requesting Grants or Cooperative Agreements:

Proposers requesting grants or cooperative agreements may submit proposals through one of the following methods: (1) hard copy mailed directly to DARPA; or (2) electronic upload per the instructions at http://www.grants.gov/applicants/apply-for-grants.html. Grant or cooperative agreement proposals may not be submitted through any other means. If proposers intend to use Grants.gov as their means of submission, then they must submit their entire proposal through Grants.gov; applications cannot be submitted in part to Grants.gov and in part as a hard-copy. Proposers using the Grants.gov do not submit paper proposals in addition to the Grants.gov electronic submission.

Grants.gov Submissions: Grants.gov requires proposers to complete a one-time registration process before a proposal can be electronically submitted. First time registration can take between three business days and four weeks. For more information about registering for Grants.gov, see http://www.darpa.mil/work-with-us/additional-baa.

Hard-copy Submissions: Proposers electing to submit grant or cooperative agreement proposals as hard copies must complete the SF 424 R&R form (Application for Federal Assistance,) available on the Grants.gov website http://apply07.grants.gov/apply/forms/sample/RR_SF424_2_0-V2.0.pdf.

Failure to comply with the submission procedures may result in the submission not being evaluated. DARPA will acknowledge receipt of complete submissions via email and assign control numbers that should be used in all further correspondence regarding proposals.

4.2.5. Disclosure of Information and Compliance with Safeguarding Covered Defense Information Controls

The following provisions and clause apply to all solicitations and contracts; however, the definition of "controlled technical information" clearly exempts work considered fundamental research and therefore, even though included in the contract, will not apply if the work is fundamental research.

DFARS 252.204-7000, "Disclosure of Information"
DFARS 252.204-7008, "Compliance with Safeguarding Covered Defense Information Controls"
DFARS 252.204-7012, "Safeguarding Covered Defense Information and Cyber Incident Reporting"

The full text of the above solicitation provision and contract clauses can be found at http://www.darpa.mil/work-with-us/additional-baa#NPRPAC.

Compliance with the above requirements includes the mandate for proposers to implement the security requirements specified by National Institute of Standards and Technology (NIST) Special Publication (SP) 800-171, "Protecting Controlled Unclassified Information in Nonfederal Information Systems and Organizations" (see https://doi.org/10.6028/NIST.SP.800-171r1) that are in effect at the time the BAA is issued, or as authorized by the Contracting Officer, not later than December 31, 2017.

For awards where the work is considered fundamental research, the contractor will not have to implement the aforementioned requirements and safeguards; however, should the nature of the work change during performance of the award, work not considered fundamental research will be subject to these requirements.

4.3. FUNDING RESTRICTIONS

Not Applicable.

4.4. OTHER SUBMISSION REQUIREMENTS

Not Applicable.

5. Application Review Information

5.1. EVALUATION CRITERIA

Proposals will be evaluated using the following criteria, listed in descending order of importance: 5.1.1 Overall Scientific and Technical Merit; 5.1.2 Potential Contribution and Relevance to the DARPA Mission; and 5.1.3 Cost Realism and 5.1.4 Plans and Capability to Accomplish Technology Transition.

5.1.1. Overall Scientific and Technical Merit

The proposed technical approach is innovative, feasible, achievable, and complete.
The proposed technical team has the expertise and experience to accomplish the proposed tasks. Task descriptions and associated technical elements provided are complete and in a logical sequence with all proposed deliverables clearly defined such that a final outcome that achieves the goal can be expected as a result of award. The proposal identifies major technical risks and planned mitigation efforts are clearly defined and feasible. If applicable, the CUI risk mitigation plan effectively presents a strategy for safeguarding controlled unclassified information.

5.1.2. Potential Contribution and Relevance to the DARPA Mission

The potential contributions of the proposed effort are relevant to the national technology base. Specifically, DARPA's mission is to make pivotal early technology investments that create or prevent strategic surprise for U.S. National Security.

5.1.3. Cost Realism

The proposed costs are realistic for the technical and management approach and accurately reflect the technical goals and objectives of the solicitation. The proposed costs are consistent with the proposer's Statement of Work and reflect a sufficient understanding of the costs and level of effort needed to successfully accomplish the proposed technical approach. The costs for the prime proposer and proposed subawardees are substantiated by the details provided in the proposal (e.g., the type and number of labor hours proposed per task, the types and quantities of materials, equipment and fabrication costs, travel and any other applicable costs and the basis for the estimates).

It is expected that the effort will leverage all available relevant prior research in order to obtain the maximum benefit from the available funding. For efforts with a likelihood of commercial application, appropriate direct cost sharing may be a positive factor in the evaluation. DARPA recognizes that undue emphasis on cost may motivate proposers to offer low-risk ideas with minimum uncertainty and to staff the effort with junior personnel in order to be in a more competitive posture. DARPA discourages such cost strategies.

5.1.4. Plans and Capability to Accomplish Technology Transition

The proposer clearly demonstrates its capability to transition the technology to the research, industrial, and/or operational military communities in such a way as to enhance U.S. defense. In

addition, the evaluation will take into consideration the extent to which the proposed intellectual property (IP) rights will potentially impact the Government's ability to transition the technology.

5.2. REVIEW OF PROPOSALS

Review Process

It is the policy of DARPA to ensure impartial, equitable, comprehensive proposal evaluations based on the evaluation criteria listed in Section V.A. and to select the source (or sources) whose offer meets the Government's technical, policy, and programmatic goals.

DARPA will conduct a scientific/technical review of each conforming proposal. Conforming proposals comply with all requirements detailed in this BAA; proposals that fail to do so may be deemed non-conforming and may be removed from consideration. Proposals will not be evaluated against each other since they are not submitted in accordance with a common work statement. DARPA's intent is to review proposals as soon as possible after they arrive; however, proposals may be reviewed periodically for administrative reasons

Award(s) will be made to proposers whose proposals are determined to be the most advantageous to the Government, consistent with instructions and evaluation criteria specified in the BAA herein, and availability of funding.

Handling of Source Selection Information

DARPA policy is to treat all submissions as source selection information (see FAR 2.101 and 3.104), and to disclose their contents only for the purpose of evaluation. Restrictive notices notwithstanding, during the evaluation process, submissions may be handled by support contractors for administrative purposes and/or to assist with technical evaluation. All DARPA support contractors performing this role are expressly prohibited from performing DARPA-sponsored technical research and are bound by appropriate nondisclosure agreements. Subject to the restrictions set forth in FAR 37.203(d), input on technical aspects of the proposals may be solicited by DARPA from non-Government consultants/experts who are strictly bound by the appropriate non-disclosure requirements.

Federal Awardee Performance and Integrity Information (FAPIIS)

Per 41 U.S.C. 2313, as implemented by FAR 9.103 and 2 CFR § 200.205, prior to making an award above the simplified acquisition threshold, DARPA is required to review and consider any information available through the designated integrity and performance system (currently FAPIIS). Awardees have the opportunity to comment on any information about themselves entered in the database, and DARPA will consider any comments, along with other information in FAPIIS or other systems prior to making an award.

6. Award Administration Information

6.1. SELECTION NOTICES

6.1.1. Proposal Abstracts

DARPA will respond to abstracts with a statement as to whether DARPA is interested in the idea. If DARPA does not recommend the proposer submit a full proposal, DARPA will provide feedback to the proposer regarding the rationale for this decision. Regardless of DARPA's response to an abstract, proposers may submit a full proposal. DARPA will review all full proposals submitted using the published evaluation criteria and without regard to any comments resulting from the review of an abstract.

6.1.2. Full Proposals

As soon as the evaluation of a proposal is complete, the proposer will be notified that (1) the proposal has been selected for funding pending award negotiations, in whole or in part, or (2) the proposal has not been selected. These official notifications will be sent via e-mail to the Technical POC and/or Administrative POC identified on the proposal coversheet.

6.2. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS

6.2.1. Meeting and Travel Requirements

There will be a program kickoff meeting in a location central to the performer teams (assume central US for budgeting purposes), and all key participants are required to attend. Performers should also anticipate regular program-wide meetings and periodic site visits at the DARPA Program Manager's discretion. Proposers shall include within the content of their proposal details and costs of any travel or meetings they deem to be necessary throughout the course of the effort. Performers should anticipate at least quarterly meetings, including teleconference calls, in-person program reviews, and site visits by the DARPA Program Manager and/or Government team. For travel budgeting purposes, proposers may assume program reviews at six (6) month intervals with alternating locations in Arlington, VA and a location central to the performer team.

6.2.1. FAR and DFARS Clauses

Solicitation clauses in the FAR and DFARS relevant to procurement contracts and FAR and DFARS clauses that may be included in any resultant procurement contracts are incorporated herein and can be found at http://www.darpa.mil/work-with-us/additional-baa.

6.2.2. Controlled Unclassified Information (CUI) on Non-DoD Information Systems

Further information on Controlled Unclassified Information on Non-DoD Information Systems is incorporated herein can be found at http://www.darpa.mil/work-with-us/additional-baa.

6.2.3. Representations and Certifications

If a procurement contract is contemplated, prospective awardees will need to be registered in the SAM database prior to award and complete electronic annual representations and certifications consistent with FAR guidance at 4.1102 and 4.1201; the representations and certifications can be

found at www.sam.gov. Supplementary representations and certifications can be found at http://www.darpa.mil/work-with-us/additional-baa.
.

6.2.4. Terms and Conditions

A link to the DoD General Research Terms and Conditions for Grants and Cooperative Agreements and supplemental agency terms and conditions can be found at http://www.darpa.mil/work-with-us/contract-management#GrantsCooperativeAgreements.

6.3. REPORTING

The number and types of reports will be specified in the award document, but will include as a minimum monthly financial and technical status reports. The reports shall be prepared and submitted in accordance with the procedures contained in the award document and mutually agreed on before award. Reports and briefing material will also be required as appropriate to document progress in accomplishing program metrics. A phase end report containing the phase accomplishments (Phase I and II) as well as the plan for the following phase (Phase II and III) will be required prior to entering into the next phase. A Final Report that summarizes the project and tasks will be required at the conclusion of the performance period for the award, notwithstanding the fact that the research may be continued under a follow-on vehicle.

6.4. ELECTRONIC SYSTEMS

6.4.1. Wide Area Work Flow (WAWF)

Performers will be required to submit invoices for payment directly to https://wawf.eb.mil, unless an exception applies. Performers must register in WAWF prior to any award under this BAA.

6.4.2. i-EDISON

The award document for each proposal selected for funding will contain a mandatory requirement for patent reports and notifications to be submitted electronically through i-Edison (http://public.era.nih.gov/iedison).

7. Agency Contacts

Administrative, technical or contractual questions should be sent via e-mail to APT@darpa.mil.

Points of Contact
The BAA Coordinator for this effort may be reached at:
APT@darpa.mil
DARPA/BTO
ATTN: HR001118S0005
675 North Randolph Street
Arlington, VA 22203-2114

For information concerning agency level protests see http://www.darpa.mil/work-with-us/additional-baa#NPRPAC.

8. Other Information

DARPA will host a Proposers Day in support of the APT program on **December 12, 2017** at the Westin Arlington Gateway hotel in Arlington, VA. The purpose is to provide potential proposers with information on the APT program, promote additional discussion on this topic, address questions, provide a forum to present their capabilities, and to encourage team formation.

Interested proposers are not required to attend to respond to the APT BAA, and relevant information and materials discussed at Proposers Day will be made available to all potential proposers in the form of a FAQ posted on the DARPA Opportunities Page. The event will be webcast for those who would like to participate remotely.

DARPA will not provide cost reimbursement for interested proposers in attendance.

An online registration form and various other meeting details can be found at the registration website, https://events.sa-meetings.com/APTProposersDay.

To encourage team formation, interested proposers are encouraged to submit information to be shared with all potential proposers through the Proposers Day website and the DARPA Opportunities Page. This information may include contact information, relevant publications, and a slide or poster to summarize the proposer's interests.

Participants are required to register no later than **December 6, 2017**. This event is not open to the Press. The Proposers Day will be open to members of the public who have registered in advance for the event; **there will be no onsite registration**.

All foreign nationals, including permanent residents, must complete and submit a DARPA Form 60 "Foreign National Visit Request," which will be provided in the registration confirmation email.

Proposers Day Point of Contact: DARPA-SN-18-05@darpa.mil.

9. APPENDIX 1 – Volume II checklist

Volume II, Cost Proposal
Checklist

The following checklist is provided to assist the proposer in developing a complete and responsive cost volume. Full instructions appear in Section 4.2.2 beginning on Page 23 of HR001118S0005. This worksheet must be included with the coversheet of the Cost Proposal.

1. Are all items from Section 4.2.2 (Volume II, Cost Proposal) of **HR001118S0005** included on your Cost Proposal cover sheet?
   ○ **YES** ○ **NO** **Appears on Page(s)** [Type text]
   If reply is "No", please explain:

2. Does your Cost Proposal include (1) a summary cost buildup by Phase, (2) a summary cost buildup by Year, and (3) a detailed cost buildup of for each Phase that breaks out each task and shows the cost per month?
   ○ **YES** ○ **NO** **Appears on Page(s)** [Type text]

   If reply is "No", please explain:

3. Does your cost proposal (detailed cost buildup #3 above in item 2) show a breakdown of the major cost items listed below:
   Direct Labor (Labor Categories, Hours, Rates)
   ○ **YES** ○ **NO** **Appears on Page(s)** [Type text]

   Indirect Costs/Rates (i.e., overhead charges, fringe benefits, G&A)
   ○ **YES** ○ **NO** **Appears on Page(s)** [Type text]

   Materials and/or Equipment
   ○ **YES** ○ **NO** **Appears on Page(s)** [Type text]

   Subcontracts/Consultants
   ○ **YES** ○ **NO** **Appears on Page(s)** [Type text]

   Other Direct Costs
   ○ **YES** ○ **NO** **Appears on Page(s)** [Type text]

   Travel
   ○ **YES** ○ **NO** **Appears on Page(s)** [Type text]

   If reply is "No", please explain:

4. Have you provided documentation for proposed costs related to travel, to include purpose of trips, departure and arrival destinations and sample airfare?
   ○ **YES** ○ **NO** **Appears on Page(s)** [Type text]

If reply is "No", please explain:

5. Does your cost proposal include a complete itemized list of all material and equipment items to be purchased (a priced bill-of-materials (BOM))?
   ○ **YES** ○ **NO** **Appears on Page(s)** [Type text]

   If reply is "No", please explain:

6. Does your cost proposal include vendor quotes or written engineering estimates (basis of estimate) for all material and equipment with a unit price exceeding $5000?
   ○ **YES** ○ **NO** **Appears on Page(s)** [Type text]

   If reply is "No", please explain:

7. Does your cost proposal include a clear justification for the cost of labor (written labor basis-of-estimate (BOE)) providing rationale for the labor categories and hours proposed for each task?
   ○ **YES** ○ **NO** **Appears on Page(s)** [Type text]

   If reply is "No", please explain:

8. Do you have subcontractors/consultants? If YES, continue to question 9. If NO, skip to question 13.
   ○ **YES** ○ **NO** **Appears on Page(s)** [Type text]

9. Does your cost proposal include copies of all subcontractor/consultant technical (to include Statement of Work) and cost proposals?
   ○ **YES** ○ **NO** **Appears on Page(s)** [Type text]

   If reply is "No", please explain:

10. Do all subcontract proposals include the required summary buildup, detailed cost buildup, and supporting documentation (SOW, Bill-of-Materials, Basis-of-Estimate, Vendor Quotes, etc.)?
    ○ **YES** ○ **NO** **Appears on Page(s)** [Type text]

    If reply is "No", please explain:

11. Does your cost proposal include copies of consultant agreements, if available?
    ○ **YES** ○ **NO** **Appears on Page(s)** [Type text]

    If reply is "No", please explain:

12. If requesting a FAR-based contract, does your cost proposal include a tech/cost analysis for all proposed subcontractors?
    ○ **YES** ○ **NO** **Appears on Page(s)** [Type text]

    If reply is "No", please explain:

13. Have all team members (prime and subcontractors) who are considered a Federally Funded Research & Development Center (FFRDC), included documentation that clearly demonstrates work is not otherwise available from the private sector AND provided a letter on letterhead from the sponsoring organization citing the specific authority establishing their eligibility to propose to government solicitations and compete with industry, and compliance with the associated FFRDC sponsor agreement and terms and conditions.

○ **YES** ○ **NO** **Appears on Page(s)** [Type text]

If reply is "No", please explain:

14. Does your proposal include a response regarding Organizational Conflicts of Interest?

○ **YES** ○ **NO** **Appears on Page(s)** [Type text]

If reply is "No", please explain:

15. Does your proposal include a completed Data Rights Assertions table/certification?

○ **YES** ○ **NO** **Appears on Page(s)** [Type text]

If reply is "No", please explain: