



Broad Agency Announcement

Reefense

BIOLOGICAL TECHNOLOGIES OFFICE

HR001121S0012

January 4, 2021

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PART I: OVERVIEW INFORMATION

- **Federal Agency Name** – Defense Advanced Research Projects Agency (DARPA), Biological Technologies Office (BTO)
- **Funding Opportunity Title** – Reefense
- **Announcement Type** – Initial Announcement
- **Funding Opportunity Number** – HR001121S0012
- **North American Industry Classification System (NAICS)** – 541714
- **Catalog of Federal Domestic Assistance Numbers (CFDA)** – 12.910 Research and Technology Development
- **Dates**
 - Posting Date: **January 4, 2021**
 - Proposal Abstract Due Date and Time: **February 22, 2021, 4:00 PM ET**
 - Full Proposal Due Date and Time: **April 14, 2021, 4:00 PM ET**
 - BAA Closing Date: **April 14, 2021**
 - Proposers' Day: **January 22, 2021**

<https://beta.sam.gov/opp/1161c787cdeb4b179ffcf2baaabc0f6/view>
- **Concise description of the funding opportunity** – Reefense seeks to develop self-healing, hybrid biological, and engineered reef-mimicking structures to mitigate the coastal flooding, erosion, and storm damage that increasingly threaten civilian and Department of Defense (DoD) infrastructure and personnel. Under Reefense, custom wave-attenuating base structures will promote calcareous reef organism (coral or oyster) settlement and growth, which will enable the system to self-heal and keep pace with sea level rise over time. A system will be put in place that will also attract non-reef building organisms necessary to help maintain a healthy, growing system. Finally, adaptive biology (other than genetically modified organisms) will enable improved coral and oyster resilience against disease and temperature stress, to ensure compatibility with a changing environment.
- **Anticipated individual awards** – Multiple awards are anticipated.
- **Types of instruments that may be awarded** – Procurement contract, cooperative agreement, or Other Transaction.
- **Agency contact**

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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 C.F.R. § 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.

Reefense seeks to develop self-healing, hybrid biological, and engineered reef-mimicking structures to mitigate the coastal flooding, erosion, and storm damage that increasingly threaten civilian and DoD infrastructure and personnel. Under Reefense, custom wave-attenuating base structures will promote calcareous reef organism (coral or oyster) settlement and growth, which will enable the system to self-heal and keep pace with sea level rise over time. A system will be put in place that also attracts non-reef building organisms necessary to help maintain a healthy, growing system. The Reefense strategy includes employing recent innovations in materials science, hydrodynamic modeling, adaptive biology, and multiple effectors to develop growing structures that are optimized to rapidly implement coastal defenses suited to a changing environment. By co-designing structures with biology such that they can be rapidly deployed to provide immediate protection and then persistently facilitate the growth of calcareous organisms, the protective Reefense structures will be rapidly enhanced by what would normally require decades of biological structure-building, but which can be achieved in a matter of months to years.

1.1. PROGRAM OVERVIEW

Despite previous efforts to implement storm mitigation solutions (e.g., concrete breakwaters), damage due to storm surge and flooding continues to devastate coastal areas around the world. Current DoD coastal protection systems generally fall into two categories - shorelines armored with concrete bulkheads or free-standing monolithic and heterogeneous storm breaks (e.g., using “rip-rap,” an aggregation of stones and concrete chunks). Bulkheads reflect rather than dissipate wave energy, resulting in unintended damage from seabed scouring and over-wash flooding during high surf. Bulkheads also require expensive, persistent maintenance (due to storm-induced damage to the structures themselves, degradation of the structures in the seawater environment, and loss of material behind the structures due to erosion). Importantly, these structures are not designed to recruit or take advantage of natural reef building organisms. An alternative approach of replacing existing coastal infrastructure with engineered structures (i.e., erecting buildings on stilts) exists but remains expensive to implement and provides only a short-term solution that does not address the long-term maintenance issues given the global scale of intensified storms and sea level rise.

In contrast to a solely engineered approach, the Reefense strategy combines (1) the durability and instantaneous protection afforded by biocompatible, engineered base structures with (2) a healthy reef ecosystem capable of promoting and sustaining reef building organisms, armed with (3) the incorporation of techniques to provide greater environmental resilience for those

calcareous reef-building organisms. Combined innovations in all three of these areas will enable the development of novel, living structures that can attenuate rather than reflect wave energy while keeping pace with sea level rise; and that were not previously achievable through implementation in any one area on its own or via prior traditional techniques (Figure 1).

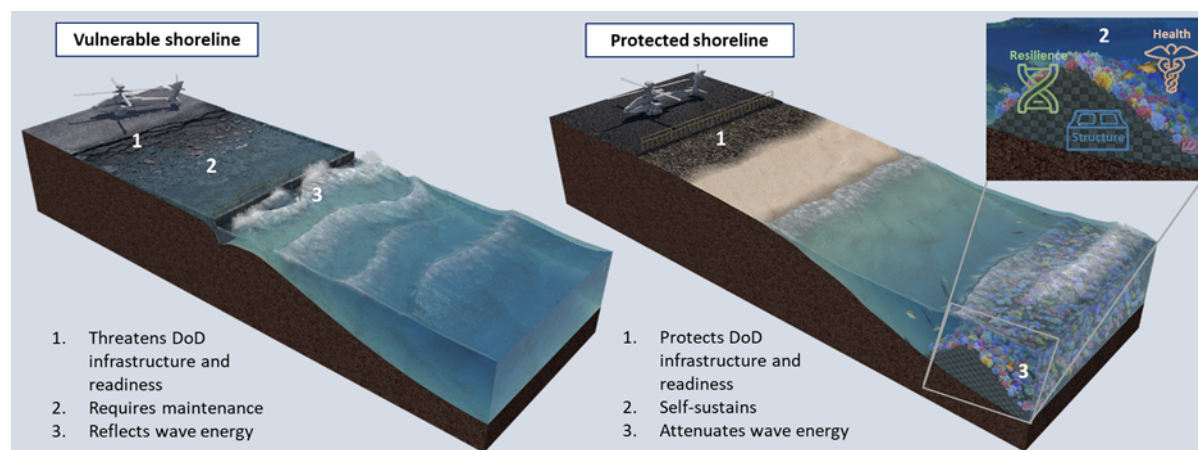


Figure 1. Comparison of current (left) vs. a Reefense (right) protected shoreline. The Reefense protection system will require innovations in reef organism resilience, structural design, and reef ecosystem health

1.1.1 Organisms and Environments

Proposers are expected to select from one of two environment/organism combinations for their envisioned Reefense efforts. Test sites where performance will be evaluated are both envisioned to be in Florida or the Caribbean region. However, the exact site locations will be chosen by the Government team and evaluated for reef slope, proximity to shore, depth, and other parameters that will be provided to teams during Phase 1. The two evaluation sites, with their respective organisms, are:

1. U.S. Gulf Coast (oyster reef approaches)
2. South Florida or Caribbean (coral reef approaches)

Additional or alternate sites may be contemplated, and early stage field-testing by performers can occur in additional geographies as well.

1.1.2 Technical Approach

The program is comprised of three technical areas (TAs). While only one organism type should be proposed, performer teams must propose to all TAs for that organism type, in order to produce fully integrated systems. Proposals that do not address all TAs as characterized within this section will be deemed non-conforming and not considered for review.

The functionality of the integrated Reefense structure will be evaluated through demonstrations in maritime environments throughout the program, though some aspects (see TA3) may remain

in laboratory settings through Phase 2. Preference will be given to approaches that prioritize field-testing early and often.

Technical Area 1: Substrate Design and Structure

TA1 focuses on the base structure and component materials to serve two purposes: provide immediate wave attenuation through deployment, and promote the establishment and growth of marine life while attenuating this energy. TA1 will employ innovations in materials science, micro and macro reef component design, and hydrodynamic modeling for wave attenuation and larval attraction. Materials could include but are not limited to cementitious materials such as marine-, Roman-, or alternative-cement concrete, upcycled materials, and coated natural materials. The structure may comprise modular and/or monolithic components, and may consist of geometric designs optimized for wave attenuation over a large area. In Phase 1, proposers will be required to construct a 50-meter segment of their designed reef structure parallel to the shoreline. The reef structure's length metric increases to 100 meters in Phase 2 and 150 meters in Phase 3. The material costs of the reef structure in production quantities should not greatly exceed that of conventional solutions (e.g., seawalls and riprap) for the system produced by the end of Phase 3. See Table 1 for the specific wave energy attenuation metrics.

Other important considerations for the base structure's material include compressive strength, flexural strength, penetration resistance, abrasion resistance, expected service life, cost per volume of material and/or region of coastline protected, local sourcing, and practical transport and installation. Standard tests such as those developed by the American Society for Testing and Materials (ASTM) should be employed in the development and assessment of proposed solutions. The structures must be robust enough to ensure they neither degrade nor become dislodged in a coastal seawater environment. To accomplish this, wave tank experiments will enable assessment of structural design with respect to reef height, width, slope, rugosity (a measure of surface convolution), and depth relative to different sea state conditions, including wave height and frequency, prior to fielding the base structures and testing them under real-world conditions. Standard National Oceanic and Atmospheric Administration (NOAA) protocols will be followed to ensure that reef structures are included in navigational charts (and US Navy charts as a consequence), and the required buoys to mark the reef locations will be installed by the Government team so that they are visible to mariners.

Technical Area 2: Ecosystem Engineering

TA2 efforts will promote rapid recruitment of the non-reef building organisms needed to protect the reef, allowing the structure to grow over timescales at least as fast as the healthiest reefs found in nature. A wide array of multi-domain chemical, acoustic, structural, and optical promoters could be considered as technologies that aid in ecosystem establishment. TA2 efforts should focus on increasing recruitment of the various organisms that naturally protect reef-builders from predation and reduce competition for substrate, while enabling the buildup of beneficial organisms (e.g., coralline algae) that aid in recruitment. Examples include the fish and invertebrates that prey on organisms that consume corals or oysters, as well as herbivores that prevent the algae overgrowth that smothers and degrades both coral and oyster reefs. These organisms must occur natively in the region where the Reefense structures will be employed, as this program does not support introduction of non-native species. The program will entertain modest efforts to breed native species whose populations have been in decline. However,

government partners will assess that the organisms are healthy before any field deployment can occur to avoid inadvertent introduction of pathogens into the system.

This work will need to be performed in close concert with TA1 structural designs, in order to incorporate favorable conditions on and around the structure for providing the optimized ecosystem establishment cues. Many reef denizens require places to hide, so the base structure should incorporate appropriate voids to attract and maintain thriving reef populations. All TA2 solutions will need to be non-toxic and field deployable per [Section 1.5](#) of this BAA.

Technical Area 3: Adaptive Biology

TA3 focuses on adaptive biology for coral and oysters, to ensure compatibility with a changing environment for greater long-term resilience. This TA will be conducted in a laboratory setting for the first phase of the program. Techniques can focus on adaptive breeding and other approaches (aside from genetic modification for final deployable systems) that can be implemented *in-situ*. New adaptive biological strategies for corals, their endosymbionts, and oysters (through increased temperature and disease tolerance) may provide the necessary elements to enable continued reef growth. Insights into how the holobiont (microorganisms such as bacteria, archaea, fungi) enhance the health and resilience of corals and their symbiotic algae can be leveraged. Chimerism - a natural process where two sexually produced early juvenile corals of the same species fuse - enhances genetic diversity and increases the probability of survival under changing environmental conditions, and could be explored through laboratory studies to produce individuals that are resilient to environmental stresses. New molecular techniques involving coral epigenetics may be leveraged that could help create stronger, more resilient, and faster growing reefs. Employment of directed selection to increase temperature tolerance in coral endosymbionts may also be used to enable adaptation of the faster growing portion of the coral-endosymbiont pair. As these techniques will all be aimed at increasing the pace of adaptation which would naturally occur by happenstance over much longer periods, organisms produced via these solutions can be placed in the field, following compliance with all permits outlined in [Section 1.5](#) of the BAA. In addition to permitting requirements, solutions will be reviewed by experts from the Reefense Ethics, Legal and Societal Implications (ELSI) Group prior to deployment.

1.1.3 Program Phases

Reefense is a 60-month program divided into three phases. Based on the criteria outlined below, there will be a down-select after Phase 1 (see [Section 1.5](#)).

Phase 1 (18 months)

For TA1 during Phase 1, structures will be designed (in concert with the prerequisites for TA2 and TA3 success) by way of modeling and wave tank experiments with consideration for structure height, width, slope, rugosity, and depth relative to different sea state conditions including wave height and frequency. Efforts will produce a structure suitable for fielding at the evaluation site as mentioned in Section 1.1.1, which will then be evaluated under real-world conditions in the latter part of the phase (deployment in months 12-14 and testing at month 15). An independent verification and validation (IV&V) Government team will perform site scouting for the exact evaluation sites, conduct tests on performer technologies, and generate reports on

the performance of all teams' TA1 deployed structural solutions for Phase 1 by no later than month 16. Teams must demonstrate wave attenuation by their 50-meter long reef structures of 70% compared to control (no protective structure) during the Phase 1 IV&V testing. The structures will remain in-water for the duration of the program, to serve as a host platform for later phase extensions and for long-term evaluation.

In the first phase, TA2 teams will establish their ecosystem engineering approaches and demonstrate a rudimentary ability to mitigate different predation and competition activities by biological organisms. One potential option includes embedding TA2 technologies in the TA1 structures and fielding them after rigorous laboratory testing. In the latter part of Phase 1, teams will deploy their best TA2 technologies in the field, on or around the TA1 structural platform to be evaluated in this and subsequent phases. In laboratory experiments, the ecosystem engineers must maintain algae cover < 10% compared to a control for corals. The solutions must achieve improved recruitment (new settlement by juvenile organisms) of at least 10% for oysters, or 5% for corals, compared to a control.

The TA3 tasks in Phase 1 will identify adaptive biology techniques that focus on the actual reef builders (corals and oysters) with the ultimate goal of achieving resilient organisms that can thrive on Reefense structures. In this first phase, teams will characterize their solutions and begin laboratory studies. The resilient organisms must achieve a 15% growth improvement for coral, or 10% for oysters, over their control counterparts. Teams working on corals will need to achieve coral survivability at conditions 0.5°C above ambient, while teams working with oysters will need to show a 10% increase in lab disease tolerance of *Perkinsis marinus* (Dermo) compared to control treatments in a laboratory setting. By the end of the phase, performers should be able to show a viable pathway to field deployable TA3 solutions by Phase 3.

Phase 2 (18 months)

In the second phase, TA1 structures will need to persist and demonstrate that they support the growth of emplaced reef organisms and attract new calcareous reef builders. By the end of Phase 2, proposers will refine their TA1 designs and extend their structures by 50 meters for a total length of 100 meters. The new structure should incorporate any improvements identified during Phase 1 IV&V evaluations and Phase 2 performer-conducted assessments to demonstrate resistance to erosion, waves, disease, and other natural phenomena. For TA2, performers will focus on down selecting their best field solutions. The larval attractants will be tested, as performers will need to demonstrate recruitment improvement of 50% for oysters and 25% for corals above the control. In addition, the healthy reef will be assessed through metrics of algal reduction of 30% over the control. For TA3, not only do teams need to achieve the metrics but they must conclusively prove why and how they were able to do so by identifying specific biomarkers that resulted in metric performance ([Table 1](#)) on growth, disease resistance, and temperature tolerance. Teams will need to demonstrate increased growth of 10% for oysters, or 15% for corals, in laboratory settings. For oyster approaches, disease tolerance for Dermo needs to be 15% higher compared to controlled settings. Teams working on corals must achieve temperature tolerance and survivability at 1°C above ambient conditions.

Phase 3 (24 months)

The final phase will combine all aspects of the project in the field, to demonstrate the fielding of healthy reefs that are resilient and can protect the shoreline with greater efficacy and persistence than current storm mitigation solutions. The TA1 structures placed during Phase 1 and 2 will be further lengthened by 50 meters of improved structure to reach the total length of 150 meters, and will continue to be evaluated for long-term endurance after three years of total deployment. The 150-meter-long structure will need to attenuate 90% or more of the wave energy by the end-of-phase. TA2 approaches, having proven initial capability for sustaining a healthy reef ecosystem in the field, will continue to improve on ecosystem engineering metrics. The larval attractants will be tested, as performers need to demonstrate increased recruitment by 4x for oysters, or 35% for corals, above the control in the field. In addition, the healthy reef will be assessed through metrics of algal reduction of 50% over the control. Most of TA3 metrics will be evaluated in the field during Phase 3. One laboratory test of note is that sufficient adaptations have been implemented to provide improved survival at a seawater temperature increase of 3°C above ambient, to ensure compatibility with surface seawater temperature projections. For the reefs in the field, teams must demonstrate increased growth of 15% for oysters, or 30% for corals, relative to control. For oyster approaches, disease tolerance for Dermo needs to be 20% higher compared to control, as evaluated in the field.

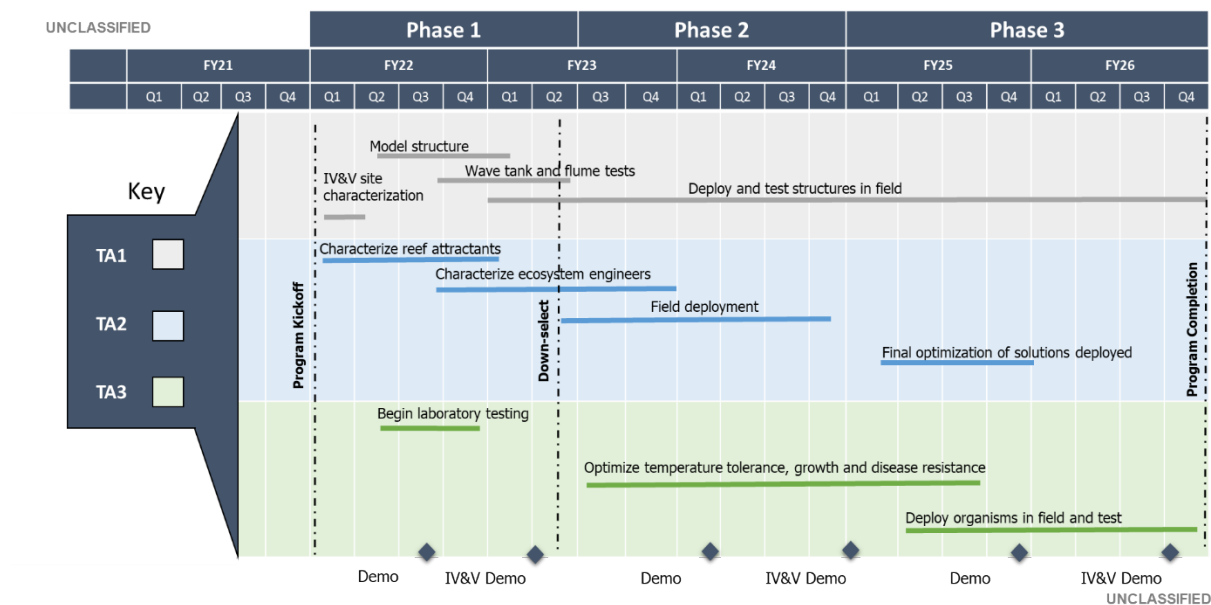


Figure 2. Program Schedule

1.2. PROGRAM METRICS

In order for the Government to evaluate the effectiveness of a proposed solution in achieving the stated program objectives, proposers should note that the Government hereby promulgates the following program metrics that may serve as the basis for determining whether satisfactory progress is being made to warrant continued funding of the program. Continued funding for each subsequent phase is contingent upon meeting or exceeding the metrics prescribed for the current phase. Although the following program metrics are specified, proposers should note that the

Government has identified these goals with the intention of bounding the scope of effort, while affording the maximum flexibility, creativity, and innovation in proposing solutions to the stated problem, to include variations in performance.

The metrics identified for this program were designed to encourage and drive innovative solutions that significantly increase the understanding of the physical, chemical, and biological processes at work in optimized Reefense systems, in order to advance the attenuation capability and persistence of such systems for coastal defense applications. Only successful satisfaction of the metrics for all TAs will be considered successful completion of a given phase. These metrics are presented in Table 1 below.

Table 1. Program Metrics

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	TA 1: Structure	TA 2: Ecosystem Engineering		TA 3: Adaptive Biology	
	Corals and Oysters	Corals	Oysters	Corals	Oysters
Phase 1	<ul style="list-style-type: none"> Wave energy (E) values must be reduced by 70% 50 m long base structure 	<ul style="list-style-type: none"> Algal cover < 10% control Recruitment densities 5% above control 	<ul style="list-style-type: none"> Recruitment densities 10% above control 	<ul style="list-style-type: none"> Temperature tolerances survivability at 0.5 °C above ambient conditions Growth increase 15% over control 	<ul style="list-style-type: none"> Growth increase 10% over control 10% increased in-lab disease tolerance of Dermo (<i>Perkinsus marinus</i> parasite) compared to control
Phase 2	<ul style="list-style-type: none"> Wave energy (E) values must be reduced by 80% 50 m new base structure added, for total 100 m in length 	<ul style="list-style-type: none"> Algal cover < 30% vs. control > 25% hard coral cover 	<ul style="list-style-type: none"> Recruitment densities 50% above control Size distributions from 10-75 mm 	<ul style="list-style-type: none"> Temperature tolerances survivability and reproductive success at 1 °C above ambient conditions Growth increase of 30% over ambient and a 15% increase in the field 	<ul style="list-style-type: none"> Growth increase 10% increased growth in field 15% increased in-lab disease tolerance of Dermo compared to control Identify biomarker(s) pathway
Phase 3	<ul style="list-style-type: none"> Wave energy (E) values must be reduced by 90% 50 m new base structure added, for total 150 m in length 	<ul style="list-style-type: none"> Algal cover < 50% vs. control > 35% hard coral cover 	<ul style="list-style-type: none"> Recruitment densities 4x above phase one Size distributions from 10-150 mm 	<ul style="list-style-type: none"> Temperature tolerances survivability and reproductive success at 3°C above ambient conditions Show 30% growth increase in coral in the field Identify biomarker(s) pathway 	<ul style="list-style-type: none"> Growth increase of 15% over ambient 20% increased in-lab disease tolerance of Dermo compared to control

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Wave attenuation measurements will be taken by conducting transects across a Reefense structure. Each transect will consist of three bottom-mounted wave gauges (i.e., pressure sensors) over the fore reef, on the reef, and behind it in the back reef (toward land). In addition, upward-looking Acoustic Wave and Current (AWAC) meters will be placed at the fore reef to collect additional pressure information and be directly compared with the wave gauges. Cross-reef patterns of wave energy, *E*, will be calculated according to the collected parameters in a method designed by the IV&V team and communicated to performers well in advance of testing. The IV&V team will utilize pressure sensors (sampling at least 2 Hz over a period of time) that facilitate the calculation of wave attenuation. Wave attenuation goals are expected to be achieved as compared to median conditions.

The production cost of the developed base structure should not greatly exceed that of conventional concrete solutions by the end of Phase 3. DARPA expects that proposers will demonstrate, via techno-economic modeling, the potential of their proposed structure production costs to be ≤ \$300 per cubic meter of deployed structure by the end of Phase 2. The techno-economic assessment will include a rigorous analysis that clearly spells out underlying assumptions. Techno-economic assessments will be required from each performer at the end of

Phases 1 and 2. A preliminary assessment is due at the conclusion of Phase 1, and a final assessment is due at the end of Phase 2.

As referenced earlier, reef health will be evaluated based on biological coverage of the Reefense structure vs. a control. This will be an area to area comparison measured in square meters as obtained by quadrats. Measurements will be taken on both control and Reefense structures by subsampling, and evaluated as defined by the government-led IV&V team. A subsample of oyster population shell heights will be measured to ensure they meet the distribution metrics.

Both laboratory and field assessment tests will also be conducted by the IV&V team on adaptive biology that help measure the metrics, including survivability, growth, and disease tolerance. More details on exact procedures will be given at a later time.

1.3. PROGRAM MILESTONES AND DELIVERABLES

In addition to meeting the specific metrics outlined in Section 1.2 above, proposers must achieve program milestones by particular deadlines, as well as produce specific deliverables for submission to the Government. These milestones must be specific to each TA and phase, and reaching these milestones will facilitate overall successful completion of the requirements for this program. Proposers may include supplemental milestones specific to their project, but at a minimum all proposals must include the milestones in Table 2. The month enumeration refers to a deadline of the last day of the calendar month, counting from the first full month of the contractual start of an award.

Table 2. Program Milestones and Deliverables

		Milestones	Deliverables
Phase 1 (18 months)	Technical Area 1	<ul style="list-style-type: none"> • Month 1: Identify materials sources (vendor and country of origin) • Month 9: Model structure and demonstrate design plans, show wave attenuation in flume wave tank up to 70% • Month 12-14: Deployment of 50 meter reef base structure • Month 15: Conduct assessment of the TA1 installation's structural integrity after 2 months in the field 	<ul style="list-style-type: none"> • Month 3: Model design report for proposed structure and materials based on IV&V team site feedback • Month 5: Report plan for wave tank experiment • Month 10: Report on Model TA1 structure demonstration in flume and wave tank • Month 13: Report on deployment of structure • Month 16: Preliminary techno-economic assessment of the material production and installation (anticipated costs of \leq \$500 per cubic meter of deployed structure at the end of Phase 1) • Month 16: Report on final Phase 1 performance and path forward

	Technical Area 2	<ul style="list-style-type: none"> • Month 2: Identify and characterize solutions in laboratory setting • Month 12: Identify progress on increasing recruitment densities in laboratory settings • Month 18: Deploy initial solutions for field testing 	<ul style="list-style-type: none"> • Month 3: Report on solutions for achieving TA2 that outlines all strategies • Month 16: Report on metrics performance for Phase 1 with path outlined for achieving Phase 2 metrics
	Technical Area 3	<ul style="list-style-type: none"> • Month 2: Begin preliminary lab testing identifying plan forward • Month 17: Show viable pathway to field able solution 	<ul style="list-style-type: none"> • Month 3: Report characterizing approaches and target species • Month 5: Report outlining adaptive biology techniques being employed • Month 16: Report on metrics performance for phase 1 with path outlined for achieving phase 2 metrics
Phase 2 (18 months)	Technical Area 1	<ul style="list-style-type: none"> • Month 25: Technical interchange meeting TIM (for all TAs, topics TBD by government team) • Month 28: Report on fielded TA2 solutions • Month 33: Deployment of 50 meter extension to reef base structure (100 meter total length) • Month 34: Structural assessment on structure after field deployment 	<ul style="list-style-type: none"> • Months 21 & 35: Report on structural integrity of deployed system • Month 25: Report on TIM (all TAs) • Month 28: Report on mid-phase demonstration • Month 35: Final techno-economic assessment of the material production and installation (assessed costs of \leq \$300 per cubic meter of deployed structure at the end of Phase 2) • Month 35: Report on final phase demonstration
	Technical Area 2	<ul style="list-style-type: none"> • Month 25: Create and outline plan for density increase and algae cover decrease 	<ul style="list-style-type: none"> • Month 21: Report on field deployment of solutions • Month 35: Report on final phase demonstration
	Technical Area 3	<ul style="list-style-type: none"> • Month 19: Demonstrate increased organism growth in the laboratory • Month 24: Conduct optimized temperature, growth and disease resistance experiments • Month 30: Identify biomarkers 	<ul style="list-style-type: none"> • Month 25: Report on organisms' growth and disease resistance tolerances • Month 35: End of phase report including biomarkers
Phase 3 (24 months)	Technical Area 1	<ul style="list-style-type: none"> • Month 39: Technical interchange meeting (TIM) (for all TAs, topics TBD by Government team) • Month 45: Deployment of 50 meter extension to reef base structure (150 meter total length) 	<ul style="list-style-type: none"> • Month 40: Report on structure deployment • Month 40: Report on TIM (all TAs) • Month 40, 47, 53: Reports on structural integrity

		<ul style="list-style-type: none"> Months 39, 46, 52: Assess long-term robustness of structure 	<ul style="list-style-type: none"> Month 59: Report on final phase demonstration
	Technical Area 2	<ul style="list-style-type: none"> Month 37: Deploy new solutions Months 39, 46, 52: Assess performance of new solutions 	<ul style="list-style-type: none"> Months 43, 47, 53: Report on performance of new TA2 solutions Month 59: Report on final phase demonstration
	Technical Area 3	<ul style="list-style-type: none"> Month 38: Identify biomarkers used across three generations Month 38: Deploy organisms in field Months 46, 52: Demonstrate increased organism growth in the field Month 47: Conduct optimized temperature, growth and disease resistance experiments 	<ul style="list-style-type: none"> Months 40, 47, 53: Report on organisms' growth and disease resistance tolerances Month 59: Report on final phase demonstration including biomarkers and field deployment techniques for organisms

Note: All mid-phase and end of phase reports must address performance against tested metrics as well as mitigations and strategies for achieving future metrics

1.4. PROGRAM DEMONSTRATIONS

Essential program demonstrations are outlined below. Additional demonstrations may be proposed, but those outlined below must be included, per the schedule set below.

Phase 1

Month 9: Model TA1 structure demonstration in flume and wave tank showing 70% attenuation

Month 15: Final Phase 1 Demonstration

- Demonstration of wave attenuation in the field measured by the IV&V team with TA2 reef health effectors embedded in the material to be evaluated in the next phase.
- Achieve temperature tolerances that confer survivability at 0.5°C above ambient conditions in laboratory settings (for coral).
- Achieve 10% decrease in Dermo disease for oysters vs. control populations in laboratory.

Phase 2

Month 27: Mid-phase demonstration showing increased (> 75%) wave attenuation and increased (> 10% over control) densities for corals and oysters. Laboratory studies for TA3 must show that they are on track to meet end-of-phase metrics.

Month 34: Final Demonstration

- Demonstrate wave attenuation (80%) in the field, with 100-meter long reef structure, as measured by the IV&V team. Reduce algae cover by 30% over control (coral teams).
- Demonstrate recruitment densities of 50% (oysters) and hard cover (coral) of 25% over control. Show oyster size distributions in 10-75 mm range.
- Demonstrate temperature tolerances and survivability of coral at 1.0°C above ambient conditions in the laboratory.
- Demonstrate increased laboratory disease tolerance of Dermo by 15% compared to control

Phase 3

Month 48: Mid-phase demonstration showing increased > 80% attenuation and increased > 35% over control densities for corals and oysters. Laboratory studies for TA3 must show that they are on track to meet end-of-phase metrics and that all necessary permits are obtained for deployment.

Month 58: Final Demonstration

- Demonstrate wave attenuation of 90% in the field, with 150-meter long reef structure, as measured by IV&V. At this time, the long-term endurance will be evaluated by IV&V after the more than three-year deployment of the structure to see how they were affected by hurricane seasons.
- Demonstrate reduced algal cover by 50% over control in the field. Recruitment densities for oysters should be 4x above Phase 1 numbers with size distributions from 10-150 mm. Temperature tolerance of corals in laboratory must survive at 3.0°C.
- Demonstrate an increase in-lab disease tolerance of Dermo by 20% compared to control in laboratory settings for oysters.

1.5. GENERAL REQUIREMENTS

Proposing Teams

It is expected that proposals will involve multidisciplinary teams that include expertise from multiple complementary disciplines (e.g., coral and/or oyster biology, chemistry, engineering, epigenetics, marine ecology, hydrodynamics, data science, acoustics, analytics, oceanography, and physics). 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.

Data Sharing

The Reefense program will require that performer data, analysis, and software executables (or source code) be shared with DARPA, the Government IV&V team, and U.S. Government stakeholders. Performers are strongly encouraged to establish the appropriate agreements to enable collaboration and data sharing beyond these organizations. DARPA encourages sharing of pre-existing data, including those generated through funding from other sources, although this is not a requirement of the program.

Biocontainment / Bio Safety

This program will not support proposals that include engineered organisms.

Permits and Compliance

It is the proposing team's responsibility to obtain all necessary federal, state, and local government permits and approvals, and abide by all applicable laws where necessary for the proposed work to be conducted. Proposing teams are expected to design their proposals so that they minimize the potential adverse impact on the environment. Proposals will be reviewed to ensure that they have sufficient environmental documentation to allow the Government team to determine whether the proposal is categorically excluded from further National Environmental Policy Act (NEPA) analysis, or whether an Environmental Assessment or Environmental Impact Statement is necessary to conform with NEPA requirements. For those applications needing an Environmental Assessment, affected proposers will be informed after the proposal review stage and will be requested to assist in the preparation of a draft of the assessment (prior to award). Failure to apply for and/or obtain federal, state, and local permits, approvals, letters of agreement, or failure to provide environmental analysis where necessary (e.g., NEPA environmental assessment) will also delay the award of funds if a project is otherwise selected for funding. DARPA intends that execution of the Reefense program comply with all applicable laws and regulations protecting marine life, including Executive Order 12114, Endangered Species Act, and Marine Mammal Protection Act.

Ethical Legal Social Implications (ELSI) Activities

Proposers are expected to engage with relevant regulatory bodies to identify and mitigate challenges to the transition of resulting technology and in anticipation of future deployment. The proposers should plan to support ELSI activities with DARPA, including semi-annual teleconference calls with the Reefense Program ELSI Group and consideration of feedback from the group regarding research activities. ELSI activity outcomes will be reported regularly to DARPA.

Down-select

A down-selection process (as mentioned in Section 1.1.3) will occur at the end of Phase 1. The down-selection process will be based on the performer's ability to meet the following metrics:

- Achieve threshold performance subset of metrics:
 - Wave energy must be reduced by 70% after performer base structure is installed compared to no structure present
- Demonstrate viable path towards meeting Phases 2 and 3 metrics in Phase 1 report

The performance will be determined by the IV&V test partner during testing in Month 15, with results provided to DARPA and to all teams by Month 16. The Phase 1 report is due to DARPA in Month 16. In addition, teams will be subject to the below priority weighting during performance evaluation:

- 50% technical: Most reasonable technical path to achieving Phases 2 and 3 metrics
- 25% management: Effective intra-team working relationships across co-/sub-PIs
- 25% cost: clear ability to achieve Phases 2 and 3 objectives within proposed budget

The performer teams with the highest weighted scores will be considered for progression.

Other Requirements

Performers are expected to attend program level meetings to provide scientific and technical updates to the other performers on the Reefense 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. Program level meetings will be held at the kick-off of each phase (Phases 1, 2, and 3), as well as mid-phase (Phases 1, 2, and 3) for the program duration.

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 VI.B.2., “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, 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 accordance with 10 U.S.C. § 2371b(f), the Government may award a follow-on production contract or Other Transaction (OT) for any OT awarded under this BAA if: (1) that participant in the OT, or a recognized successor in interest to the OT, successfully completed the entire prototype project provided for in the OT, as modified; and (2) the OT provides for the award of a follow-on production contract or OT to the participant, or a recognized successor in interest to the OT.

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 does not anticipate applying publication restrictions of any kind to individual awards for fundamental research that may result from this BAA. Notwithstanding this statement of expectation, the Government is not prohibited from considering and selecting research proposals that, while perhaps not qualifying as fundamental research under the foregoing definition, still meet the BAA criteria for submissions. If proposals are selected for award that offer other than a fundamental research solution, the Government will either work with the proposer to modify the proposed statement of work to bring the research back into line with fundamental research or else the proposer will agree to restrictions in order to receive an award.

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 determine whether the proposed research shall be considered fundamental and to select the award instrument type. Appropriate language will be included in resultant awards for non-fundamental research to prescribe publication requirements and other restrictions, as appropriate. This language 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 to be performed by a potential awardee is non-fundamental research, its proposed subawardee's effort may be fundamental research. It is also possible that the research performed by a potential awardee is fundamental research while its proposed subawardee's effort may be non-fundamental research. In all cases, it is the potential awardee's responsibility to explain in its proposal which proposed efforts are fundamental research and why the proposed efforts should be considered 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, that (a) cites the specific authority establishing their eligibility to propose to Government solicitations and compete with industry, and (b) certifies the FFRDC's compliance with the associated FFRDC sponsor agreement's terms and conditions. These conditions are a requirement 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 and compete with industry. This information is required for Government Entities proposing to be awardees or subawardees.

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.

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. CONTACT AND FORM OF APPLICATION SUBMISSION

All submissions, including abstracts and proposals, must be written in English with type no smaller than 12-point font. Smaller font may be used for figures, tables, and charts. The page limitation includes all figures, tables, and charts. All pages shall be formatted for printing on 8-1/2 by 11 inch paper. Margins must be 1-inch on all sides. 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. The time and date for submission of proposal abstracts are specified in Part I above.

The abstract is a concise version of the proposal comprising a maximum of 10 pages including all figures, tables, and charts. All submissions must be written in English with type no smaller than 12-point font. Smaller font may be used for figures, tables, and charts. All pages shall be formatted for printing on 8-1/2 by 11 inch paper. Margins must be 1-inch on all sides. Copies of all documents submitted must be clearly labeled with the DARPA BAA number, proposer organization, and proposal abstract title.

The page limit does NOT include:

- Official transmittal letter (optional);
- Cover sheet;

- Executive summary slide;
- Resumes; and
- 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:

Note: Please answer the questions for each technical area (TA):

1. What calcareous organism/environment is being chosen to accomplish the proposed work? Why?
2. What are the biggest enabling technologies of TA1, TA2, and TA3?
3. How is it done today? And what are the limitations?
4. What is innovative in your approach and how does it compare to the current state-of-the-art (SOA):
 - TA1: Structural
 - TA2: Ecosystem Engineering
 - TA3: Adaptive biology
5. What are the key technical challenges in your approach and how do you plan to mitigate these risks?
6. How do the estimated costs for procurement, fabrication, and installation of your TA1 materials compare to the state of the art?
7. List your timeline for field deployments for all TAs. Priority will be given to teams with accelerated and/or frequent developmental testing in the field.

C. Executive Summary Slides: The slide template is provided as **Attachment 1** to the BAA posted at <https://beta.SAM.gov>. Use of this template is required.

D. Technical Plan: Outline and address all technical areas and challenges inherent in the approach and possible solutions for overcoming potential problems. This section should provide specific objectives, metrics, and milestones at intermediate stages of the project to demonstrate a plan for accomplishment of the program goals. Propose additional appropriate qualitative and quantitative metrics specific to the approach, as needed. Outline of intermediary milestones should occur at no greater than 6-month increments.

E. Management and Capabilities: Provide a brief summary of expertise of the team, including subcontractors and key personnel.

A principal investigator for the project must be identified, and a description of the team's organization including a breakdown by technical area (TA). All teams are strongly encouraged to identify a separate Project Manager/Integrator to serve as the primary point of contact to communicate with the DARPA Program Manager, IV&V partner, and Contracting Officer's Representative, coordinate the effort across co-performer, vendor, and subcontractor teams, organize regular performer meetings or discussions, facilitate data sharing, and ensure timely completion of milestones and deliverables.

Include a description of the team's organization including roles and responsibilities. Team member descriptions should address the Technical Plan, describe the time and percent effort divisions for members participating across multiple TAs, and delineate individuals to avoid duplication of efforts.

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. Describe any specialized facilities to be used as part of the project, the extent of access to these facilities, and any biological containment, biosafety, and certification requirements.

F. 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

As soon as the evaluation of all proposals 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 point of contact (POC) and Administrative POC identified on the proposal coversheet.

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 submissions must be written in English with type no smaller than 12-point font. A smaller font may be used for figures, tables, and charts. The page limitation includes all figures, tables, and charts. All pages shall be formatted for printing on 8-1/2 by 11- inch paper. Margins must be 1-inch on all sides. Copies of all documents submitted must be clearly labeled with the DARPA BAA number, proposer organization, and proposal title/proposal short title. 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 1 is 40 pages.** The official transmittal letter is not included in the page count. Volume I should include the following components:

NOTE: Non-conforming submissions that do not address all technical areas and/or 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 (HR001121S0012);
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 Award 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-fee (CPFF), cost-contract—no fee, cost sharing contract – no fee, or other type of procurement contract (*specify*), cooperative agreement, or other transaction;
10. Place(s) of performance, including all subcontractors and consultants;
11. Period of performance;
12. Total funds requested from DARPA, total funds requested per phase and the amount of any cost share (if any);
13. Proposal validity period; AND
14. 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: The slide template is provided as **Attachment 2** to the BAA posted at <https://beta.SAM.gov>. 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:

- What calcareous organism/environment is being chosen to accomplish the proposed work? Why?
- What are the biggest enabling technologies of TA1, TA2, and TA3?
- How is it done today? And what are the limitations?
- What is innovative in your approach, and how does it compare to the current state-of-the-art (SOA):
 - TA1: Structural
 - TA2: Ecosystem Engineering
 - TA3: Adaptive biology
- What are the key technical challenges in your approach and how do you plan to mitigate these risks?
- How do the estimated costs for procurement, fabrication, and installation of your TA1 materials compare to the state of the art?
- List your timeline for field deployments for all TAs. Priority will be given to teams with accelerated and/or frequent developmental testing in the field.

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, plan for achieving the milestones, and must include a simple process flow diagram of their final system concept. 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. A Principal Investigator (PI) for the project must be identified, along with a description of the team organization, including the breakdown by Technical Area. All teams are strongly encouraged to

identify a separate Project Manager/Integrator to serve as the primary point of contact to communicate with the DARPA Program Manager, IV&V partner, and Contracting Officer's Representative, coordinate the effort across co-performer, vendor, and subcontractor teams, organize regular performer meetings or discussions, facilitate data sharing, and ensure timely completion of milestones and deliverables.

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 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, and any Government-furnished materials or information. Describe any specialized facilities to be used as part of the project, the extent of access to these facilities, and any biological containment, biosafety, and certification requirements. Discuss any work in closely related research areas and previous accomplishments.
- F. Statement of Work (SOW) NOT INCLUDED IN PAGE COUNT:** The SOW should provide a detailed task breakdown, citing specific tasks for each Technical Area, and their connection to the 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**. The SOW should be provided as a separate document and is not included in the Volume 1 page count.

For each task/subtask, provide:

- A detailed description of the approach to be taken to accomplish each defined task/subtask.
- Identification of the primary organization responsible for task execution (prime contractor, subcontractor(s), consultant(s), by name).
- A measurable milestone, i.e., a deliverable, demonstration, or other event/activity that marks task completion. Include completion dates for all milestones. Include quantitative metrics.
- A definition of all deliverables (e.g., data, reports, software) to be provided to the Government in support of the proposed tasks/subtasks. Please include a table of deliverables and due dates.

It is recommended that the SOW be developed so that each Technical Area and Phase of the program is separately defined.

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. 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.

a. Volume II, Cost Management Proposal

Cover Sheet (LABELED “PROPOSAL: VOLUME II”):

1. BAA Number (HR001121S0012);
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 Award 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-fee (CPFF), cost-contract—no fee, cost sharing contract – no fee, or other type of procurement contract (*specify*), cooperative agreement, or other transaction;
10. Place(s) of performance, including all subcontractors and consultants;
11. Period of performance;

12. Total funds requested from DARPA, total funds requested per phase (as defined in Table 1), and the amount of any cost share (if any);
13. Name, address, and telephone number of the proposer's cognizant Defense Contract Management Agency (DCMA) administration office (*if known*);
14. Name, address, and telephone number of the proposer's cognizant Defense Contract Audit Agency (DCAA) audit office (*if known*);
15. Date proposal was prepared;
16. Data Universal Numbering System (DUNS) number (<http://www.dnb.com/get-a-duns-number.html>);
17. Taxpayer ID number (<https://www.irs.gov/Individuals/International-Taxpayers/Taxpayer-Identification-Numbers-TIN>);
18. Commercial and Government Entity (CAGE) code (<https://cage.dla.mil/Home/UsageAgree>); and
19. Proposal validity period

NOTE: Non-conforming submissions that do not address all Technical Areas and/or follow the instructions herein may be rejected without further review.

The Government requires that proposers use the provided MS Excel™ DARPA Standard Cost Proposal Spreadsheet in the development of their cost proposals. A customized cost proposal spreadsheet may be an attachment to this solicitation. If not, the spreadsheet can be found on the DARPA website at <http://www.darpa.mil/work-with-us/contract-management> (under "Resources" on the right-hand side of the webpage). All tabs and tables in the cost proposal spreadsheet should be developed in an editable format with calculation formulas intact to allow traceability of the cost proposal. This cost proposal spreadsheet should be used by the prime organization and all subcontractors. In addition to using the cost proposal spreadsheet, the cost proposal still must include all other items required in this announcement that are not covered by the editable spreadsheet. Subcontractor cost proposal spreadsheets may be submitted directly to the Government by the proposed subcontractor via e-mail to the address in Part I of this solicitation. **Using the provided cost proposal spreadsheet will assist the Government in a rapid analysis of your proposed costs and, if your proposal is selected for a potential award, speed up the negotiation and award execution process.**

- (1) Total program, per phase (Phase 1 (Base); Phase 2 (Option); and Phase 3 (Option)), and per task cost broken down by major cost items to include:
 - i. **Direct labor** – provide an itemized breakout of all personnel, listed by name or TBD, with labor rate (or salary), labor hours (or percent effort), and labor category. All senior personnel must be identified by name.
 - ii. **Materials and Supplies** – itemized list which includes description of material, quantity, unit price, and total price. If a material factor is used based on historical purchases, provide data to justify the rate.
 - iii. **Equipment** – itemized list which includes description of equipment, unit price, quantity, and total price. Any equipment item with a unit price over \$5,000 must include a vendor quote.

- iv. **Animal Use Costs** – itemized list of all materials, animal purchases, and per diem costs, associated with proposed animal use; include documentation supporting daily rates.
 - v. **Travel** – provide an itemized list of travel costs to include purpose of trips, departure and arrival destinations, projected airfare, rental car and per GSA approved diem, number of travelers, number of days); provide screenshots from travel website for proposed airfare and rental car, as applicable; provide screenshot or web link for conference registration fee and note if the fee includes hotel cost. Conference attendance must be justified, explain how it is in the best interest of the project. **Plan for two (2) DARPA program review meetings per year.**
 - vi. **Other Direct Costs (e.g., computer support, clean room fees)** – Should be itemized with costs or estimated costs. Backup documentation and/or a supporting cost breakdown is required to support proposed costs with a unit price over \$5,000. An explanation of any estimating factors, including their derivation and application, must be provided. Please include a brief description of the proposers’ procurement method to be used.
 - vii. **Other Direct Costs** – Consultants: provide executed Consultant Agreement that describes work scope, rate and hours.
 - viii. **Indirect costs** including, as applicable, fringe benefits, overhead, General and Administrative (G&A) expense, and cost of money (see university vs. company-specific requirements below).
 - ix. **Indirect costs specific to a University performer:** (1) **Fringe Benefit Rate** (provide current Department of Health and Human Services (DHHS) or Office of Naval Research (ONR) negotiated rate package; if calculated by other than a rate, provide University documentation identifying fringe costs by position or HR documentation if unique to each person); (2) **F&A Indirect Overhead Rate** (provide current DHHS or ONR negotiated rate package); (3) **Tuition Remission** (provide current University documentation justifying per student amount); and (4) **Health Insurance/Fee** (provide current University documentation justifying per student amount, if priced separately from fringe benefits with calculations included in the EXCEL cost file).
Indirect costs specific to a Company performer: (1) **Fee/Profit** (provide rationale for proposed fee/profit percentage using criteria found in DFARS 215.404-70); and (2) **Fringe Benefit/Labor OH/Material OH/G&A Rates** (provide current Forwarding Pricing Rate Proposal (FPRP) or DCMA/DCAA Forward Pricing Rate Recommendation or Agreement (FPRR or FPRA). If these documents are not available, provide company historical data, preferably two years, minimum of one, to include both pool and expense costs used to generate the rates).
- (2) A summary of total program costs by Phase 1, 2, and 3 and task.
- (3) 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). The prime proposer is responsible for compiling and providing all subcontractor proposals for the Procuring Contracting Officer (PCO). The proposal must show how subcontractor costs are applied to each phase and task. If consultants are to be used, proposer must provide consultant agreement or other document that verifies the proposed loaded daily/hourly rate.

- (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) A summary of projected funding requirements by month for all phases of the project.
- (6) A summary of tasks that have animal or human use funding.
- (7) The source, nature, and amount of any industry cost-sharing. Where the effort consists of multiple portions that could reasonably be partitioned for purposes of funding, these should be identified as options with separate cost estimates for each.
- (8) 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.).
- (9) Any Forward Pricing Rate Agreement, DHHS rate agreement, other such approved rate information, or such documentation that may assist in expediting negotiations (if available).
- (10) Proposers with a Government acceptable accounting system who are proposing a cost-type contract must submit the DCAA document approving the cost accounting system.

Per FAR 15.403-4, certified cost or pricing data shall be required if the proposer is seeking a procurement contract award per the referenced threshold, unless the proposer requests and is granted an exception from the requirement to submit cost or pricing data. Certified cost or pricing data” are not required if the proposer proposes an award instrument other than a procurement contract (e.g., a grant, cooperative agreement, or other transaction.)

DARPA Embedded Entrepreneur Initiative (EEI)

Awardees pursuant to this solicitation may be eligible to participate in the DARPA Embedded Entrepreneur Initiative (EEI) during the award’s period of performance. EEI is a limited scope program offered by DARPA, at DARPA’s discretion, to a small subset of awardees. The goal of DARPA’s EEI is to increase the likelihood that DARPA-funded technologies take root in the U.S. and provide new capabilities for national defense. EEI supports DARPA’s mission “to make pivotal investments in breakthrough technologies and capabilities for national security” by accelerating the transition of innovations out of the lab and into new capabilities for the Department of Defense (DoD). EEI investment supports development of a robust and deliberate Go-to-Market strategy for selling technology to government and commercial markets and positions DARPA awardees to attract U.S. investment. The following is for informational and planning purposes only and does not constitute solicitation of proposals to the EEI.

There are three elements to DARPA's EEI: (1) A Senior Commercialization Advisor (SCA) from DARPA who works with the Program Manager (PM) to examine the business case for the awardee's technology and uses commercial methodologies to identify steps toward achieving a successful transition of technology to the government and commercial markets; (2) Connections to potential industry and investor partners via EEI's Transition Working Groups; and (3) Additional funding for awardees to hire an embedded entrepreneur to achieve specific commercialization milestones and work towards the delivery of a robust transition plan for both defense and commercial markets. This embedded entrepreneur's qualifications should include business experience within the target industries of interest, experience in commercializing early stage technology, and the ability to communicate and interact with technical and non-technical stakeholders. Funding for EEI is typically no more than \$250,000 per awardee over the duration of the award. An awardee may apportion EEI funding to hire more than one embedded entrepreneur, if achieving the milestones requires different expertise that can be obtained without exceeding the awardee's total EEI funding. The EEI effort is intended to be conducted concurrent with the research program without extending the period of performance.

EEI Application Process:

After receiving an award under the solicitation, awardees interested in being considered for EEI should notify their DARPA Program Manager (PM) during the period of performance. Timing of such notification should ideally allow sufficient time for DARPA and the awardee to review the awardee's initial transition plan, identify commercial milestones to deliver under EEI, modify the award, and conduct the work required to achieve such milestones within the original award period of performance. These steps may take 18-24 months to complete, depending on the technology. If the DARPA PM determines that EEI could be of benefit to transition the technology to product(s) the Government needs, the PM will refer the performer to DARPA's Commercial Strategy team.

DARPA's Commercial Strategy team will then contact the performer, assess fitness for EEI, and in consultation with the DARPA technical office, determine whether to invite the performer to participate in the EEI. Factors that are considered in determining fitness for EEI include DoD/Government need for the technology; competitive approaches to enable a similar capability or product; risks and impact of the Government's being unable to access the technology from a sustainable source; Government and commercial markets for the technology; cost and affordability; manufacturability and scalability; supply chain requirements and barriers; regulatory requirements and timelines; Intellectual Property and Government Use Rights, and available funding.

Invitation to participate in EEI is at the sole discretion of DARPA and subject to program balance and the availability of funding. EEI participants' awards may be subsequently modified bilaterally to amend the Statement of Work to add negotiated EEI tasks, provide funding, and specify a milestone schedule which will include measurable steps necessary to build, refine, and execute a Go-to-Market strategy aimed at delivering new capabilities for national defense. Milestone examples are in the attachment to this solicitation.

Awardees under this solicitation are eligible to be considered for participation in EEI, but selection for award under this solicitation does not imply or guarantee participation in EEI.

Subawardee Proposals

The awardee is responsible for compiling and providing all subawardee proposals for the Procuring Contracting Officer (PCO)/Agreements Officer (AO), as applicable. Subawardee proposals should include Interdivisional Work Transfer Agreements (ITWA) or similar arrangements. Where the effort consists of multiple portions that could reasonably be partitioned for purposes of funding, these should be identified as options with separate cost estimates for each.

All proprietary subawardee proposal documentation, prepared at the same level of detail as that required of the awardee's proposal and which cannot be uploaded with the proposed awardee's proposal, shall be provided to the Government either by the awardee or by the subawardee organization when the proposal is submitted. Subawardee proposals submitted to the Government by the proposed subawardee should be submitted via e-mail to the address in Section I.

Other Transaction Requests

All proposers requesting an OT must include a detailed list of milestones for each phase of the program (1, 2, and 3). Each milestone must include the following:

- milestone description,
- completion criteria,
- due date, and
- payment/funding schedule (to include, if cost share is proposed, awardee and Government share amounts).

It is noted that, at a minimum, milestones should relate directly to accomplishment of program technical metrics as defined in the BAA and/or the proposer's proposal. Agreement type, expenditure or fixed-price based, will be subject to negotiation by the Agreements Officer. Do not include proprietary data.

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 Program Security Officer (PSO). If a determination is made that the award instrument may result in access to classified information, a Security Classification Guide (SCG) and/or DD Form 254 will be issued by DARPA and attached as part of the award.

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>) and DoDI 8582.01 that are in effect at the time the solicitation is issued.

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.

Representations and Certifications

In accordance with FAR 4.1102 and 4.1201, proposers requesting a procurement contract must complete electronic annual representations and certifications at <https://www.sam.gov/>.

In addition, all proposers are required to submit for all award instrument types (i.e., procurement contract, cooperative agreement, grant, and Other Transaction for Prototype) supplementary DARPA-specific representations and certifications at the time of proposal submission. See <http://www.darpa.mil/work-with-us/rep-cert> for further information on required representation and certification depending on your requested award instrument.

Human Subjects Research (HSR)/Animal Use

Proposers that anticipate involving human subjects or animals in the proposed research must comply with the approval procedures detailed at <http://www.darpa.mil/work-with-us/additional-baa>, to include providing the information specified therein as required for proposal submission.

Approved Cost Accounting System Documentation

Proposers that do not have a Cost Accounting Standards (CAS) compliant 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.

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.

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 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.

International entities can register in SAM by following the instructions in this link:

https://www.fsd.gov/fsd-gov/answer.do?sysparm_kbid=dbf8053adb119344d71272131f961946&sysparm_search=KB0013221.

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 HR001121S0012. Submissions may not be sent 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.

Abstracts and Full Proposals sent in response to HR001121S0012 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 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 the submission process be started as early as possible.

For Cooperative Agreements only:

Proposers requesting cooperative agreements must submit proposals through one of the following methods: (1) electronic upload per the instructions at <https://www.grants.gov/applicants/apply-for-grants.html>; or (2) hard-copy mailed directly to DARPA. 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 Grants.gov do not submit hard-copy proposals in addition to the Grants.gov electronic submission.

Submissions: Proposers must submit the three forms listed below.

Form 1: SF 424 Research and Related (R&R) Application for Federal Assistance, available on the Grants.gov website at https://apply07.grants.gov/apply/forms/sample/RR_SF424_2_0-V2.0.pdf. *This form must be completed and submitted.*

To evaluate compliance with Title IX of the Education Amendments of 1972 (20 U.S.C. § 1681 et seq.), the Department of Defense (DoD) is collecting certain demographic and career information to be able to assess the success rates of women who are proposed for key roles in applications in science, technology, engineering or mathematics disciplines. In addition, the National Defense Authorization Act (NDAA) for FY 2019, Section 1286, directs the Secretary of Defense to protect intellectual property, controlled information, key personnel, and information about critical technologies relevant to national security and limit undue influence, including foreign talent programs by countries that desire to exploit United States' technology within the DoD research, science and technology, and innovation enterprise. This requirement is necessary for all research and research-related educational activities. The DoD is using the two forms below to collect the necessary information to satisfy these requirements. Detailed instructions for each form are available on Grants.gov.

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

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

Additional senior/key persons can be added by selecting the “Next Person” button at the bottom of the form. Note that, although applications without this information completed may pass Grants.gov edit checks, if DARPA receives an application without the required information, DARPA may determine that the application is incomplete and may cause your submission to be rejected and eliminated from further review and consideration under the BAA. DARPA reserves the right to request further details from the applicant before making a final determination on funding the effort.

Form 2: Research and Related Senior/Key Person Profile (Expanded), available on the Grants.gov website at https://apply07.grants.gov/apply/forms/sample/RR_KeyPersonExpanded_2_0-V2.0.pdf. This form must be completed and submitted.

Form 3: Research and Related Personal Data, available on the Grants.gov website at https://apply07.grants.gov/apply/forms/sample/RR_PersonalData_1_2-V1.2.pdf. Each applicant must complete the name field of this form, however, provision of the demographic information is voluntary. Regardless of whether the demographic fields are completed or not, this form must be submitted with at least the applicant’s name completed.

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>.

Proposal abstracts will not be accepted if submitted via Grants.gov.

Hard-copy Submissions: Proposers electing to submit cooperative agreement proposals as hard copies must complete the SF 424 R&R form (Application for Federal Assistance,) available on the Grants.gov website (https://apply07.grants.gov/apply/forms/sample/SF424_2_1-V2.1.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.

4.3. FUNDING RESTRICTIONS

Not applicable.

4.4. OTHER SUBMISSION INFORMATION

DARPA will post a consolidated Frequently Asked Questions (FAQ) document. To access the posting go to <http://www.darpa.mil/work-with-us/opportunities>. A link to the FAQ will appear under the HR001121S0012 summary. Submit your question(s) via e-mail to Reefense@darpa.mil.

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; 5.1.3 Cost Realism; 5.1.4 Realism of Proposed Schedule; 5.1.5 Proposer's Capability and/or Related Experience; and 5.1.6 Plans and Capabilities 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.

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. Realism of Proposed Schedule

The proposed schedule aggressively pursues performance metrics in the shortest timeframe and accurately accounts for that timeframe. The proposed schedule identifies and mitigates any potential schedule risk.

5.1.5. Proposer's Capabilities and/or Related Experience

The proposer's prior experience in similar efforts clearly demonstrates an ability to deliver products that meet the proposed technical performance within the proposed budget and schedule. The proposed team has the expertise to manage the cost and schedule. Similar efforts completed/ongoing by the proposer in this area are fully described, including identification of other Government sponsors.

5.1.6. 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 AND NOTIFICATIONS

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 conforming full proposals 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 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 the Arlington, VA vicinity and all key participants are required to attend. Performers should also anticipate regular program-wide PI meetings and periodic site visits at the Program Manager's discretion to the Arlington, VA vicinity. 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, to include periodic status reviews by the government.

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. Terms and Conditions

For terms and conditions specific to grants and/or cooperative agreements, see the DoD General Research Terms and Conditions (latest version) at <http://www.onr.navy.mil/Contracts-Grants/submit-proposal/grants-proposal/grants-terms-conditions> and the supplemental DARPA-

specific terms and conditions 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 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 the mailbox listed below.

Points of Contact

The BAA Coordinator for this effort may be reached at:

Reefense@darpa.mil

DARPA/BTO

ATTN: HR001121S0012

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 Reefense program on January 22, 2021 via webcast. The purpose is to provide potential proposers with information on the Reefense program, promote additional discussion on this topic, address questions, provide a forum to present their capabilities, and encourage team formation.

Interested proposers are not required to attend in order to respond to the Reefense 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.

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

Participants are required to register no later than **January 15, 2021**. 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.

Proposers Day Point of Contact:

DARPA-SN-21-07@darpa.mil

ATTN: DARPA-SN-21-07

9. APPENDIX 1 – Volume II checklist

Volume II, Cost Proposal Checklist and Sample Templates

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 of HR001121S0012. 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 **HR001121S0012** included on your Cost Proposal cover sheet?

☐ **YES**
☐ **NO**

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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**

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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**

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Indirect Costs/Rates (i.e., overhead charges, fringe benefits, G&A)

☐ **YES**
☐ **NO**

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Materials and/or Equipment

☐ **YES**
☐ **NO**

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Subcontracts/Consultants

☐ **YES**
☐ **NO**

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Other Direct Costs

☐ **YES**
☐ **NO**

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Travel

☐ **YES**
☐ **NO**

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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: