Broad Agency Announcement

DEMONSTRATION ROCKET FOR AGILE CISLUNAR OPERATIONS (DRACO) PHASE 2 AND PHASE 3

TACTICAL TECHNOLOGY OFFICE

HR001122S0035

Amendment 01

June 21, 2022

The purpose of this amendment is to:

1. Publish answers to questions submitted by the original question submission due date and add a supplemental Questions Due Date and Time as noted below and in PART I on page 5.

2. Add language on expected activities prior to launch as noted below and on page 12.

3. Revise proposal format language as noted below and on page 24.

4. Revise Volume I, Technical and Management Proposal page limit language as noted below and on page 25.

5. Edit the Intellectual Property section to address a typo as noted below and on page 38.

6. Add language allowing the use of a Unique Entity ID (SAM) (i.e., System for Award Management) in lieu of a DUNS number as noted below and on page 30.

Revisions are highlighted in yellow throughout the document.

1. PART I. Questions Due Date and Time: May 27, 2022 by 1700 ET. Supplemental Questions Due Date and Time: June 29, 2022 by 1700 ET.

2. I.C.1.3 “Added DARPA expects performers to conduct one full-core (with the flight-unit reactor and reflector) zero power critical (ZPC) test. Besides this test, DARPA is not requiring performers to conduct additional criticality experiments (i.e., sub-core, component criticals, or other experiments). However, DARPA expects the performers to ensure the ZPC test meets assumptions of the facility’s safety basis, including NCERC-DSA.100 and NCERC-TSR.100. Additional experiments may be required prior to the full-core test to demonstrate the safety basis assumptions are met. If additional criticality experiments are proposed by the proposer to minimize design uncertainties, they should be kept to a minimum. In such cases, the performer should provide justification that includes the need for proposed additional experiments, how they benefit the program, and how the performer proposes to bound cost and schedule impacts.”

3. IV.B.1. Revised “The maximum page limit for Volume I is 52 pages, excluding the sections with no page limit. Bracketed numbers before each section denote recommended page limits” to “The maximum page limit for Volume I is 62 pages, excluding the sections with no page limit. Bracketed numbers before each section denote recommended page guidelines”.

4. IV.B.1. Revised “Section I: Administrative” to Section I: Administrative {no page limit}

5. IV.B.2. Revised “In support of integration and future transition opportunities, DARPA expects to receive, at a minimum, Government Purpose Rights for Glide Breaker” to “In support of integration and future transition opportunities, DARPA expects to receive, at a minimum, Government Purpose Rights for DRACO.”

6. IV.B.1. Revised “DUNS number” to “DUNS number or Unique Entity ID (SAM)” to reflect this Government-wide transition.

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PART I: OVERVIEW INFORMATION

- **Federal Agency Name** – Defense Advanced Research Projects Agency (DARPA), Tactical Technology Office (TTO)
- **Funding Opportunity Title** – Demonstration Rocket for Agile Cislunar Operations (DRACO), Phase 2 and Phase 3
- **Announcement Type** – Initial announcement
- **Funding Opportunity Number** – HR001122S0035
- **Catalog of Federal Domestic Assistance Numbers (CFDA)** – Not applicable
- **Dates**
  - Posting: Date May 4, 2022
  - SECRET Appendix D Requests Due Date and Time: May 18, 2022 at 1700 Eastern Time (ET)
  - Questions Due Date and Time: May 27, 2022 at 1700 ET
  - Supplemental Questions Due Date and Time: June 29, 2022 by 1700 ET
  - Proposal Due Date and Time: August 5, 2022 at 1700 ET

- **Concise description of the funding opportunity –** The DRACO program seeks to build a nuclear thermal rocket (NTR) engine and test it on orbit in Fiscal Year 2026 (FY26). This solicitation is for Phase 2 and Phase 3 of the DRACO program, which is anticipated to last approximately three to four years. The objectives of Phase 2 are to complete preliminary and detailed design of a Demonstration System (DS) and to construct and experimentally validate the NTR flight engine to the extent possible. The DS will be built to host an NTR for its full-power, on-orbit flight test, in Phase 3.
- **Anticipated individual awards** – A single award is anticipated.
- **Types of instruments that may be awarded** – Procurement contract or other transaction.
- **Agency contact**
  - Points of Contact

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PART II: FULL TEXT OF ANNOUNCEMENT

I. Funding Opportunity Description

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

The Defense Advanced Research Projects Agency (DARPA) is soliciting innovative proposals for the design, development fabrication, assembly, and in-space flight demonstration of a nuclear thermal rocket (NTR) engine in FY 2026.

Instructions for requesting the Security Classification Guide (SCG), DD 254, Proposer's Day Slide Package, and classified SECRET Appendix D are in Section IV.A of this BAA.

A. Background and Overview

In-space propulsion systems in use today include electric and chemical propulsion. Electric propulsion systems (including nuclear electric propulsion (NEP)) have high efficiency (i.e., specific impulse) but low thrust-to-weight; because of this, electric and NEP systems are prohibitively slow for conducting time-critical missions. Chemical propulsion systems have comparatively low efficiency but high thrust-to-weight; because of the low efficiency, using chemical propulsion systems for time-critical missions can be prohibitively heavy due to the propellant and tank size requirements.

The DRACO program intends to develop novel nuclear thermal propulsion (NTP) technology to enable time-critical missions over vast distances in cislunar space. Unlike propulsion technologies in use today, NTP can achieve high thrust-to-weights similar to chemical propulsion but with two to five times the efficiency. This enables NTP systems to be both faster and smaller than electric and chemical systems, respectively. The propulsive capabilities afforded by NTP will enable the United States to maintain its interests in space, and to expand possibilities for the National Aeronautics and Space Administration (NASA)'s long-duration human spaceflight missions (i.e., to Mars). Because of the ability to transit space faster than other propulsion systems, the NTR engine can return astronauts to Earth much faster in case of an emergency and similarly ensure reduction of overall trip time and exposure to deleterious impacts to astronaut health which come with long-term spaceflight.

B. Program Structure

Prior to the release of this solicitation, both DARPA and NASA conducted multiple years of design activities, reactor component hardware manufacturing and testing, materials fabrication

and research, cryogenic fluid management (CFM) studies, and other technologies applicable to this program, in order to provide a foundation for an eventual in-space NTR flight demonstration. This BAA solicits proposals for Phases 2 and 3 of the DRACO program with the ultimate objective of executing an on-orbit NTR demonstration in FY 2026.

1. DRACO Phase 1

DARPA is currently completing Phase 1 of the DRACO program. Phase 1 was a risk reduction phase that consisted of two tracks: Track A, which focused on developing an NTR reactor design to a preliminary design review level, and Track B, which focused on developing demonstration system (DS) designs for an on-orbit demonstration. Proposals for Phase 2 and 3 under this BAA are not limited to Phase 1 performers.

2. DRACO Phase 2 and 3: Program Approach

The focus of DRACO Phases 2 and 3 is on developing and demonstrating an NTR in orbit on a DS, whereby the DS is meant to act as a delivery vehicle to orbit and host platform for the NTR engine. Utilizing mature and/or low-risk non-NTR components and technologies on the DS, such as heritage hardware from pre-existing upper stages to minimize program cost, schedule, and risk is highly encouraged. Demonstrating DS traceability to the conceptual operational system (OS) explored in Phase 1 is not a requirement of DRACO Phase 2 and 3. Only the NTR engine itself will carry an expectation of traceability between the DS NTR engine and OS NTR engine. More information on possible, relevant characteristics of an OS NTR engine and desired traceability of the DRACO NTR engine are provided in the classified Appendix D (See Section IV.A for instructions on acquiring the appendix).

The DRACO NTR is expected to utilize liquid hydrogen (LH_2) propellant. Proposals must present a concept that is capable of storing a sufficient amount of LH_2 propellant for the length of the demonstration and include the rationale for their design. Proposals should explain all proposed risk reduction and verification/validation testing of their tank and CFM technologies leading up to the in-space flight demonstration. Preference for selection will be weighted towards proposals that adequately balance the duration of the on-orbit demonstration with sufficiently high Technology Readiness Level (TRL) technologies. DARPA prefers heritage components previously demonstrated on existing upper stages using cryogenic LH_2. However, DARPA understands additional work will likely be required to evolve certain technologies, in order to accommodate longer duration, of on-orbit LH_2 storage beyond state of the art. Additionally, proposals that plan to use pre-existing LH_2 servicing infrastructure at the Kennedy Space Center/Cape Canaveral Space Force Station launch complex are preferred due to high cost, long-lead nature of launch pad upgrades.

DRACO reactor designs are expected to utilize 19.75% High Assay, Low Enriched Uranium (HALEU) fuel. DARPA expects to provide HALEU metal as government furnished equipment (GFE). Proposals should include an estimate of the amount of HALEU required for Phase 2 and Phase 3 fabrication and test activities and an estimate of when the HALEU is needed for utilization. There is an approximately 6-month lead time for DARPA to coordinate HALEU

production and delivery with the National Nuclear Security Administration (NNSA), so providing accurate estimates and timelines is essential to ensuring DARPA can meet the proposed timelines.

DARPA anticipates that reactor designs will utilize beryllium reflectors. Due to the long-lead nature of beryllium material, DARPA expects to procure a performer-agnostic beryllium blank that can be machined to performer-specification. DARPA expects this procurement to begin prior to selection of a Phase 2/3 performer and that the blank will be provided to the performer as GFE after award. DARPA expects the performer will then process the blank as needed in Phase 2 to fabricate their flight reactor.

Proposals must substantiate the ability of the proposed approach to meet the DRACO performance objectives and FY26 in-space flight demonstration timeline. Accordingly, proposals for the reactor and non-nuclear NTR components should leverage previous NTR engine work, such as the Rover/NERVA program. Developing an NTR engine with HALEU fuel that leverages heritage Rover/NERVA reactor design and engine testing data will help ensure the risks associated with the selected DRACO design approach are well understood and will maximize the likelihood of success within the desired timeline. Additionally, proposers should substantiate that the non-NTR components on the DS (i.e., communications equipment, thermal management techniques, navigation and guidance, attitude control secondary propulsion systems, command and data handling, CFM, etc.) are mature, high TRL, heritage, and/or low-risk wherever possible, and proposals should substantiate the ability of the selected components to operate robustly in their respective, anticipated radiation environment. Similarly, proposals must elicit confidence that the proposed reactor and NTR design can be fabricated, assembled, and tested within the desired timeline. In particular, the proposed reactor design should utilize NTR fuel that has been proven to be manufacturable on reasonable time scales by the performer and should have demonstrated characteristic NTR reactor performance in a hot hydrogen environment, substantiated by data that gives confidence in its ability to meet the performance objectives.

3. DRACO Phase 2: Major Milestones

Phase 2 is anticipated to last 24 months, as shown in Figure 1. The objectives of Phase 2 are to complete preliminary and detailed design of the DS and to construct and experimentally validate the NTR flight engine to the extent possible before its full-power, on-orbit flight test in Phase 3. The “flight engine” is defined to include the nuclear reactor, nozzle, NTR controller(s), associated pump(s), valves, lines, and ducts that drive the propellant from its tank, into and out of the reactor.

Phase 2 will consist of several milestones, design reviews and testing activities. At the beginning of Phase 2, performers should hold a kickoff that covers the program objectives and describes the design in sufficient detail to allow the performer to proceed to preliminary design. The design reviews should include a DS Preliminary Design Review (DS PDR) around month six, NTR Critical Design review (NTR CDR) around month 12, a DS CDR around month 21, and Test Readiness Reviews (TRRs) at least two months prior to major test events. Phase 2 is expected to include cold flow testing of a representative engine and engineering development unit (EDU) of

the reactor, fabrication and assembly of the flight reactor, and zero-power critical (ZPC) testing of the flight reactor. Specific expectations on these test activities are provided in Section I.C and expectations of the reviews are provided in Section I.D. Testing of nuclear and non-nuclear components should be completed as early as possible to inform the NTR and DS CDRs. Some key NTR components will have long lead times that require procurement and manufacture to begin prior to CDR. Testing of such items must be completed as early as possible to ensure their sufficiency. To summarize, as shown in the schedule, two major assemblies will be expected in the first year of Phase 2–one of an EDU of the NTR and the second of the flight-unit NTR reactor, expected to be tested in a ZPC test in year two of Phase 2.

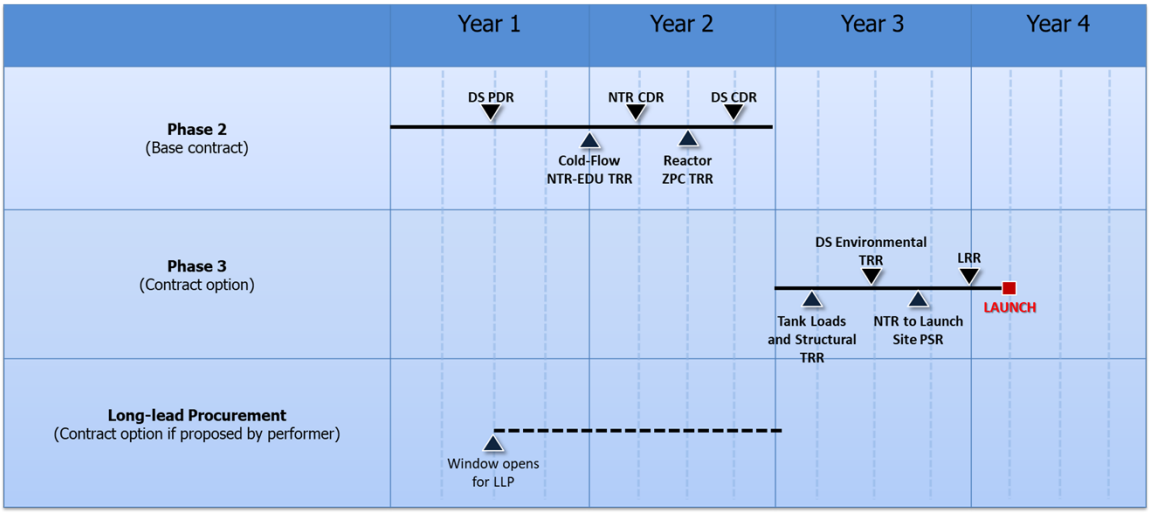


Figure 1: Notional Phase 2 and 3 Schedule

4. DRACO Phase 3: Major Milestones

Phase 3 will immediately follow Phase 2 and shall be proposed as a contract option. Phase 3 is anticipated to last approximately 15 months. The hydrogen tank will be expected to be fully fabricated in the early part of Phase 3 and to undergo structural, leak, flow, and other performance tests while fully loaded with liquid. Environmental testing of the fully-assembled DS should be executed in Phase 3 utilizing the reactor EDU. At a minimum, this should include testing of expected shock, vibration, and loading conditions on the DS during launch. The ultimate objectives of Phase 3 are to support launch, and conduct an on-orbit demonstration of the NTR engine, which brings the NTR engine to full power and full thrust on-orbit. Phase 3 should include TRRs for major DS test events, Pre-Shipment Reviews (PSRs) prior to shipping major components such as the NTR engine, and a Launch Readiness Review (LRR) prior to launch and on-orbit demonstration. Specific expectations on these reviews are provided in Section I.D.

5. DRACO Long-Lead Procurements

Proposers may also propose a contract option for long-lead DS procurements that would need to begin in Phase 2 to meet the desired launch date. If proposed, this option period should not occur

before the DS PDR. Additionally, proposals should substantiate why materials selected for procurement in this option period must be acquired before Phase 3 to meet the desired launch date. As an example, these long-lead procurements may include activities which involve developing non-engine elements of the DS that require co-evolution with the NTR, such as flight software and structures at the interface between the NTR and the rest of the DS.

C. DRACO Program Considerations

1. NASA Collaboration Opportunities

a) Summary

NASA has an interest in and is looking to further the development of technologies and capabilities in support of NTP efforts with potential future NASA utilization in alignment with agency objectives. Specifically, NASA retains unique experience and capabilities concerning NTP-related subject matter areas, including, but not limited to: turbopumps; liquid hydrogen CFM components, modeling, and testing (including active cooling and liquid acquisition devices); non-nuclear test facilities; and subject matter expertise in many aspects of design, test, safety, launch, and space operations that may be leveraged through collaboration with industry. DRACO proposers may be able to avail themselves of this unique experience through the execution of mutually beneficial, no funds exchanged partnerships with NASA which may be relevant or have applicability to (and which may facilitate) proposers' DRACO Phase 2 and Phase 3 activities. NASA may consider entering into these potential partnership opportunities on a non-exclusive basis to interested DRACO proposers, subject to prior coordination and subsequent execution of separate, non-reimbursable agreements (non-reimbursable Space Act Agreements or "NRSAAs") between the DRACO proposers and NASA. Under such agreements, NASA and the DRACO proposers would each bear the cost of their respective participation in the collaborative activities prescribed therein. NASA anticipates that the amount of NASA resources available for each collaborative project will be approximately $10M, depending upon the nature and scope of each project.

b) Process

DRACO proposers may refer to the Summary of Relevant Center Key Capabilities (Appendix C) to determine NASA resources that may be available to serve as the basis of potential collaborative partnerships. Proposers may reach out to NASA's point of contact: Harold Gerrish (harold.p.gerrish@nasa.gov) to coordinate on activities of mutual interest and scoping and agreement formulation activities in conjunction with NASA partnerships personnel and applicable NASA Center agreements managers. Upon successful discussion of potential partnership purpose, scope, and mutual benefit, NASA will issue a non-binding statement of commitment which will outline the parties' (NASA's and the proposer's) respective responsibilities, and the availability of all resources, facilities, or other support that may be provided by NASA under the NRSAA. NASA will finalize and execute any such NRSAAs after the DRACO selection decision. NASA does not anticipate any changes to the standard terms and conditions which will accompany each contemplated NRSAA. NASA's decision to execute any

NRSAAs is separate and distinct from and is not dependent upon the DRACO competition or its outcome. NASA's decision(s) will be at its sole discretion.

c) Ground Rules

DRACO proposers are reminded that any resultant NRSAA with NASA is a separate instrument, subject to review and approval by NASA and independent of the proposer's contemplated DRACO Phase 2/3 contract or agreement with DARPA. As such, DRACO proposers should identify in their proposal potential workarounds and alternatives in the event that NASA is unable to execute any aspect of the contemplated NRSAA. Further, NASA shall not be considered a teaming partner/subcontractor to the DARPA proposer and NASA shall not be responsible for performance of critical path contract activities under the scope of the DRACO contract or agreement. In all cases, DRACO proposers are reminded that full performance of Phase 2 and Phase 3 activities remains solely the responsibility of the proposer pursuant to the terms and conditions of its contract or agreement with DARPA.

2. Government Stewardship of DRACO Reactor

DARPA has been granted authorization to procure, build, and operate the nuclear reactor under § 91.b of the Atomic Energy Act of 1954 (AEA 1954). Under this authority, the nuclear reactor fueled with fissile material fabricated under DRACO will remain under the legal stewardship of the Department of Defense during its entire life cycle. Accordingly, DRACO performers will need to manage safety according to established guidelines and regulations. More information is provided in Appendix B of this BAA.

3. Activities Prior to Launch

The DRACO program is envisioned to accomplish major tests and demonstration activities before the flight demonstration occurs in FY26. Some of these major tests and activities will be accomplished with the help of government furnished equipment and facilities. Per the 91.b authorization stated above, DARPA is arranging to have major handling procedures of the NTR conducted with the assistance of the Department of Energy (DOE). The Nevada Nuclear Security Site (NNSS) has been selected as a prime candidate location to accomplish the aforementioned activities in order to stay within compliance.

The NTR "flight engine" (i.e., meant for the on-orbit demonstration) should be assembled with the reactor plus non-nuclear engine components on an engine assembly stand at the NNSS prior to delivery to the launch site. Proposers may work with Government agencies to identify an existing stand to use for this work as GFE. If the stand is proposed as GFE, proposers must substantiate the availability, costs, and schedule associated with its utilization. DARPA expects performers to conduct a zero-power critical test at the NNSS and that performers will conduct "staging" (i.e., assembly, disassembly, and work on the flight unit reactor to be used in the ZPC test) before and after the ZPC test at NNSS's Device Assembly Facility (DAF). Information on geometrical and size constraints on the engine that are dictated by DAF are stated in the classified Appendix D.

Performers are expected to ensure that the reactor is assembled, handled, protected, tested, transported, and managed according to federal standards and include solutions to these standards in their proposals. These include measures to meet safety basis while on the NNSS property including 10 CFR § 830 Subpart B and 10 CFR § 835. DARPA expects performers to conduct one full-core (with the flight-unit reactor and reflector) zero power critical (ZPC) test. Besides this test, DARPA is not requiring performers to conduct additional criticality experiments (i.e., sub-core, component criticals, or other experiments). However, DARPA expects the performers to ensure the ZPC test meets assumptions of the facility's safety basis, including NCERC-DSA.100 and NCERC-TSR.100. Additional experiments may be required prior to the full-core test to demonstrate the safety basis assumptions are met. If additional criticality experiments are proposed by the proposer to minimize design uncertainties, they should be kept to a minimum. In such cases, the performer should provide justification that includes the need for proposed additional experiments, how they benefit the program, and how the performer proposes to bound cost and schedule impacts.

After criticality testing is complete with the flight-unit reactor, DARPA expects that performers will assemble the reactor with the remaining non-nuclear engine components to complete the NTR flight engine assembly prior to shipment from NNSS to the launch complex. DARPA expects that the existing documented nuclear safety basis of the NNSS will make it a more favorable location for NTR flight engine assembly compared to performer facilities or at the launch complex due to the potential need for manufacturing and assembly tools and techniques such as welding to the reactor plant, which may not be covered by nuclear safety standards elsewhere. Proposals should include a detailed discussion of the NTR assembly process including any specialized equipment that would be required at the NNSS for assembly of the reactor or NTR and any proposed deviations to DARPA's expected use of the NNSS for reactor and NTR assembly.

During Phase 2 reactor parts and assemblies will need to be staged and transported between facilities at the NNSS. During Phase 3, the fully-assembled reactor assembly and possibly the fully assembled NTR, will be transported across state lines from the NNSS to the launch complex. Transportation onsite at the NNSS and from the NNSS to the launch complex may be provided as GFE and should be accomplished using a government-approved cask provided as GFE. DARPA is currently coordinating the necessary logistics of transporting the reactor and NTR while onsite at the NNSS and from the NNSS to the launch complex. DARPA expects to procure and provide a cask as GFE during all phases of transportation and to manage contracting for transportation services. During transportation, safety features shall be incorporated as needed to meet federal safety requirements, including 10 CFR Part 71. DARPA expects approval for transportation will be managed by the NNSS for intra-NNSS transportation and by the Department of Transportation for transportation from the NNSS to the launch complex.

Proposals should provide a facility utilization and transportation plan for reactor components, reactor and engine assembly, staging of parts and assemblies, and transportation between sites and to the launch complex. This discussion should include specific facilities that will be used for fabrication, assembly, testing, etc.; infrastructure that exists and infrastructure that must be added to the facility for the proposed activities; timelines and cost estimates for required facility

modifications that would be assessed against the DRACO program; and discussion of the proposed strategy for managing safety during transportation between sites and to the launch complex. Proposers opting to utilize the NNSS for such activities are encouraged to work directly with the NNSS to determine the optimal facility and process-flow approach for their proposal. Proposers are encouraged to incorporate a Manufacturing Readiness Assessment (MRA) for NTR assembly, a Process Failure Modes and Effects Analysis (PFMEA) event, and/or a Production Readiness Review (PRR) prior to assembly into their work plan. In addition, proposers are encouraged to include a plan to substantiate adequate work instructions and fixturing/tooling approaches for NTR assembly prior to arrival at the assembly facility(ies). Contacts for the NNSS can be reached by contacting the National Nuclear Security Administration's Office of Strategic Partnership Programs at SPP@nnsa.doe.gov.

Proposers are expected to develop a non-nuclear EDU of the NTR engine, which does not have significant mass or materials deviations from the flight unit, and only differs from the flight unit in that it utilizes a mass surrogate for enriched uranium fuel inside of the reactor (i.e., zirconium, hafnium, or other surrogates that complement the performer's pre-existing fuel architecture). Proposers shall include tests in their proposal utilizing an NTR engine EDU for mass simulation to do structural, mechanical, and vibrational loads testing on the reactor and engine (i.e., flow induced vibrations into the core, slosh and pogo effects on the non-nuclear engine components from draining the tank, et cetera). The EDU should also be used with integrated structural loads and modal testing with a fully weighted propellant tank to validate center of gravity and launch load predictions, and also that the vehicle is structurally robust. Additionally, proposals should include any testing required to substantiate the launch safety approach to meet launch approval requirements.

4. Launch Activities

Integration of the flight unit NTR engine with the DS is expected to take place at the launch complex. DARPA expects to provide the payload-processing facility for assembly, integration and testing as GFE. Due to the classified and radiological nature of the flight unit NTR, the processing facilities will likely be limited to the National Reconnaissance Office's (NRO) Eastern Processing Facility at Cape Canaveral Space Force Station or the NASA payload handling facility at Kennedy Space Center.

DARPA expects the launch vehicle to be provided as GFE under the United States Space Force (USSF)'s National Security Service Launch (NSSL) contract. During Phase 1, DARPA compared NSSL launch vehicles. From this comparison, DARPA determined that the Falcon 9 does not presently have the infrastructure or fairing interfaces to support liquid hydrogen payloads. Additionally, the Falcon 9 limited the launch mass and volume that could be delivered to orbit for the demonstration mission. In comparison, the Vulcan Centaur presently has the infrastructure to support a liquid hydrogen payload, but would need a fairing modification to support delivering liquid hydrogen to a DS delivered as a separate payload on top of the second stage. To minimize cost and risk to schedule, DARPA will favor proposals that take advantage of pre-existing infrastructure, internal fairing LH_2 loading interfaces and DS concepts that most seamlessly integrate with their Launch Vehicle (LV).

DOD/USSF processes and procedures, including those associated with the launch vehicle, will be followed with regards to launch approval, qualification, processing, etc. As such, DARPA anticipates launch would occur from Cape Canaveral Space Force Station, Florida. Utilization of existing LH_2 servicing infrastructure will likely be the most cost-effective way to provide for the LH_2 servicing requirements of DRACO. The Government expects proposers to articulate the extent of new infrastructure to be constructed or modifications to existing facilities that are required for DRACO LH_2 requirements, along with an associated ROM cost. Proposers may also propose alternative launch vehicle procurement and launch site strategies.

The Phase 2/3 performer(s) will be required to adhere to the Presidential Memorandum on Launch of Spacecraft Containing Space Nuclear Systems (National Security Presidential Memorandum 20). Specific information on expectations and process are included in the Appendix B included at the end of this BAA.

5. In-Space Flight Demo

The first programmatic goal of the flight demonstration is to demonstrate that the flight of nuclear thermal rockets is feasible. Therefore, proposers should ensure their approach minimizes the risk and maximizes the reliability associated with non-NTR components, maintains sufficient margin in NTR performance to maximize the likelihood of success, and maintains traceability to a higher-performing NTR that could enable future operational DoD missions. To meet this objective, proposers should ensure data is collected that characterizes engine operation and confirms whether engine operation was nominal or off-nominal. The second programmatic goal is to gather data that aids the design of a second-generation NTR in a future program. This includes data necessary for model validation, performance verification, and operational procedures development

Proposers should recommend a flight demonstration mission profile that is tailored to their DS design. Per lessons learned during Phase 1 of the DRACO program, the duration of the in-space flight demonstration is expected to last at least a day and ideally exceed a week. This is within the realm of possible given today's on-orbit CFM and power capabilities.

At a minimum, the in-space flight demonstration shall execute a ZPC test on orbit, bring the NTR engine to a state of full power and thrust, turn the engine off (i.e., take the reactor to a sub-critical state), and then attempt to bring the engine to a full-power, full-thrust state a second time. Proposed demonstration plans must address the likelihood that the engine may not start as predicted. At a minimum, this should include a testing sequence that validates predicted performance in a methodical fashion to maximize the likelihood of success, has the ability to abort and attempt another startup, and ensures sufficient propellant remains to ensure proper reactor decay heat removal after the startup attempt.

The proposed DS must be instrumented sufficiently to monitor and control the experiments conducted on the NTR engine and also to acquire sufficient amounts of scientific data during the experiments to fill in gaps in understanding that may otherwise not have been acquired through

ZPC testing and other experiments on the ground. For example, the in-space flight demonstration should study and acquire data on the effect of hydrogen reactivity worth on the reactor while the reactor is undergoing full-power, full-thrust operation. Furthermore, telemetry systems, communications systems, and on-orbit test plans should be designed to maximize the collection and return of data under anomaly and contingency conditions. Additional example in-space flight demonstration objectives and sequences are detailed in Appendix A of this BAA. These example objectives are based on historical NERVA/Rover test sequences and the current desire to understand HALEU NTR operations. Proposals should include a post-mission review to review the results of the on-orbit demonstration.

Proposals should present a plan for control of the NTR engine as it cycles through the on-orbit demonstration. This should include discussion of ground facilities that will be used, communications systems that will be used, plans for training operators, and any simulators that will be developed for training and/or use during the flight demonstration. Proposers should also include preliminary plans to control the NTR and its effectors manually from the ground with ground operators, should the NTR controllers fail to adequately control the reactor autonomously. Proposed facilities and systems can be commercially procured or GFE. If GFE facilities or systems are requested, proposals should substantiate its availability and cost.

D. Major Design Reviews

Management Approach: Proposers should provide a description of their program and risk management approach. The management approach should include regular teleconferences with the Government to review program, design, and development details, and regular interactions with performers to discuss any relevant interface and functional design details and to coordinate relevant program schedule items. In person reviews should be held with the Government at major program milestones to review progress against program objectives and to receive Government inputs on risk management trades. The program management approach should identify and track technical risks and establish risk mitigation approaches early and continuously throughout the program.

The overall approach for technology maturation should be described for all program phases. The management approach should describe the process for schedule management for the performer, any subcontractors, and any suppliers.

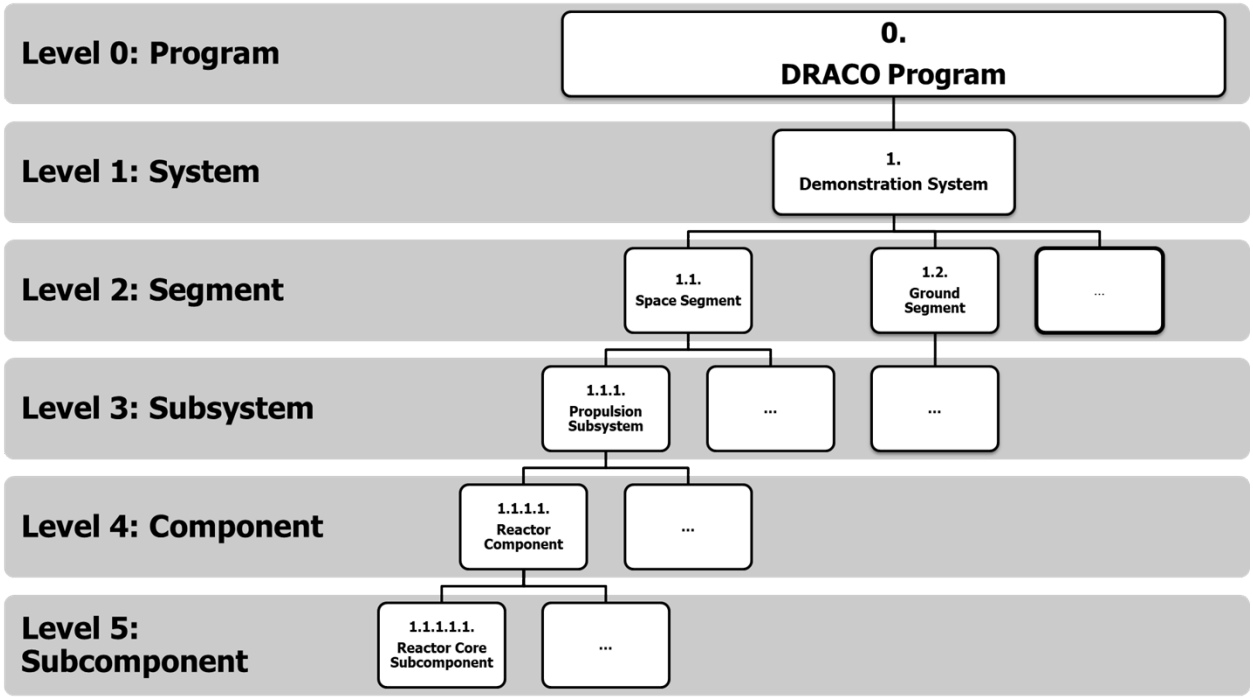
Design Reviews: The performer will execute appropriate program reviews. Program reviews should include a preliminary design review (PDR) and a critical design review (CDRs) with content and entrance and exit criteria tailored from a recognized industry or military standard (e.g., Defense Acquisition Guidance (DAG) guidelines available at https://dag.dau.mil and MIL-STD-1521B are suggested sources) for appropriate application to a technology demonstration program, as appropriate for the proposed effort. Proposals should clearly address how these standards will be tailored in the proposed effort. Any tailoring of design review content and criteria must include an assessment of the design maturation of the technology, technical risk, and incorporate demonstrable technology maturation progress and achievements. Specific expectations for the program are outlined below, and should be incorporated into the performer's comprehensive list of tailored design review criteria, which will be evaluated to assess the

adequacy of the proposed systems engineering processes. **Proposals should include specific entrance and exit criteria that will be used for each design review.** These checklists will need to be reviewed and approved by the Government prior to the start of the reviews to allow the Government to understand and assess the adequacy of the proposed tailoring of these reviews. Any changes or updates to the entrance and exit criteria during phases must be provided to the Government and approved, as indicated in the deliverables table.

General:

- Requirements Development – A complete set of interfaces, demonstration system performance, and design requirements is established at level 4 of the system hierarchy (i.e., system, segment, subsystem, and component) for the subject review. Each requirement must include verification provisions. System interfaces are identified and documented.
- Design Definition – The design of the system is established at level 4 of the system hierarchy for the subject review, satisfies established requirements, and is sufficiently detailed to enable the next level of design definition. Appropriate design margins are identified and maintained.
- Risk Management – Technical, cost, and schedule risks are identified as if/then statements and assessed (e.g., consequence and likelihood). Mitigation plans are in place along with associated completion criteria. Technical risks have been updated with results of any mitigation activities.
- Technology Maturation – System/hardware/software attributes requiring maturation have been identified and associated analysis, test, and demonstration objectives have been documented. The representative test article design is documented.

Figure 2: Nomenclature for hierarchy of requirements



PDR

- Requirements Development – System (Level 1), segment (Level 2), and subsystem (Level 3), component (Level 4) requirements are complete. Verification methods (e.g., Analysis, Integration, Test, and Demonstration) are identified. Interfaces are documented.
- Design Definition – Assess the allocated design documented in subsystem requirements. Preliminary design is complete to the subsystem level (Level 3), closes around documented requirements, adequately demonstrates that performance achieves minimum and maximum threshold ranges, and meets size, weight, power and cost (SWaP-C) constraints.
- Software Development – Development plan with processes and metrics to measure progress.
- Risk Management – Risk matrix and management plan updated.
- Technology Maturation - Desired technology maturation can be achieved via planned development within program budget and schedule. Test plans define objectives and expected results that will validate design proof-of-concept.
- Cost – Revised bill of materials (BOM) cost based on preliminary design is documented and within established performer-defined cost metrics.
- Manufacturing and Integration Readiness – The design has been shown to be fabricable and can be feasibly assembled and integrated. Suppliers for critical components and raw materials are identified. An initial procurement, manufacturing, and assembly schedule shows feasible plan to meet key milestones.
- Launch Safety – The launch safety approach is shown to be feasible and sufficient to meet launch approval requirements. Draft Mission Safety Analysis Report (MSAR) was

provided to the Government for peer review prior to PDR and peer-review comments have been satisfactorily addressed.
- Launch Vehicle Integration – Documentation required by the launch vehicle provider is known, draft documents have been provided to the launch-vehicle provider, and path to meet all launch-vehicle requirements is feasible.

DS CDR
- Requirements Development – subcomponent (Level 5) and element (Level 6) requirements for the DS are complete. Verification approach for each DS requirement has been established. Internal interfaces between DS subsystems are documented.
- Design Definition – Critical DS designs are complete to the component level (Level 4) and achieves compliance with all associated requirements.
- Cost – Final DS design BOM costs are documented and within performer-defined cost metrics.
- Manufacturing and Integration Readiness – The DS design is ready to be manufactured, assembled and integrated. A DS subsystem procurement, manufacturing, and assembly plan is documented. Facilities and procedures for assembly and integration are in place.
- Launch Safety – The launch safety analyses on design are complete and meet launch approval requirements. Draft MSAR was provided to the Government for peer review prior to PDR and peer-review comments have been satisfactorily addressed. Draft MSAR has been reviewed by INSRB (Interagency Nuclear Safety Review Board) for completeness and quality. Provide analysis and test program that clearly demonstrates that the system safety will meet launch approval requirements. Substantiate the nuclear safety program prior to PDR to ensure launch approval can be completed in time. Use past test information, if applicable, to support your conclusions and specific ways this will be substantiated for the current design.
- DS Launch Vehicle Integration – Required documentation has been provided to launch-vehicle provider and is sufficient to meet requirements for launch.

NTR CDR
- Requirements Development – subcomponent (Level 5) and element (Level 6) requirements are complete for the NTR. Verification approach for each requirement has been established. Internal interfaces between subsystems are documented.
- Design Definition – Critical designs are complete to the subcomponent level (Level 5) and achieves compliance with all associated requirements.
- Cost – Final design BOM costs are documented and within performer-defined cost metrics.
- Final review and approval of all required safety and environmental launch documents.
- Manufacturing and Integration Readiness – The NTR design has been informed by the cold flow test which has occurred prior to CDR, such that any design changes informed by the cold flow test are incorporated into the NNE and reactor. Facilities and procedures for assembly and integration are being implemented.

Readiness Reviews: The performer shall complete readiness reviews prior to all major test events, shipment of major assemblies (e.g. flight reactor from NNSS to the launch facility), and launch of the DS.

TRR
The TRR verifies that the planned tests meet the Government's expectations of the necessary demonstration, by proving accomplishment of performance requirements prior to expending limited hardware. The TRR should be conducted substantially ahead of the demonstration to allow adjustments based on Government feedback. Demonstration unit design and instrumentation for recording data associated with major performance requirements should be reviewed. Limitations of the test should be discussed and possible mitigations considered.

Prior to the TRR, the performer should confirm the following criteria:

- Test objectives are defined and agreed to by the Government
- Test plan to meet the test objectives is documented and agreed to by the Government
- All hardware is available or will be delivered in time with reasonable margin for system integration and demonstration;
- All firmware/software is in final system simulation evaluation and under configuration control;
- The test article(s) and the procedures and plans for their use have been submitted to and approved by the safety entity responsible for evaluating the test safety;
- Training material is complete for personnel to be involved in the testing concerning the objectives of the test(s) and the jobs personnel are responsible for accomplishing;
- Resources (people, equipment, and materials) needed to accomplish the testing are available and ready for the testing;
- The equipment, facilities, and ranges (if applicable) are evaluated as ready for test; and
- Documentation of evaluations, assessments, plans, procedures, training, and other factors applicable to the tests are available for Government review.

PSR
A PSR should be executed prior to the shipment of major hardware assemblies to ensure government concurrence with major hardware movements. The PSR verifies that major hardware assemblies have been manufactured within acceptable tolerances, appropriately assembled, tested sufficiently to verify the assembly performs as expected, and that the packaging and shipping procedure is adequate. Proposals should include specific exit criteria for this review that are tailored for the particular hardware shipment.

LRR
An LRR should be executed prior to DS integration with the launch vehicle and launch of the DS for the on-orbit demonstration. Proposals should include specific exit criteria for this review. At a minimum, the LRR should verify that:

- All hardware arrived at the payload processing facility in acceptable condition,
- The DS was appropriately assembled and verification testing of the DS at the launch site produced adequate results
- Environmental factors are adequate for launch
- Launch and operation crews are prepared to fill their expected roles

- Test procedures are adequate for the demonstration and operations crews are adequately trained to execute the procedures
- The launch vehicle is ready for integration and launch
- Communications infrastructure and operations center are prepared to support launch and on-orbit demonstration

Government Management Approach and Operations: The Government recognizes that a streamlined, collaborative management approach is essential to achieving the program technical, cost, and schedule objectives. The Government team is comprised of a core technical and programmatic team, which may be augmented with Government-led Integrated Product Teams (IPTs) for targeted technical disciplines, for example, systems engineering, integration, modeling & simulation, etc. The performers will interface with the Government teams via coordination meetings at the technical level, status meetings at the management level and quarterly program management reviews. The proposers are asked to provide a management approach to allow for collaboration with the Government team to ensure a successful program.

II. Award Information

A. General Award Information

A single award is anticipated. 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 proposals from award consideration, should the parties fail to reach agreement on award terms, conditions, and/or cost/price within a reasonable time, or if the proposer fails to provide requested additional information in a timely manner. Proposals identified for negotiation may result in a procurement contract 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. § 4003(f), the Government may award a follow-on production contract or Other Transaction (OT) for any OT awarded under this solicitation 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

B. Proposals and Awards

Proposers shall prepare full proposals in accordance with the proposal format instructions detailed under Section IV to address this Phase 2 and 3 solicitation (including options).

C. 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 solicitation, the Government expects that program goals as described herein either cannot be met by proposers intending to perform fundamental research or the proposed research is anticipated to present a high likelihood of disclosing performance characteristics of military systems or manufacturing technologies that are unique and critical to defense. Therefore, the Government anticipates restrictions on the resultant research that will require the awardee to seek DARPA permission before publishing any information or results relative to the program.

Proposers should indicate in their proposal whether they believe the scope of the research included in their proposal is fundamental or not. While proposers should clearly explain the intended results of their research, the Government shall have sole discretion to 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.

III. Eligibility Information

A. Eligible Applicants

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

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

a) FFRDCs

FFRDCs are subject to applicable direct competition limitations and cannot propose to this solicitation 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.

All proposers are expected to address transition; transition is part of the evaluation criteria in Section V.A. However, given their special status, FFRDCs should describe how and when a proposed technology/system will transition to which Non-FFRDC organization(s).

b) 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.

c) 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.§ 4892 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.

2. Non-U.S. Organizations and/or Individuals

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.

B. 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 solicitation. 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 solicitation 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.

C. Cost Sharing/Matching

Cost sharing is not required; however, it will be carefully considered where there is an applicable statutory condition relating to the selected funding instrument. Cost sharing is encouraged where there is a reasonable probability of a potential commercial application related to the proposed research and development effort.

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

D. Other Eligibility Criteria

In addition to the security requirements stated in Section I, proposers shall be International Traffic in Arms Regulations (ITAR) compliant and have appropriate personnel clearances and facilities for processing and storing at least SECRET level information to propose to this BAA and execute the DRACO program. Performers are desired to have personnel and facilities to operate at higher classification levels. Further details are provided in the classified Appendix D.

IV. Application and Submission Information

A. Requesting Security Classification Guide, DD 254, Proposer's Day Slide Package, and SECRET Appendix D

This announcement **with its unclassified and classified SECRET appendixes**, any attachments, and any references to external websites herein constitute the entire solicitation. If proposers cannot access the referenced material posted in the announcement found at https://sam.gov/ or www.darpa.mil, contact the administrative contact listed herein.

A formal request for the DRACO Security Classification Guide (SCG), a DD 254, Proposer's Day Slide Package, and the BAA SECRET Appendix D may be e-mailed to HR001122S0035@darpa.mil. Requests should include, at a minimum:

- the organization name;
- technical point of contact (POC) name, phone number, and e-mail address;
- Facility Security Officer (FSO) name, phone number, and e-mail address;
- Commercial and Government Entity (CAGE) code;
- statement of facility clearance and safeguarding capability and

- a valid address for receiving classified material at the SECRET level via express mail.

DARPA will provide the SCG, DD 254, and Proposer's Day Slide Package via encrypted e-mail or DoD Secure Access File Exchange (SAFE) (https://safe.apps.mil), a secure on-line document sharing service approved for CUI.

B. Content and Form of Application Submission

All proposal submissions must be written in English with type not smaller than 12-point font. Smaller font may be used for figures, tables, and charts. All hard copies must be on 8½ inch by 11 inch paper with 1" margins. Copies of all documents submitted must be clearly labeled with the DARPA BAA number, proposer organization, and proposal title/proposal short title.

1. Proposal Format

All proposals must be in the format given below. The typical proposal should express a consolidated effort in support of one or more related technical concepts or ideas. Disjointed efforts should not be included into a single proposal. Proposals shall consist of two volumes: 1) Volume I, Technical and Management Proposal (composed of three parts), and 2) Volume II, Cost Proposal. The maximum page limit for Volume I is 62 pages, excluding the sections with no page limit. Bracketed numbers before each section denote recommended page guidelines.

Ensure that each section provides the detailed discussion of the proposed work necessary to enable an in-depth review of the specific technical and managerial issues. Specific attention must be given to addressing both risk and payoff of the proposed work that make it desirable to DARPA.

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

a) Volume I, Technical and Management Proposal

Section I: Administrative {no page limit}

(a) Cover Sheet to include:
(1) BAA number (HR001122S0035);
(2) Technical area;
(3) Lead Organization submitting proposal;
(4) Type of organization, selected among the following categories: "LARGE BUSINESS," "SMALL DISADVANTAGED BUSINESS," "OTHER SMALL BUSINESS," "HBCU," "MI," "OTHER EDUCATIONAL," OR "OTHER NONPROFIT"
(5) Proposer's reference number (if any);
(6) Other team members (if applicable) and type of organization for each;
(7) Proposal title;

(8) Technical point of contact to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), electronic mail (if available);
(9) Administrative point of contact to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), electronic mail (if available);
(10) Total funds requested from DARPA, and the amount of cost share (if any); and
(11) Date proposal was submitted.

(b) Official transmittal letter

Section II: Summary of Proposal

A. {2} Executive-level summary of technical rationale, technical approach, and constructive plan for accomplishment of technical goals in support of innovative claims and deliverable creation. (In the proposal, this section should be supplemented by a more detailed plan in Section III of the Technical and Management Proposal.) The summary should also include a top-level schedule that outlines the proposer's overall approach to executing proposed system development through demonstration testing.
B. {3} Innovative claims for the proposed research. This section is the centerpiece of the proposal and should succinctly describe the uniqueness and benefits of the proposed approach relative to alternate approaches.
C. {2} General discussion of other research, previous work, or experience in this area that would be leveraged for the proposed scope.
D. {3} A clearly defined organization chart for the program team which includes, as applicable: (1) the programmatic relationship of team member; (2) the unique capabilities of team members; (3) the task of responsibilities of team members; (4) the teaming strategy among the team members; and (5) the key personnel along with the amount of effort to be expended by each person during each year. DARPA requires key personnel identified in the proposal to be assigned as proposed, and the resulting contract/agreement will indicate no substitution shall be made without prior approval of the Government.

Section III: Detailed Proposal Information

A. {20} Detailed technical approach and plan for accomplishing program objectives and to provide the basis for the proposed architecture, risk reduction activities (to include a risk assessment), and a software development plan. Proposals should address the proposed approach to testing to provide early risk reduction and demonstrate the ability to operate with flexibility.

The proposal should: identify critical technologies and system attributes that constitute the major technical and system integration risks on the program, i.e., pertaining to the NTR engine and CFM technologies; identify major risk reduction activities and demonstrations required to validate the ability to achieve component and system level performance goals, including the risk reduction tests described in Section I; provide a description of key test activities including test rationale, objectives, facilities (including

the facilities listed in Section I), and metrics; and an assessment of the technical maturity level at the end of the program.

This section should clearly outline draft objectives, test sequence, and communications strategy for the flight demonstration. Discussion should clearly substantiate that the proposed fluid systems solution supports the accomplishing proposed test objectives and test sequence with sufficient margin for troubleshooting and resolving off-nominal operations.

This section should include a process flow for fabrication, assembly, integration, and test of the DS including timelines and facilities that will be utilized for each step.

This section should include discussion of the proposed approach for maintaining nuclear safety during all stages of the program. In particular, this should include discussion of the approach to attain NSPM-20 launch approval including systems that will be incorporated into the design to meet the safety criteria as well as the proposed approach to developing the SAR and interfacing with reviewer teams (i.e. external peer review and the INSRB).

B. {8} Provide a management plan that describes the proposed system development processes and management approach to support successful program execution. The proposal should describe teaming arrangements as appropriate. Lessons learned from prior experience in managing efforts with this level of complexity and uncertainty should be discussed.

Provide an overview of the system development processes to be used along with the organizational responsibilities and authority for the development effort. Describe the development approach to facilitate the final design and ensure that it meets program objectives. Describe how key system knowledge acquired during the program will be captured, as well as describe the use of key tracking measures to enable efficient assessment of program progress. Describe ongoing design update activities, including integration of risk reduction activities, test results, interfaces, and integration support. Proposals should identify the team structure and plan for coordination with the system integrator as appropriate. This should include considerations for regular interchange meetings.

Describe how activities will be managed and integrated across geographically and/or organizationally separate team elements. Describe the proposed approach to subcontractor management, quality control, safety, and security. Describe the proposed level of Government interaction to facilitate efficient interactions and streamlined decision making.

If applicable, the management plan should provide details of proposed collaboration with NASA, to include technical areas of interest, systems and components on which they will collaborate; labor, support, materials, hardware, and information to be requested from NASA; and facilities at which collaborative work is anticipated to take place.

Include in the management plan, the proposed programmatic approach to cost, schedule, and risk management. Although formal Earned-Value Management (EVM) is not required for the program, the proposer is expected to describe how they will provide ongoing assessment of technical and programmatic progress against the program plan, critical path, schedule and cost. Define the content of technical and financial progress reports to enable efficient program monitoring, tracking, and reporting. Program management tools should be the same tools used internally to manage the program. No additional unique information for the Government is desired or required.

C. {no page limit} Statement of Work (SOW) – In plain English, clearly define the technical tasks/subtasks to be performed, their durations, and dependencies among them. The proposer shall employ a common work breakdown structure (WBS), or other detailed project organization structure, for numbering all activities in the SOW, IMS, and cost proposal. Major hardware and software component development and test activities shall be detailed to Level 4 or below such that there is a direct correlation between material purchases and individual items, understanding of individual test composition and cost, etc. A less detailed WBS breakdown is acceptable for level-of-effort type tasks such as program management, program control, etc. The page length for the SOW will be dependent on the amount of the effort. For each task/subtask, provide:
    - A general description of the objective (for each defined task/activity);
    - A detailed description of the approach to be taken to accomplish each defined task/activity;
    - Identification of the primary organization responsible for task execution (prime, sub, team member, by name, etc.);
    - The completion criteria for each task/activity - a product, event or milestone that defines its completion;
    - A definition of all deliverables (reporting, data, reports, software, etc.) to be provided to the Government in support of the proposed research tasks/activities; and
    - Clear identification of any tasks/subtasks (to be performed by either an awardee or subawardee) that will be accomplished on-campus at a university, if applicable.

Note: The SOW shall be developed so that each Phase of the program is separately defined, with the Phase 2, Phase 3, and Long-Lead-Procurement tasks clearly labeled and delineated.

Do not include any proprietary information in the SOW.

D. {no page limit} Include an Integrated Master Schedule in a common format (e.g., MS Project) that details all of the proposed program activities. The IMS shall detail the specific tasks to be accomplished, their interrelationships, and time sequencing. The IMS should be provided at the same or lower level of detail as the SOW. Proposers should include a separate IMS file from the software used to generate the IMS (e.g. MS Project) to allow DARPA assessment of the source file.

E. {no page limit} Deliverables associated with the proposed research including technical deliverables, such as reports, technical design reviews, hardware deliveries, etc. This section should also include a separate list of all technical data, hardware, or software that will be furnished to the Government with other than unlimited rights. The

Government will assume unlimited rights if proposers fail to identify any intellectual property restrictions in their proposals. Include in this section all proprietary claims to the results, prototypes, intellectual property, or systems supporting and/or necessary for the use of the research, results, and/or prototype. If there are no proprietary claims, this should be stated. For forms to be completed regarding intellectual property, see Section IV.B.3.i of this BAA.

F. {no page limit} Design Review Content and Data Package Development: Describe the content of the program review plans. Provide a complete list of the content, proposed entrance and exit criteria for each of these reviews and identify which deliverables will contain the expected content. For PDR, also identify a list of anticipated subsystems that will be addressed by this review. Describe how technology maturation and risk reduction results that occur outside of the design review cycle will be documented and delivered. Identify how all deliverables will be initially developed and updated for subsequent reviews, including planned completion dates as captured in the IMS. Provide an overview of the capture, documentation, and design control processes and tools used for, including but not limited to, requirements management, configuration management, technical documentation and drawings, design data packages, and test reports.

G. {no page limit} If an OT is proposed, provide description of milestone cost and accomplishments, including estimates of cost for each task in each year of the effort delineated by the primes and major subcontractors, total cost, and any company cost share. (Note: Measurable milestones should capture key development points in tasks and should be clearly articulated and defined in time relative to start of effort.) The milestones must not include proprietary information.

H. {5} Description of the results, products, transferable technology, and expected technology transfer path to supplement information included in the summary of the proposal. This should also address mitigation of life-cycle and sustainment risks associated with transitioning intellectual property for U.S. military applications, if applicable. See also Section IV.B.3.h of this BAA., “Intellectual Property.”

I. {2} Description of Security Management architecture and/or approach for the proposed effort that demonstrates the ability to accomplish the proposed work at the appropriate classification level within the proposed schedule. Detail unique additional security requirements information system certification expertise for controlled unclassified information (CUI) or classified processing, operational security (OPSEC), program protection planning, test planning, transportation plans, work being performed at different classification levels, and/or utilizing test equipment not approved at appropriate classification level (may not be applicable for fundamental research).

J. {5} Description of the facilities that would be used for the proposed effort including discussion of required safety and security infrastructure, as applicable.

b) Volume II, Cost Proposal

All proposers, including FFRDCs, must submit the following:

Cover sheet to include:

(1) BAA number (HR001122S0035);

(2) Technical area;

(3) Lead Organization submitting proposal;
(4) Type of organization selected among the following categories: "LARGE BUSINESS," "SMALL DISADVANTAGED BUSINESS," "OTHER SMALL BUSINESS," "HBCU," "MSI," "OTHER EDUCATIONAL," OR "OTHER NONPROFIT";
(5) Proposer's reference number (if any);
(6) Other team members (if applicable) and type of organization for each;
(7) Proposal title;
(8) Technical point of contact to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), electronic mail (if available);
(9) Administrative point of contact to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), and electronic mail (if available);
(10) Award instrument requested: cost-plus-fixed-fee (CPFF), cost-contract—no fee, cost sharing contract – no fee, or other type of procurement contract (specify) or Other Transaction;
(11) Place(s) and period(s) of performance;
(12) Total proposed cost separated by basic award and option(s) (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) DUNS number or Unique Entity ID (SAM);
(17) TIN number;
(18) CAGE Code;
(19) Subawardee Information; and
(20) Proposal validity period.

Additional Cost Proposal Information

A. Supporting Cost and Pricing Data

The proposer should include supporting cost and pricing information in sufficient detail to substantiate the summary cost estimates. The proposal should include a description of the method used and the basis of estimates used to estimate costs and supporting documentation. The realism of the total cost estimate should be addressed. This may be shown by a comparison to previous efforts that were of a similar size, scope and complexity, or by outlining the approach that was used to establish the total cost of the program. The realism of the total cost estimation should be substantiated, where possible, by showing the as-bid cost and schedule as well as the at-completion cost and schedule of previous science and technology development efforts of similar size, scope, and complexity. Allocations for tasks in the cost proposal should include a task-level basis of estimate. The Government requires that tables included in the cost proposal also be provided in an editable (e.g., MS Excel) format with calculation formulas intact to allow traceability of the cost proposal numbers across the prime and subcontractors.

B. Cost Breakdown Information and Format

Detailed cost breakdown to include:

- Basis for total cost estimate
- Assessment of realism of the total cost estimate by comparison to efforts of similar size, scope, and complexity, or by other means described in the proposal
- Discussion of other cost estimation techniques used
- Total program costs broken down by major cost items (direct labor, including labor categories; subcontracts; materials; other direct costs; overhead charges, etc.) and further broken down by task and phase
- Major program tasks by fiscal year
- An itemization of major subcontracts and equipment purchases.
- Documentation supporting the reasonableness of the proposed equipment costs (vendor quotes, past purchase orders/purchase history, detailed engineering estimates, etc.) shall be provided.
- An itemization of any information technology (IT) purchase, as defined by FAR 2.101 – Documentation supporting the reasonableness of the proposed equipment costs (vendor quotes, past purchase orders/purchase history, detailed engineering estimates, etc.) shall be provided, including a letter stating why the proposer cannot provide the requested resources from its own funding for prime and all sub-awardees.
- A summary of projected funding requirements by month
- The source, nature, and amount of any industry cost-sharing
- 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 Experts, etc.)

Tables included in the cost proposal should be in editable (e.g., MS Excel) format with calculation formulas intact. NOTE: If PDF submissions differ from the Excel submission, the PDF will take precedence.

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**.

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., an Other Transaction.)

a. 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 that 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 awardee should be submitted in a sealed envelope (or submitted electronically via BAAT separately from the prime) that the proposed awardee will not be allowed to view. The subawardee must provide the same number of copies to the PCO/AO as is required of the awardee. See Section IV.B.3.a of this BAA for proposal submission information.

b. Other Transaction Requests

The Government may award either a Federal Acquisition Regulation (FAR) based contract or an Other Transaction for Prototype (OT) agreement for prototype system development.

All proposers requesting an OT must include a detailed list of milestones. 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.

2. Additional Proposal Information

a) 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." 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.

b) Security Information

(1) Program Security Information

Proposers should include with their proposal any proposed solution(s) to program security requirements unique to this program. Common program security requirements include but are not limited to: operational security (OPSEC) contracting/sub-contracting plans; foreign participation or materials utilization plans; program protection plans (which may entail the following) manufacturing and integration plans; range utilization and support plans (air, sea, land, space, and cyber); data dissemination plans; asset transportation plans; classified test activity plans; disaster recovery plans; classified material/asset disposition plans and public affairs/communications plans.

(2) Classified Submissions

For classified proposals, applicants will ensure all industrial, personnel, and information systems processing security requirements are in place and at the appropriate level (e.g., Facility Clearance Level (FCL), Automated Information Security (AIS), Certification and Accreditation (C&A), and any Foreign Ownership Control and Influence (FOCI) issues are mitigated prior to submission. Additional information on these subjects can be found at https://www.dcsa.mil./.

(a) Classified Proposal Markings

At this time, DARPA anticipates that proposals submitted in response to this BAA may generate or involve access to classified information. Classified submissions shall be transmitted and marked in accordance with the following guidance. Security classification guidance via a Security Classification Guide (SCG) and/or DARPA DD Form 254, "DoD Contract Security Classification Specification," will be provided as an attachment to the BAA or may be provided at a later date.

If a submission contains Classified National Security Information or the suspicion of such, as defined by Executive Order 13526, the information must be appropriately and conspicuously marked with the proposed classification level and declassification date. Submissions requiring DARPA to make a final classification determination shall be marked as follows:

"CLASSIFICATION DETERMINATION PENDING. Protect as though classified_____ (insert the recommended classification level, e.g., Top Secret, Secret or Confidential)"

NOTE: Classified submissions must indicate the classification level of not only the submitted materials, but also the classification level of the anticipated award.

Submissions containing both classified information and CUI must be appropriately and conspicuously marked with the proposed classification level as well as ensuring CUI is marked in accordance with DoDI 5200.48.

(b) Classified Submission Requirements and Procedures

Proposers submitting classified information must have, or be able to obtain prior to contract award, cognizant security agency approved facilities, information systems, and appropriately cleared/eligible personnel to perform at the classification level proposed. All proposer personnel performing Information Assurance (IA)/Cybersecurity related duties on classified Information Systems shall meet the requirements set forth in DoD Manual 8570.01-M (Information Assurance Workforce Improvement Program). Additional information on the subjects discussed in this section may be found at https://www.dcsa.mil/.

Proposers choosing to submit classified information from other collateral classified sources (i.e., sources other than DARPA) must ensure (1) they have permission from an authorized individual at the cognizant Government agency (e.g., Contracting Officer, Program Manager); (2) the proposal is marked in accordance with the source Security Classification Guide (SCG) from which the material is derived; and (3) the source SCG is submitted along with the proposal.

When a proposal includes a classified portion, and when able according to security guidelines, we ask that proposers send an e-mail to HR001122S0035@darpa.mil as notification that there is a classified portion to the proposal. When submitting a hard copy of the classified portion according to the instructions outlined below, proposers should submit two (2) hard copies of the classified portion of their proposal and two (2) CD-ROMs containing the classified portion of the proposal as a single searchable Adobe PDF file.

See Attachment TBD for Security classification guidance and guidance on the DD Form 254, "DoD Contract Security Classification Specification.

Confidential, Secret, and Top Secret Information

Use transmission, classification, handling, and marking guidance provided by previously issued SCGs, the DoD Information Security Manual (DoDM 5200.01, Volumes 1 - 4), and the National Industrial Security Program Operating Manual, including the Supplement Revision 1 (DoD 5220.22-M and DoD 5200.22-M Sup. 1), when submitting Confidential, Secret, and/or Top Secret classified information.

Confidential and Secret

Confidential and Secret classified information may be submitted via ONE of the two following methods to the mailing address listed in the contact information in Part I of this BAA:

- Hand-carried by an appropriately cleared and authorized courier to the DARPA Classified Document Registry (CDR). Prior to traveling, the courier shall contact the DARPA CDR at 703-526-4052 to coordinate arrival and delivery.

OR

- Mailed via U.S. Postal Service (USPS) Registered Mail or USPS Express Mail. All classified information will be enclosed in opaque inner and outer covers and double-wrapped. The inner envelope shall be sealed and plainly marked with the assigned classification and addresses of both sender and addressee. Senders should mail to the mailing address listed in the contact information herein.

The inner envelope shall be addressed to Defense Advanced Research Projects Agency, ATTN: DARPA/TTO (Maj Nathan Greiner, USAF), with a reference to the BAA number.

The outer envelope shall be sealed with no identification as to the classification of its contents and addressed to Defense Advanced Research Projects Agency, Security & Intelligence Directorate, Attn: CDR.

Top Secret Information

Top Secret information must be hand-carried by an appropriately cleared and authorized courier to the DARPA CDR. Prior to traveling, the courier shall contact the DARPA CDR at 703-526-4052 to coordinate arrival and delivery.

Sensitive Compartmented Information (SCI)

SCI must be marked, managed and transmitted in accordance with DoDM 5105.21 Volumes 1 - 3. Questions regarding the transmission of SCI may be sent to the DARPA Technical Office Program Security Officer (PSO) via the BAA mailbox or by contacting the DARPA Special Security Officer (SSO) at 703-812-1970.

Successful proposers may be sponsored by DARPA for access to SCI. Sponsorship must be aligned to an existing DD Form 254 where SCI has been authorized. Questions regarding SCI sponsorship should be directed to the DARPA Personnel Security Office at 703-526-4543.

Special Access Program (SAP) Information

SAP information must be marked in accordance with DoDM 5205.07 Volume 4 and transmitted by specifically approved methods which will be provided by the Technical Office PSO or their staff.

Proposers choosing to submit SAP information from an agency other than DARPA are required to provide the DARPA Technical Office PSO written permission from the source material's cognizant Special Access Program Control Officer (SAPCO) or designated representative. For

clarification regarding this process, contact the DARPA Technical Office PSO via the BAA mailbox or the DARPA SAPCO at 703-526-4102.

Additional SAP security requirements regarding facility accreditations, information security, personnel security, physical security, operations security, test security, classified transportation plans, and program protection planning may be specified in the DD Form 254.

NOTE: All proposals containing Special Access Program (SAP) information must be processed on a SAP information technology (SAP IT) system that has received an Approval-to-Operate (ATO) from the DARPA Technology Office PSO or other applicable DARPA SAP IT Authorizing Official. The SAP IT system ATO will be based upon the Risk Management Framework (RMF) process outlined in the Joint Special Access Program Implementation Guide (JSIG), current version (or successor document). (Note: A SAP IT system is any SAP IT system that requires an ATO. It can range from a single laptop/tablet up to a local and wide area networks.)

The Department of Defense mandates the use of a component's SAP enterprise system unless a compelling reason exists to use a non-enterprise system. The DARPA Chief Information Officer (CIO) must approve any performer proposal to acquire, build, and operate a non-enterprise SAP IT system during the awarded period of performance. Use of the DARPA SAP enterprise system, SAVANNAH, does not require CIO approval.

SAP IT disposition procedures must be approved in accordance with the DoD CIO Memorandum of April 20, 2020[1].

c) 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://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-171r2.pdf) and DoDI 8582.01 that are in effect at the time the solicitation is issued.

[1] The title of this memorandum is CUI and the memo is classified SECRET//HANDLE VIA SPECIAL ACCESS CHANNELS ONLY. This memorandum may be provided under separate cover.

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.

d) 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 supplementary DARPA-specific representations and certifications at the time of proposal submission. See http://www.darpa.mil/work-with-us/reps-certs for further information on required representation and certification depending on your requested award instrument.

e) 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.

f) 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/. 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.

g) 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.

h) 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.

i) 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.

(1) 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)

(2) For All Non-Procurement Contracts

Proposers responding to this BAA requesting a 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 use a format similar to that described in Paragraph (1). above. If no restrictions are intended, then the proposer should state "NONE."

All proposers responding to this BAA must submit a separate list of all contract deliverables, including technical data or computer software that will be furnished to the Government with other than unlimited rights. The Government will assume unlimited rights if proposers fail to identify any intellectual property restrictions in their proposals. Include in this section all limited data rights or Government purpose rights, or proprietary claims to the results, data, reports, prototypes, software, or systems supporting and/or necessary for the use of the research, results, and/or prototype. If there are no proprietary claims, this should be stated.

In support of integration and future transition opportunities, DARPA expects to receive, at a minimum, Government Purpose Rights for DRACO.

j) 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 solicitation. 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/sys_attachment.do?sys_id=c08b64ab1b4434109ac5ddb6bc4bcbb8.

3. Submission Information

All times listed herein are in U.S. Eastern Time. Proposers are warned that submission deadlines as outlined herein are strictly enforced. When planning their response to this solicitation, proposers should take into account that some parts of the submission process may take from one business day to one month to complete (e.g., registering for a DUNS number or TIN).

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 HR001122S0035. Submissions may not be submitted by fax or e-mail; any so sent will be disregarded.

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

Note: Proposers submitting a proposal via the DARPA BAA Submission site MUST complete all submission activities (including selecting the "Finalize" button and allowing sufficient time for all files to upload) prior to the deadline. Failure to do so will result in a late submission.

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

The proposal must be received at DARPA/TTO, 675 North Randolph Street, Arlington, VA 22203-2114 (Attn.: HR001122S0035) on or before, August 5, 2022 in order to be considered during the initial round of selections; however, proposals received after this deadline may be received and evaluated up to six months (180 days) from date of posting on the System for Award Management, Contract Opportunities (https://sam.gov). The ability to review and select proposals submitted after the initial round deadline specified in the BAA or due date otherwise specified by DARPA will be contingent on availability of funds. Proposers are warned that the likelihood of available funding is greatly reduced for proposals submitted after the initial closing date deadline.

a) Proposal Submission

Refer to Section VI.A.2 for how DARPA will notify proposers as to whether or not their proposal has been selected for potential award.

(1) For Proposers Requesting Procurement Contracts or OTs and Submitting to a DARPA-approved Proposal Submissions Website

Unclassified full proposals sent in response to this BAA may be submitted via DARPA's BAA Website (https://baa.darpa.mil). Note: If an account has recently been created for the DARPA BAA Website, this account may be reused. Accounts are typically disabled and eventually deleted following 75-90 days of inactivity – if you are unsure when the account was last used, it is recommended that you create a new account. If no account currently exists for the

DARPA BAA Website, 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. The "Password Reset" option at the URL listed above can be used if the password is not received in a timely fashion. 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 proposal. Note: Even if a submitter's organization has an existing registration, each user submitting a proposal must create their own Organization Registration.

All unclassified concepts submitted electronically through DARPA's BAA Website must be uploaded as zip archives (i.e., files with a .zip or .zipx extension). The final zip archive should be no greater than 100 MB in size. Only one zip archive will be accepted per submission – subsequent uploads for the same submission will overwrite previous uploads, and submissions not uploaded as zip archives will be rejected by DARPA.

Proposers using the DARPA BAA Website may encounter heavy traffic on the submission deadline date; proposers should start this process as early as possible. Technical support for DARPA's BAA Website may be reached at BAAT_Support@darpa.mil, and is typically available during regular business hours (9:00 AM – 5:00 PM Eastern Time).

For a proposal that includes both classified and unclassified information, the proposal may be separated into an unclassified portion and a classified portion. The proposal should use the unclassified portion to the maximum extent reasonable. The unclassified portion can be submitted through the DARPA BAA Website, per the instructions above. The classified portion must be mailed separately, according to the instructions outlined in the "Security Information" section above. If a classified proposal may not be partitioned into classified and unclassified portions, then submit according to the instructions outlined in the "Security Information" section above.

When a proposal includes a classified portion, and when able according to security guidelines, we ask that proposers send an e-mail to HR001122S0035@darpa.mil as notification that there is a classified portion to the proposal. When sending the classified portion via mail according to the instructions outlined in the "Security Information" section above, proposers should submit an original and two hard copies of the classified portion of their proposal and two (2) CD-ROMs containing the classified portion of the proposal as a single searchable Adobe PDF file.

Please ensure that all CDs are well-marked. Each copy of the classified portion must be clearly labeled with HR001122S0035, proposer organization, proposal title (short title recommended), and Copy _ of _.

(3) For Proposers Requesting Procurement Contracts or OTs and Submitting Hard Copies

Proposers may submit hard copies of their proposal. Proposers opting to submit hard copies must submit an original and two copies but no more than nine (9) of the unclassified proposal and two (2) electronic copies of the unclassified proposal [in PDF (preferred)] on a CD-ROM. Each copy must be clearly labeled with HR001122S0035, proposer organization, proposal title (short title recommended), applicable handling caveat (e.g., Proprietary, CUI, or classification), and Copy _ of 2. All hard copies must be on 8 ½ by 11 paper with any applicable banner and portion markings.

4. Funding Restrictions

Preaward costs will not be reimbursed unless a preaward cost agreement is negotiated prior to award.

5. Other Submission Requirements

DARPA will post a consolidated Frequently Asked Questions (FAQ) document. To access the posting go to: http://www.darpa.mil/work-with-us/opportunities. Under the HR001122S0035 summary will be a link to the FAQ. Submit your question/s by e-mail to HR001122S0035@darpa.mil. Questions must be received by the FAQ/Questions due date listed in Part I, Overview Information.

V. Application Review Information

A. Evaluation Criteria

Proposals will be evaluated using the following criteria, listed in descending order of importance:

1. Overall Scientific and Technical Merit

The proposed technical approach is innovative, feasible, achievable, and complete.

The proposal demonstrates sound engineering judgment and technical insight during the trade space analysis and design point selection. Sufficient detail is provided to support the feasibility of the solution. The proposed solution can reasonably be expected to exhibit high performance with margin for the desired ground-testing and on-orbit demonstration.

The proposer's enabling technology design and performance predictions will be reviewed to assess the extent of innovation in the solution proposed and whether the design feasibly meets or exceeds program objectives. The Government will review the proposed technology maturation plan to assess whether the plan adequately identifies and fully characterizes technical, schedule and cost risks. The proposed development approach and content of the proposed tailored design reviews will be reviewed to assess the adequacy of proposer's systems engineering and design practices for maturing the design and executing the enabling technology maturation plan.

The proposal identifies major technical, schedule, and cost risks and planned mitigation efforts are clearly defined and feasible. Technical risks are addressed as early as possible, and schedule margin to the program critical path is maximized for all technical developments. Adequate tests

are planned to validate designs and design margins. Adequate component selection events are planned to validate design trades for components commensurate with the fidelity of applicable modelling capabilities. Flight-demonstration objectives and test sequence are adequate and achievable. The proposed propellant tankage approach supports meeting the flight-demonstration approach with sufficient margin to allow recovery from off-nominal test results.

All major tasks proposed and critical to the technical approach are captured in the SOW. The SOW and integrated master schedule will be reviewed to assess whether they are credible, executable, and address program objectives and deliverables. The Government will review the extent to which the SOW and IMS detail activities to an appropriate work breakdown structure level to enable adequate visibility for the cost proposal evaluation and execution management. 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.

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.
In addition, this 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 to the research, industrial, and operational military communities.

3. Realism of Proposed Cost and Schedule

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).

The proposed schedule aggressively pursues performance metrics in an efficient time frame that accurately accounts for the anticipated workload. The proposed schedule identifies and mitigates any potential schedule risk.

The proposer substantiates that they can realistically complete the proposed work within the cost and schedule provided in the proposal.

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.

Government Furnished Equipment (GFE) required for proposed scope is itemized and costs are substantiated. The timeline, quantity, and locations for HALEU requirements are detailed sufficiently to enable DARPA to align HALEU deliveries to proposer requirements with at least 6-month advance notice.

4. Proposer's Capabilities and/or Related Experience

The proposed technical team has the expertise and experience to accomplish the proposed tasks. 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.

The proposer substantiates their ability to complete the proposed work at the appropriate classification level utilizing either existing and available facilities or utilizing facilities that can be accredited and/or made available while meeting the proposed program schedule.

The proposer substantiates their ability to develop and integrate components to raise the technology readiness level.

The proposer identifies key personnel and substantially commits them to this effort. The proposed personnel have substantial related experience in the assigned area of responsibility. The proposed team is highly cohesive and utilization of personnel dedicated to rapidly advancing the technical capability is maximized.

B. Review of Proposals

1. 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 solicitation; 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.

2. 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.

3. 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.

VI. Award Administration Information

A. Selection Notices and Notifications

1. Proposals

After 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 email to the Technical POC and/or Administrative POC identified on the proposal coversheet.

B. Administrative and National Policy Requirements

1. Meeting and Travel Requirements

There will be a program kickoff meeting 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.

2. Solicitation Provisions and Award Clauses, Terms and Conditions

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.

3. Controlled Unclassified Information (CUI) and Controlled Technical Information (CTI) on Non-DoD Information Systems

Further information on Controlled Unclassified Information identification, marking, protecting, and control, to include processing on Non-DoD Information Systems, is incorporated herein and can be found at http://www.darpa.mil/work-with-us/additional-baa.

C. Reporting

The number and types of reports will be specified in the award document, but will include as a minimum monthly technical and financial 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. At least one copy of each report will be delivered to DARPA and not merely placed on a SharePoint site.

D. Electronic Systems

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.

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 (https://public.era.nih.gov/iedison).

VII. Agency Contacts

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

Administrative, technical, or contractual questions should be sent via e-mail to HR001122S0035@darpa.mil. All requests must include the name, e-mail address, and phone number of a point of contact.

The BAA Coordinator may be reached at:
HR001122S0035@darpa.mil
DARPA/TTO
ATTN: HR001122S0035
675 North Randolph Street
Arlington, VA 22203-2114

VIII. Other Information

Collaborative efforts/teaming are encouraged. Interested parties should submit a one-page profile with their contact information, a brief description of their technical capabilities, and the desired expertise from other teams, as applicable.

APPENDIX A: Example Primary and Secondary DRACO NTR Flight Demonstration Objectives

Included separately as a Word document.

APPENDIX B: DRACO Safety Strategy

Included separately as a Word document.

APPENDIX C: Summary of Relevant Center Key Capabilities

Included separately as a Word document.

APPENDIX D: SECRET Appendix

Instructions for requesting the classified Appendix D are in Section IV.A of this BAA.

Attachment 1: Draft Mission Safety Analysis Report Outline

Included separately as an Excel file.

Attachment 2: DARPA Standard Cost Detail Spreadsheet

Included separately as an Excel file.

Attachment 3: Proposers' Day Questions and Answers

Included separately as a Word document.