



Broad Agency Announcement
Integrated Hypersonics(IH)
Technology Development

DARPA TTO

DARPA-SN-12-48

July 6, 2012

Table of Contents:

Part I: Overview Information.....	3
Part II: Full Text of Announcement	
Sec. I: FUNDING OPPORTUNITY DESCRIPTION.....	5
A. Program Overview	
B. Background	
C. Program Goal	
D. Program Plan	
E. Technology Development Scope	
Sec. II: AWARD INFORMATION.....	24
Sec. III: ELIGIBILITY INFORMATION.....	25
A. Eligible Applicants	
B. Procurement Integrity, Standards of Conduct, Ethical Considerations, and Organizational Conflicts of Interest	
C. Cost Sharing/Matching	
Sec. IV. APPLICATION AND SUBMISSION INFORMATION.....	27
A. Address to Request Application Package	
B. Content and Form of Application Submission	
Sec. V. APPLICATION REVIEW INFORMATION.....	36
A. Evaluation Criteria	
B. Review and Selection Process	
Sec. VI. AWARD ADMINISTRATION INFORMATION.....	38
A. Selection Notices	
B. Administrative and National Policy Requirements	
C. Reporting	
D. Electronic Systems	
Sec. VII. AGENCY CONTACTS.....	46
Sec. VIII. OTHER INFORMATION.....	47
A. Intellectual Property	
B. Non-Procurement Contract Proposers – Noncommercial and Commercial Items (Technical Data and Computer Software)	
C. All Proposers – Patents	

Part I: Overview Information

- **Federal Agency Name** – Defense Advanced Research Projects Agency (DARPA), Tactical Technology Office (TTO)
- **Funding Opportunity Title** – Integrated Hypersonics (IH)
- **Announcement Type** – Initial Announcement
- **Funding Opportunity Number** – Broad Agency Announcement (DARPA-BAA-XX-XX)
- **Catalog of Federal Domestic Assistance Numbers (CFDA)** – N/A
- **Dates:**
 - Posting Date: xx
 - Deadline for Questions: xx
 - Proposal Due Date: xx

Concise description of the funding opportunity: DARPA and DoD's Strategic Warfare Office are jointly pursuing advancements in global range hypersonic technologies through the Integrated Hypersonics (IH) program. The goal of the IH program is to develop, mature, and test next-generation technologies needed for global-range, maneuverable, hypersonic flight at Mach 20 and above for missions ranging from space access to survivable, time-critical transport to conventional prompt global strike.

The BAA is divided into separate technology areas that contain multiple sub-elements. Proposers can bid to any technology area independently, addressing any sub-element(s) within that technology area. It is intentionally structured in the form of multiple independent technology areas to facilitate participation by non-traditional industry performers including small businesses, academic and research institutions.

- **Total amount of money to be awarded:** The total planned budget for the Base awards is \$40M and an additional \$30M is planned for Options. Performers are cautioned that the inclusion of an option in the contract does not guarantee that the Government will exercise the option. The exercise an option is at the Government's discretion and subject to availability of funds.
- **Types of instruments that may be awarded:** Procurement contract, Other Transaction, or Grant.
- **Any cost sharing requirements** – See Section III-C
- **Agency technical contact**
 - Maj Christopher Schulz
 - DARPA/Tactical Technology Office
 - ATTN: SN 12-48
 - 675 North Randolph Street
 - Arlington, VA 22203-2114
 - FAX: (703) 696-8401 or 2204
 - EMAIL: DARPA-SN-12-48@darpa.mil

DRAFT

Part II: Full Text of Announcement

I. FUNDING OPPORTUNITY DESCRIPTION

The Defense Advanced Research Projects Agency often selects its research efforts through the Broad Agency Announcement (BAA) process. The BAA will appear first on the FedBizOpps website, <http://www.fedbizopps.gov>, then the agency website of http://www.darpa.mil/Opportunities/Solicitations/TTO_Solicitations.aspx. The following information is for those wishing to respond to the BAA.

A. Program Overview

DARPA and DoD's Strategic Warfare Office are jointly pursuing advancements in global range hypersonic technologies through the Integrated Hypersonics (IH) program. The goal of the IH program is to develop, mature, and test next-generation technologies needed for global-range, maneuverable, hypersonic flight at Mach 20 and above for missions ranging from space access to survivable, time-critical transport to conventional prompt global strike. IH seeks technological advances in the areas of: next generation aero-configurations; thermal protection systems (TPS) and hot structures; precision guidance, navigation, and control (GNC); enhanced range and data collection methods; and advanced propulsion concepts. The IH program is designed to address technical challenges and improve understanding of long-range hypersonic flight through an initial full-scale baseline test of an existing hypersonic test vehicle, followed by a series of subscale flight tests, innovative ground-based testing, expanded modeling and simulation, and advanced analytic methods, culminating in testing of a full-scale rebaselined flight of a hypersonic X-plane (HX) in 2016. HX is envisioned as a recoverable next-generation configuration potentially augmented with a rocket-based propulsion capability, which will enable, and reduce risk for a broad spectrum of maneuverable, long-range, hypersonic platforms.

A major focus of the IH program is appropriate open-source sharing of hypersonic technology data to advance the state of practice more quickly. DARPA envisions a robust hypersonic performer base both traditional and non-traditional. DARPA's goal is wide program collaboration while considering International Traffic in Arms Regulations (ITAR) constraints as appropriate. This will be accomplished through open forum (Principal Investigator) meetings where information and developments made in the IH program will be shared through Intellectual Property Commons with all participants. Intellectual Property Commons, or IP Commons, is envisioned as a construct where data is at least Government Purpose Rights (GPR) and preferably unlimited rights to facilitate community-wide technical exchange. The ability to widely share data borne from the IH program is critical to establishing a new baseline for hypersonic technology.

B. Background and Vision Vehicles

The history of hypersonic vehicles is mostly axisymmetric, from conic ballistic reentry vehicles (RVs), biconic advanced maneuvering reentry vehicles (AMaRVs), and finned cone concepts like the Sandia Winged Energetic Reentry Vehicle Experiment (SWERVE) and AHW.

To enable hypersonic atmospheric flight over the entire global range, aerodynamically efficient non-axisymmetric configurations such as the HTV-2 with high hypersonic lift-to-drag (L/D) ratios and aerodynamically tailored blended wing-body shapes are required. These shapes generally include sharper noses and leading edges, and high wing sweeps.

Advancing the hypersonic technologies associated with non-axisymmetric lifting body and blended wing body configurations enables more advanced concepts to be developed including transatmospheric vehicles, hypersonic X-planes, Hypersonic Glide Vehicles (HGVs), and hypersonic air breathing systems.

Transatmospheric vehicles (TAVs) and hypersonic X-planes, with aerodynamic properties similar to conventional aircraft, have the promise of delivering payloads through long range glide augmented with rocket-based propulsion. TAVs are envisioned as reusable launch vehicles, utilizing rocket engines, providing the ability to reach distant locations within minutes. Additional flexibility comes from the ability to execute highly-dynamic global range trajectories.

Hypersonic X-plane concepts, while not being inserted into orbit, will take advantage of high L/D atmospheric flight combined with augmenting rocket propulsion systems to maintain an atmospheric flight capability of nearly two hours with true atmospheric global coverage and recovery.

The global range hypersonic glide vehicles (HGVs) will have long atmospheric flight range, versatility, and high maneuverability. HGVs are envisioned to have the capability to satisfy a variety of DoD missions and can be sized to be compatible with land, air, and sea based platforms. HGVs are launched into a low-altitude, long-range horizontal flight path at the edge of the Earth's atmosphere enabling long-range aerodynamic glide. The aerodynamic maneuvering capabilities of high L/D HGV vehicles enable changes to flight trajectories to significantly reduce over flight issues, significant cross-range divert capability for in-flight retasking, and flight profiles which can mask the vehicles intended destination. HGV advanced technologies will inform near-term hypersonic mission concepts under consideration that will encounter many of the same flight challenges once the longer range concepts begin testing (i.e. robust flight control, boundary layer transition, high temperature materials, etc.).

The technology developments from IH support the needs of hypersonic glide vehicles, however, air-breathing propulsion concepts are not the focus of this program.

IH will explore the enabling technologies that differentiate the hypersonic glide vehicle family from the axisymmetric and ballistic reentry vehicles, and at the same time advance these technologies to enable the full range of hypersonic concepts. A low-altitude, long-range horizontal flight path and long duration glide trajectory will mature the end to end GNC technologies. A key distinguishing feature for the TAVs/hypersonic X-planes is propulsion, and as such IH will explore rocket propulsion to test aggressive mid-course maneuver capability and/or terminal phase performance. To ensure maximum data collection, air recovery of the vehicle will be pursued.

C. Program Goal

The goal of the IH program is to develop, test, and mature next generation hypersonic technologies to enable rapid global national security missions (transportation, x-plane, conventional prompt global strike, long-range hypersonic cruise) in excess of 20,000 nautical miles with advanced maneuverability. Innovative hypersonic technology improvements for long range HGVs, TAVs, and hypersonic X-planes is envisioned in five primary technology areas: aero-configurations; TPS and hot structures; GNC; range / recovery / instrumentation; and propulsion. The aero-configurations technology area will develop and test next generation aerodynamic configurations which retain or improve upon the high L/D performance tested under the Falcon program, gain robust aerodynamic control and utilize aerothermodynamic and energy management capabilities. The TPS and hot structures technology area will mature and test high temperature material characteristics, and optimize structural design and manufacturing approaches. GNC will develop adaptive reconfigurable control, robust real time trajectory optimization, and precision navigation. Range activities are anticipated to develop and demonstrate space based range for telemetry collection for greater testing efficiency and flexibility. The area of recovery will explore concepts to recover or capture the vehicle at the end of its flight in order to maximize flight data collection. The instrumentation technology development area will develop instrumentation approaches to address critical data collection deficiencies, especially aeroshell thermal and recession and vehicle air data measurements. Finally, the propulsion area will leverage integrated rocket propulsion technology onboard vehicles to enable extended glide range, optimal insertion and trajectory shaping.

This BAA seeks technology solutions that will enable the Design Reference Mission defined below (Figure 1). The Design Reference Mission provides the overarching objectives and framework for which technologies should be developed and tested. The intent is to sufficiently mature next generation hypersonic technologies that will enable the desired Design Reference Mission such that they can be integrated into an HX and flight tested by the end of FY16.

Design Reference Mission

The IH program design reference mission was created with the intent of enabling TAV, hypersonic X-plane, or long range hypersonic glide concepts and includes the following for consideration:

- Aero/thermal hypersonic flight capability of 2 hours
- Enhanced aerodynamic maneuvering: Global down range >20,000 nm with cross range capability >10,000 nm (as counted by either a single maneuver or the total of multiple mid-course, near terminal and terminal maneuvers)
- Ground or air launch
- Small to medium launch vehicle weight class • High G-load capability (to explore the trade space for terminal evasive maneuvers)
- Propulsion system concepts (non-airbreathing) to extend range (endo- and/or exo-atmospheric) and/or assist mid-course cross range maneuvers, and/or assist aggressive near terminal/terminal maneuvers
- Air Recoverable to afford the opportunity for post-flight vehicle data analysis

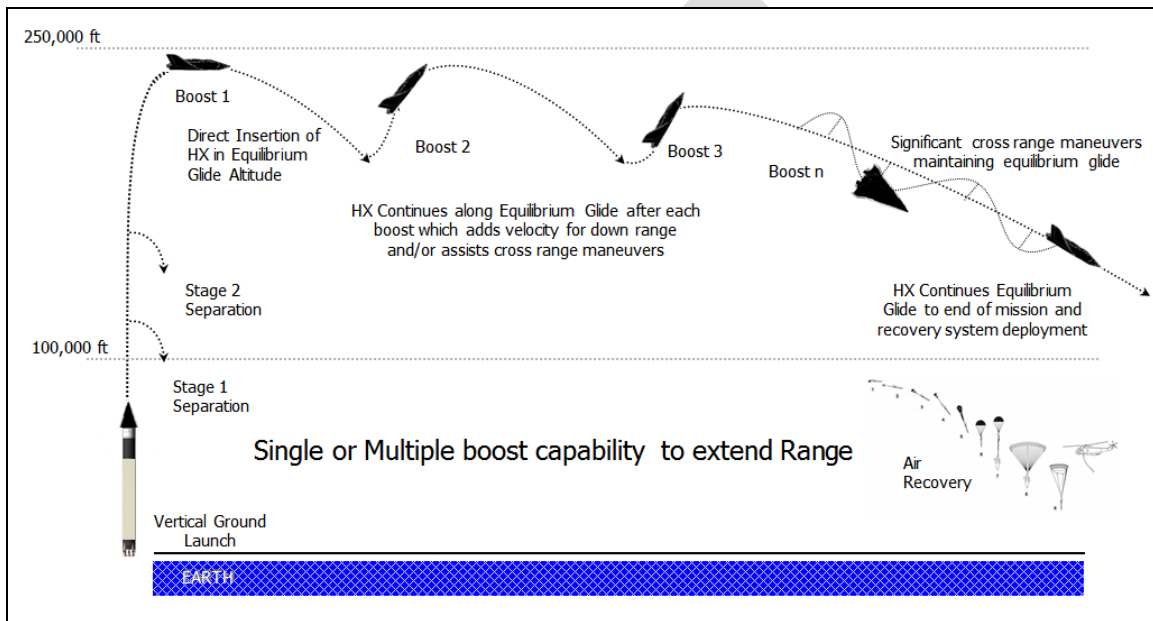


Figure 1. Representative IH Design Reference Mission

D. Overall Program Plan

The IH program is structured in two tracks with two separate BAAs planned for release. The IH Technology Development BAA will mature next generation hypersonic technologies through a series of development and demonstration efforts while a subsequent BAA for a hypersonic X-plane (HX) will integrate the technologies developed under the first track into a recoverable full-scale flight test vehicle to rebaseline technologies required for long range, hypersonic flight either powered or unpowered. Figure 2 shows the notional overall program timeline and identification of all program elements.

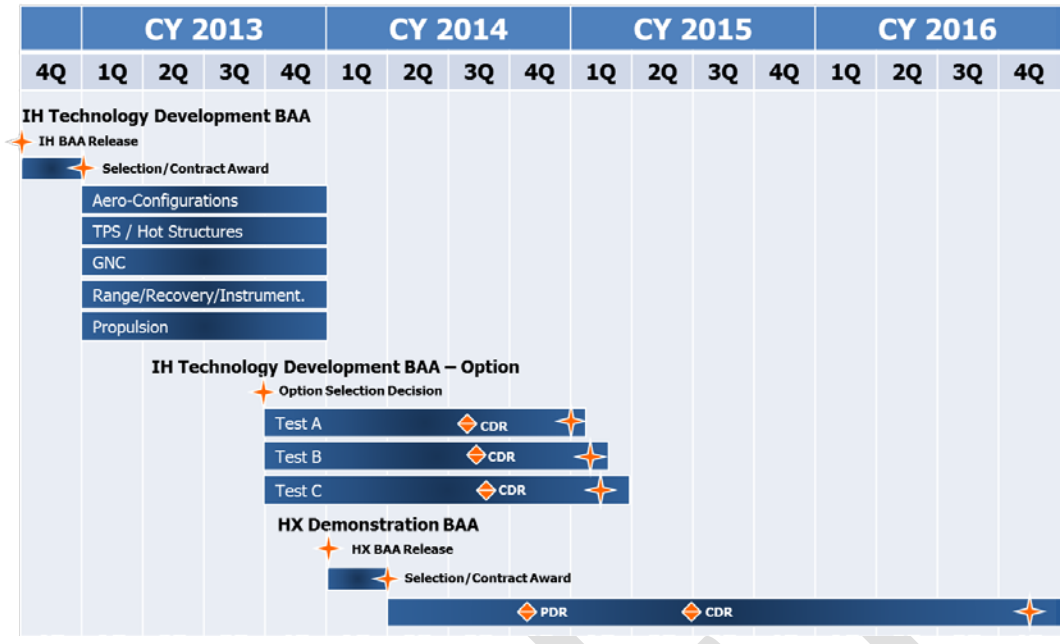


Figure 2. Notional Program Schedule

The Technology Development track encompasses a total of five technology areas: aero-configuration; thermal protection system (TPS) and hot structures; GNC; range / recovery / instrumentation; and propulsion. These technology areas are further broken down into subelements in the next section. Multiple awards are anticipated in each technology area or subelement. This BAA seeks to develop and test technology advances through modeling and simulation, ground-based testing/demonstrations, and/or subscale flight experiments. The Technology Development track follows a phased approach where the base period, notionally 12 months in duration, will achieve preliminary design level maturity in each technology area or subelement, where applicable for hardware. This is followed by an option period, notionally 18 months, where technologies will be adequately matured via enhanced ground based testing and/or sub-scale flights such that they are ready to be employed in the development of a HX to be tested within the 2016 timeframe. Within 11 months of the base award, a decision will be made to exercise options.

A subsequent BAA (HX) to cover the HX track will be released approximately 12 months following Technology Development awards. The HX track will focus on integration of the technologies developed under the first track into a vehicle concept and will culminate in a long range hypersonic flight test. One system integration performer is anticipated for this flight test. This experimental hypersonic vehicle will test hypersonic glide vehicle aerodynamic maneuverability, augmented rocket capability, control authority, and thermal performance to sustain long range flight. Significant improvements in range capabilities and flight instrumentation will enhance the ability to collect comprehensive vehicle characteristics and flight parameters to accurately characterize vehicle technology and system performance.

Data products developed will be made available to program participants in an open forum and will be developed with IP Commons to facilitate data transfer.

E. Technology Development Scope

The scope of this BAA covers the Technology Development track, to include both a Base and Option.

The Technology Development track will be executed in five (5) technology areas with IP Commons to enable effective communication across the teams and varying degrees of interface necessary with each technology area. DARPA intends to utilize a Government entity and/or Federally Funded Research and Development Center (FFRDC) to oversee technology interfaces, and to provide further development and definition of the Design Reference Mission, as necessary. It is anticipated that frequent Principal Investigator (PI) meetings will be conducted to facilitate cooperative information exchange among all performers and Government team members, and to monitor and assess progress of performer technology developments as well as provide any updates to the Design Reference Mission. Participation in the PI meetings will be required of all program performers.

This BAA is intentionally structured in the form of multiple independent technology areas and subelements to facilitate participation by a wide range of performer types to include U.S. traditional and non-traditional performers, as well as academic and other not-for-profit institutions. Proposers can bid to one or more of the technology areas or subelements. For ease of proposal review, separate proposals should be submitted for each technology area. However, multiple subelements in any individual technology area can be combined into one proposal as long as adequate technical and cost visibility is provided for each subelement. Proposers should bear in mind that technologies offered must be adequately mature such that at the end of this Technology Development track, they are ready to be employed in, and/or contribute to, the development of a hypersonic X-plane to be tested within the 2016 timeframe. DARPA reserves the right to select proposed technology solutions inside a particular proposal.

Base and Option Objectives

The primary objective of the Technology Development track is to develop technologies and elements relevant to the Design Reference Mission. The technologies shall be matured to a level such that they can be employed by a HX concept to support a flight demonstration in the 2016 time frame. Proposer(s) are encouraged to develop a tailored technology development plan that best advances the IH program goals and objectives.

Notional top-level objectives for **the Base period** are as follows:

- Develop and execute a detailed Technology Development Plan (TDP) that provides a risk reduction strategy to achieve performer defined performance metrics (examples of performance metrics are provided in the following technology sections) and, if hardware related, matures the technology component design to at least a Preliminary Design Review (PDR) level. This TDP should:

- 1) Identify and include a risk assessment of the critical technology component
 - 2) Conduct prototype risk reduction tests and demonstrations, including subscale component tests, required to validate the ability to achieve the performance metrics and maturity level
 - 3) Define credible intermediate performance objectives associated with critical tests and demonstrations
- Conduct a preliminary technology design review (i.e. a component PDR)
 - Interface with other technology areas, as appropriate, and develop integration plans to include identification of technology integration risks and issues
 - Interface with the FFRDC and PIs to maintain technology relevancy to the Design Reference Mission
 - Develop a detailed Option TDP that provides a risk reduction strategy to achieve the desired performance metrics (described in the following technology sections or, as defined by the performer) and that sufficiently matures the technology for use in a full scale flight test vehicle to be tested within the 2016 timeframe. This TDP should:
 - 1) Continue to assess the risk of the critical component development as well as integration risks with other technology areas
 - 2) Conduct enhanced ground-based demonstrations or innovative sub-scale flight experiments to mature technology in relevant combined environments that cannot be produced in small-scale ground tests or ground test facilities with limited duplication of relevant environments
 - 3) Conduct large-scale ground tests or flight experiments to collect data and benchmark knowledge and tools in flight relevant environments
 - 4) Define credible intermediate performance objectives associated with critical tests and demonstrations

Notional top-level objectives for **Option period** are as follows:

- Execute the detailed Option TDP developed during the Base period
- Interface with the FFRDC and PIs to maintain technology relevancy to the Design Reference Mission and to the potential HX concepts
- Interface with other technology performers, as appropriate, and provide provisions for potential integration with the experimental hypersonic vehicle in a technology integration plan
- Conduct a final technology design review (similar to a Critical Design Review (CDR))
- Conduct pretest readiness reviews to outline test plan, objectives, and significant results expected
- Conduct the ground/flight tests
- Conduct post flight analysis showing performance metric and technology maturity results
- Provide a comprehensive final report

Base and Option Schedule and Deliverables

The Government plans to hold frequent PI meetings which all performers across the various technology areas are expected to be present. The proposer should plan for the

meeting schedule shown in Figure 3 below. The PI meetings will be held at Government-furnished facilities in major U.S. metropolitan areas with easy access by air. At each PI meeting the performer is expected to present their technical progress and provide an associated technical data package containing applicable trade study reports, design documents, test plans and test reports, software source code, libraries, executables, test cases, data sets, specifications, and documentation developed in the course of performance for their technology elements.

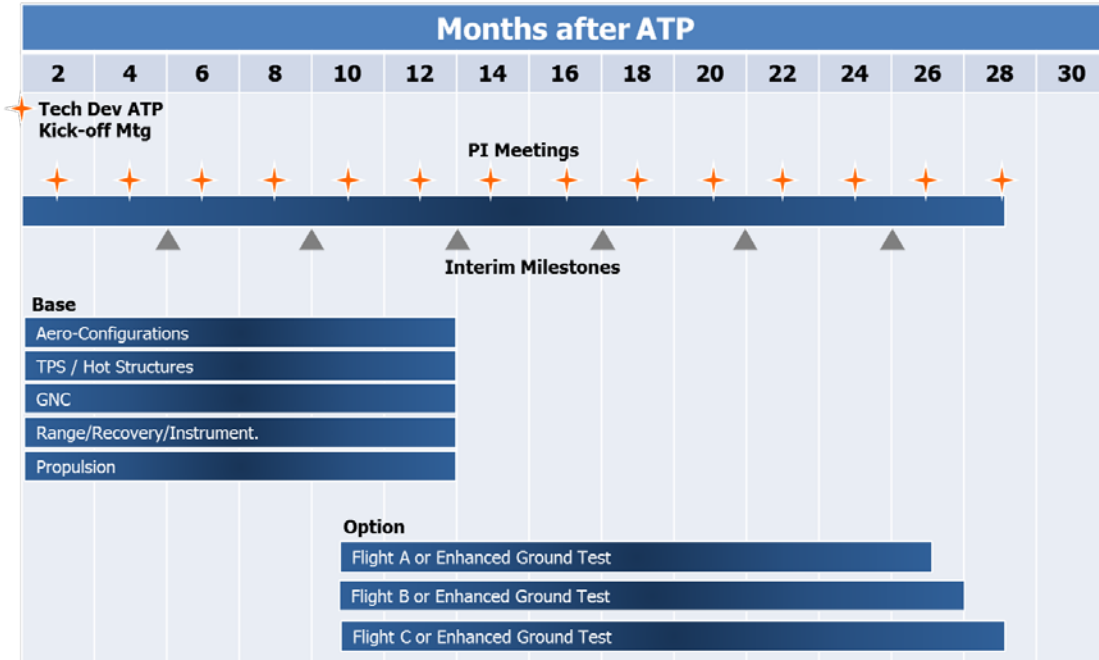


Figure 3. Notional Base and Option Schedule

Proposers should define specific deliverables for each PI meeting that are tailored to their technology development plan. Proposers should also define quantitative criteria at interim milestones (shown in Figure 4) to evaluate the effectiveness of proposed solutions in achieving the objectives and performance metrics for the technology areas. The deliverables should provide the documentation to substantiate the progress of technology development activities and achievement of performance metrics.

The standard set of desired deliverables for all technology areas is described in Table 1 below. In addition, deliverables specific to a technology area or element should be provided by the Proposer. DARPA desires Government Purpose Rights, at a minimum, to all deliverables under this program. Intellectual property rights will be an explicit proposal review criterion (see Section V) under this BAA and offerors should structure their development accordingly, especially where proprietary technical data or computer software is offered.

Table 1: Base and Option Desired Deliverables

Phase	Deliverables
Phase I	<ul style="list-style-type: none">• Kick-off meeting presentation package detailing technology development schedule and quantitative milestone criteria.• Base TDP• PI meeting technical data packages• Preliminary Technology Design Review• Preliminary Technology Integration Plan• Pre-test Readiness Reviews• Post-test Analysis Reports• Option TDP• Comprehensive Final Report
Phase II	<ul style="list-style-type: none">• Kick-off meeting presentation package detailing technology test schedule and quantitative milestone criteria.• PI meeting technical data packages• Final Technology Design Review• Pre-test Readiness Reviews• Post-test Analysis Reports• Technology Integration Plan• Product delivery (i.e. qualified flight software, hardware, analysis and simulation models or tools, etc.)• Comprehensive Final Report

Technology Areas

The following technology areas are solicited in this BAA:

Technology Area 1: Aero-Configuration

The overall objective of the aero-configuration technology area is to address vehicle configurations, aerodynamics and aerothermodynamics applicable to development and demonstration of next generation vehicle concepts/configurations which retain or improve upon the high L/D performance tested under the Falcon program and gain robust aerodynamic control and energy management capabilities. These aero advancements are intended to expand the flight envelope (short-mid-long range, wider altitude - velocity corridor) and enable more robust energy management capabilities.

Current generation hypersonic demonstrators have sought to show large improvements in hypersonic lift to drag ratio by aerodynamic tailoring of lifting body shapes or demonstrate robust flight control for less aerodynamically efficient “axisymmetric” -type shapes. These approaches while useful for technology development and testing purposes fall short of the desired end state for prompt global reach concepts. The desired end state is a vehicle concept that delivers both high aerodynamic (L/D) performance for global range flight as well as robust control for maneuvering and energy management. Aero-configuration work will require close integration with the material/thermal protection technology area the GNC technology area and the propulsion technology area.

Aerodynamics Sub-elements:

Vehicle configuration, aerodynamic and aerothermodynamic technology development and demonstration proposals are desired that will support the development of vehicle concepts with the attributes described above and that address the Design Reference Mission. Technology sub-elements of interest include, but are not limited to, the following:

- Vehicle configuration development and characterization including configuration shaping and optimization
- Advanced aerodynamic control approaches, concepts and optimal control surface integration
- Aerodynamic, stability/control, and aerothermodynamic design, analysis and prediction methods offering improved efficiency and solution fidelity for high L/D hypersonic configurations throughout the flight envelope
 - Methods for aerodynamic heating predictions for transitional and turbulent flow, bench-marked with quantified uncertainty bounds against ground and flight data, and heating predictions for complex flowfields, such as lee flows and shock boundary layer interaction, similarly bench-marked
- Work to understand configuration fluid dynamic features, boundary layer behavior and boundary layer transition (BLT) behavior on this class of flight vehicle including the effects of BLT on the aerodynamic (including stability and control) and aerothermal characteristics and performance of this class of vehicle.
 - Methods for high-fidelity spatial and temporal predictions of boundary layer transition (BLT) fronts on windward and leeward surfaces, including quantified uncertainty bounds, effects of roughness, ablation and shock-interaction on transition, and the effects of BLT on aerodynamics, (including stability and control) and aeroheating
- Development, validation, and application of methods to accurately and efficiently determine the progressive shape change and consequent aerodynamic and aerothermal changes for this class of vehicle during a long duration flight

Base and Option objectives for consideration in this technology area include, but are not limited to the following:

- Benchmarking of aero, aerothermal, transition and shape change analysis capability

- Testing of vehicle concept characteristics and performance in a relevant environment
- Benchmarking of critical technology elements such as boundary layer transition, coupling between shape change, heating and vehicle aerodynamics, or vehicle attributes such as robust control effectiveness
- Testing of advanced aero and aerothermal measurement concepts, devices, and approaches including data analysis and extraction techniques

Technology Area 2: Thermal Protection Systems (TPS) and Hot Structures

The overall objective of the Thermal Protection Systems (TPS) and Hot Structures technical area is to develop and test improved design and analysis techniques for TPS and/or hot structures, improved manufacturing techniques for TPS and/or hot structures, and improved material or structural capability or performance. These TPS and/or hot structure improvements are intended to provide more robust designs (increased margin and/or reduced weight), more accurate thermal-structural analyses, reduced cost and/or time for manufacturing, and improved system performance or capability relative to the current state of the art.

Current generation hypersonic demonstrators have sought to test increased performance through high temperature capability and high specific strength (high strength and low density) materials and structures. The desired end state is a vehicle that can survive the severe environment of long range flight, while manufactured within cost and schedule constraints consistent with an operational system. High performance vehicle configurations necessitate sharp leading edges, thermally and structurally efficient TPS and hot structures contributing to thin vehicle cross sections, and smooth continuous aerodynamic surfaces. This requirement places severe demands on the TPS and hot structures. As a result of these vehicle integration issues, this technology area will consider and have close integration with the aero-configuration, the GNC, and the propulsion technology areas.

TPS and Hot Structures Sub-elements:

TPS and hot structures technology development and testing proposals are desired that will support the development of vehicles with the attributes described above and that address the Design Reference Mission. Technology sub-elements of interest include, but are not limited to, the following:

- Innovative processes required for the rapid manufacture of low cost aeroshell TPS and/or hot structures
- Improved ablation models to accurately predict recession that may occur over the course of long duration flight in the atmosphere due to oxidation of the TPS and/or hot structure
- Stochastic finite element modeling (SFEM) for evaluating the behavior of TPS and/or hot structures due to non-deterministic inputs (such as material properties, geometry, and/or applied loads), including use of uncertainties

- Development of an automated adaptive remeshing tool for accurately modeling a receding surface which could be integrated within commercial finite element analysis codes
- Development of optimal structural design processes for high load concepts
- Aeroshell hot structures with improved interlaminar properties Improved high-temperature, light-weight, non-load bearing thermal insulation
- Improved high-temperature structural insulators
- Improved mechanical attachment techniques for hot structures
- Non- or low-recession sharp leading edges, nose tips, and acreage material that produce negligible communication signal attenuation
- Characterization and ground qualification of next generation nose tip material
- Innovative techniques to survive short term, high heat flux environments on TPS and/or hot structures
- Durable material treatment for c/c to reduce oxidation rates
- Innovative concepts for critical components such as leading edges, embedded antenna windows, and control surfaces

Base and Option objectives for consideration in this technology area include, but are not limited to the following:

- Benchmarking of thermal-structural design and analysis capability
- Demonstration of performance of TPS and/or hot structures in a relevant environment
- Demonstration of improved manufacturing methods, including those contributing to reduced cost, reduced manufacturing time, and / or improved properties
- Development of material qualification, verification, and validation plan

Technology Area 3: Guidance, Navigation and Control (GNC)

The overall objective of the GNC technology area is to develop and test next generation robust and/or adaptive GNC, rapid mission planning and energy management capabilities. These GNC advancements are intended to expand the flight envelope and enable more robust energy management capabilities. Additionally new navigation capabilities are desired for precise operation under non-optimal conditions.

The goal is to enable GNC technologies to provide robust mission planning and flight over the majority of the footprint represented by the Design Reference Mission. This capability places demands not only on the guidance navigation and control system but also on the aerodynamic shape and the vehicle control concept and thermal protection. It is likely that the realization of a wide flight envelope will require balancing the energy management requirements between the launch system (initial energy provided to the flight vehicle) and the flight vehicle (management of the kinetic and potential energy during the flight). Consequently the GNC work will require close integration with the material/thermal protection, the aero-configuration and the propulsion technology areas.

GNC Sub-elements:

Guidance, Navigation and Control technology development and demonstration proposals are desired that will support the development of vehicle concepts with the attributes described above and that address the Design Reference Mission. Technology sub-elements of interest include, but are not limited to, the following:

- Adaptive control - The desired end state is to increase the ability of the flight control laws to successfully handle large system uncertainties (aerodynamics, boundary layer transition), vehicle characteristic changes (mass properties and aerodynamics due to ablation) and/or external disturbances (high altitude wind gusts). The ability to determine flight dynamics in real time and to adjust flight control laws accordingly, during flight, is a key enabling hypersonic technology to provide a diverse and wide flight envelope. Such control laws are also considered to be critical for the ability to re-target during flight.
- Rapid optimal trajectory - To enable the ability to address a diverse and wide flight envelope, a rapid trajectory generation process needs to be developed. Under most conditions, this trajectory also needs to be optimized around one or more constraints (flight time, pathing). In order to achieve this kind of end-to-end optimal trajectory the system must be considered to be one integrated vehicle such that trades between the launch vehicle and payload performance can be made. Traditional methods, to date, can take several hours to converge on an optimal solution. Significant additional time is then required to validate the trajectory and ensure that it is realizable and robust. The computation time for the initial optimization needs to be reduced by orders of magnitude and at the same time, the ability for it to generate valid and realizable trajectories needs improvement.
- Precision navigation - The ability to provide a precision navigation solution that would enable very high position accuracy under non-optimal conditions may be required. One such condition could be operation in a global positioning system (GPS) denied environment. Additionally, the time constraint of performing long inertial measurement unit (IMU) aligns may need to be shortened and/or eliminated while retaining a precise navigation solution. While not only limited to the development of high precision IMUs, other considerations need to be made for the extreme environments.
- Reconfigurable control - Given the extreme environments that the IH concepts will likely experience, a desire for reconfigurable control has been identified. Under the condition that the flight control system experiences a control surface failure or a feedback sensor failure, the vehicle will need to detect the failure and reconfigure its control laws to maintain controllability and survivability.

Base and Option objectives for consideration in this technology area include, but are not limited to the following;

- Develop innovative solutions to key GNC technology areas and provide rigorous testing of the proposed solution under realistic and relevant simulated flight conditions

- Provide a level of detailed documentation such that the work (design and analysis) can be used as a basis for future GNC related IH research and development
- Mature algorithm design and confidence to the appropriate level to begin software development
- Implement algorithm(s) on flight, or flight like hardware, tested in a real time simulated flight environments
- Testing of robustness of algorithms by conducting sensitivity studies, including, for example, Monte Carlo, worst on worst case, and break analyses
- Successful testing of one or more GNC related IH technologies via flight test or appropriate ground testing

Technology Area 4: Range / Recovery / Instrumentation

The overall objective of the Range, Recovery, and Instrumentation technology area is to enhance the data collection scheme to allow for more robust in-flight and post-flight data analysis. This technology area seeks to define a range architecture that can utilize existing space based resources to collect telemetry data during flight which would allow for a longer, broader test range. Additionally, improvements are needed in aeroshell instrumentation to allow for in-flight recession and gradient temperature measurements and the inclusion of an air data system to collect local external environment data. These instrumentation advancements are intended to collect critical aeroshell and vehicle performance data that can be used for enhanced thermal and recession models and trajectory optimization.

Current generation hypersonic demonstrators have sought to collect critical telemetry data by using a string of land, sea and air based assets which proved costly and limited the range and type of data that could be collected. The desired end state is a recoverable, in-tact vehicle instrumented to collect gradient aeroshell temperatures and recession information and also has the capability to broadcast usable telemetry information to a combination of a terrestrial and commercial space based range.

Commercial Space-Based Range Sub-element:

Advancements in space-based telemetry collection development and demonstration are desired. Technology sub-elements of interest include, but are not limited to, the following:

- Investigation of existing commercial space based resources that could be used to collect telemetry data from the vehicle over a global flight path with minimized limitations to longitude and latitude
- Methods for a commercial space-based range to continuously track the vehicle at speeds in excess of Mach 20
- Methods and configurations for a commercial space-based range to collect telemetry from the vehicle at data rates in the 3 Mbps – 10 Mbps range
- Methods for a commercial space-based range to collect and distribute real time telemetry data to ground stations where it can be stored or used for real-time purposes (cueing, situational awareness, etc.)

- Methods to test and validate the use of a commercial space based range for hypersonic flight testing

Intact Flight Vehicle Recovery Sub-element:

An intact air recovery of the vehicle is highly desired. Examination of the external condition of the test vehicle is a critical element in understanding the performance of the thermal protection system. Recovery system deployments will require initiation at velocities up to Mach 2 as the concepts under consideration are not required to maintain stable flight down to high supersonic or subsonic speeds. For planning purposes, flight vehicle mass in the 2500 lbs to 5000 lbs range should be considered. Innovations in deployment, minimal volume and weight, and flexibility (e.g. range, logistics) of retrieval for the recovery systems will be of high interest. Technology sub-elements of interest include, but are not limited to, the following:

- A method for air recovery of the test vehicle over land, sea, or both
- Method and configuration development for multiple or staged on-board parachute deployments (e.g. high supersonic to subsonic)
- Methods for intact vehicle recovery in the event of an anomaly (air recovery optional)
- Methods to test the use of an air recovery system

Instrumentation Sub-element:

Innovative aeroshell instrumentation concepts and air data system development are desired. Technology sub-elements of interest include, but are not limited to, the following:

- Methods for accurate measurement/calculation of external temperatures as a function of time and their use to calculate heat flux, boundary layer transition, and recession (including multi-dimensional conduction effects)
- Methods for direct heat-flux measurement and methods for ground “in-situ” calibration of as-installed temperature and heat transfer instrumentation
- Methods for measuring and inferring surface recession in flight
- Methods for in-depth thermocouples and as-installed calibration methods to back out reliable heat transfer
- Methods to reliably extract vehicle aerodynamics and performance, including stability and control, in flight
- Methods to implement an air data system to provide in-flight velocity, temperature, pressure and density measurements. The method proposed should work in high and low temperature conditions, resolve all three velocity components and be instantaneous. This system should also seek to eliminate or minimize the need for active/passive cooling of the sensors used, and should not adversely affect the external flow field around the vehicle.
- Methods to implement an on-board ejectable, recoverable data collection and storage unit

Base and Option objectives for consideration in this technology area include, but are not limited to the following :

- Perform concept feasibility studies including supporting ground tests, if appropriate, and design plans (internal packaging, manufacturing implementation, mass, etc.)
- Complete subscale flight test design package and execution plan to test aeroshell instrumentation, space-based range utilization and/or vehicle recovery techniques
- Complete vehicle configuration of hardware (internal packaging, deployment method, mass, etc.)
- Complete subscale flight test demonstration:
 - aeroshell instrumentation
 - space-based range utilization
 - vehicle recovery deployment techniques

Technology Area 5: Propulsion

The overall objective of the propulsion area is to develop and test next generation vehicle concepts/configurations which can augment high L/D performance and gain robust aerodynamic control and energy management capabilities with a capability to insert into their relatively low, equilibrium glide conditions, or provide integrated booster system augmentation to enable a global atmospheric flight range capability without going into orbit. These propulsion advancements are intended to expand the flight time to up to 2 hours capability.

Current launch systems are designed for ICBM missions, utilizing high acceleration, short burn motors for exo-atmospheric ballistic trajectories to target at relatively high flight path angles. HGV insertion conditions at low-altitude, long-range horizontal flight path at the edge of the Earth's atmosphere, provide all the energy available to the HGV to meet mission requirements relying on considerable in-flight energy management. Current rocket systems need to be modified, or augmented by new stages that have added flexibility to accommodate the challenging insertion requirements for next-generation gliding hypersonic vehicles. Among the physical challenges that will be encountered are increased heating at the interface, shock-shock interaction, aggressive stage steering and relatively high dynamic pressure conditions for payload fairing, stage and payload separation. Capabilities required include flexibility to tailor ascent profiles to meet variable insertion state vectors.

For HX concepts, an integrated or attached propulsion system needs to be considered beyond the initial rocket insertion. The augmenting propulsion system can be used initially to maintain high Mach velocity to increase range, intermittently burn throughout the glide to augment turns or at mid-course to re-boost back to high Mach and separate after a completion of initial glide. Extended range, mission planning flexibility, and augmented pull-out or turns are some of the advantages of an integrated rocket capability. Among the physical challenges that will be encountered for integrated propulsion systems are high heat environment, packaging, jet interaction, heating in vicinity of

nozzle, stable flight with a moving center of gravity and multiple firing capability, and for a separable propulsion system one challenge is achieving stable flight after separation. The ultimate goal is to provide global reach but relief to the ground launched rocket and glide vehicle energy management systems and more robust mission planning. Phase 1 will address identification and design of key methodologies and technologies needed for propulsion concepts to meet these new mission conditions. In Phase 2, a combination ground facility and/or subscale flight tests to validate designs from Phase 1. Propulsion work will require close integration with the material/thermal protection technology area, the Guidance and Control technology area and the aero-configurations area.

Propulsion Sub-elements:

Propulsion technology sub-elements of interest include, but are not limited to, the following:

- Analyze and determine low altitude booster separation requirements and capabilities
 - Prediction of Interface heating and shock-shock interaction at the payload interface with booster
 - TPS solutions for inner stage heating
 - Aggressive stage steering and
 - High dynamic pressure condition separation systems for payload fairing, stage and payload
- Analyze and determine integrated or separable propulsion system requirements and capabilities
 - Trade-offs for effective usage (where and when to ignite)
 - Prediction of heating and shock-shock interaction at the engine nozzle location
 - Staging dynamics (if required)
 - Risk plan for weight growth
 - Operations logistics for rapid response
- Test advanced stage/engine technologies that provide boost ascent or augmented rocket flexibility/performance, for example
 - Oxygen-rich pre-burner and staged combustion technology
 - Alternative booster stacks, including liquid stages
 - Lower cost propellant pumps that can provide performance similar to the smaller end of the turbomachinery spectrum for an ascent stage
- Develop real time trajectory shaping and optimization
 - Incorporation of dynamic constraints such as material property parameters to enable launch to recovery point trajectory designs

Base and Option objectives for consideration in this technology area include, but are not limited to the following:

- Testing of vehicle concept characteristics and performance in a relevant environment
- Benchmarking of critical technology elements of vehicle attributes

- Complete test design package and execution plan to test concept performance, where applicable, plan and conduct proof of concept ground and or subscale flight tests
- Complete vehicle configuration of hardware (thermal protection, structural design, mass properties, propulsion engine and tank, interstages, payload integration interfaces, avionics, etc.)
- Testing of propulsion concepts, devices, and approaches including data analysis and extraction techniques

II. AWARD INFORMATION

Multiple awards are anticipated in each Technology Area. For planning purposes, the total program funding will be approximately \$70M, with the following breakdown: Base- \$40M and Option - \$30M.

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 at the end of one or more of the phases.

Awards under this BAA will be made to proposers on the basis of the evaluation criteria listed below (see section labeled “Application Review Information”, Sec. V.), and program balance to provide overall value to the Government. Proposals identified for negotiation may result in a procurement contract, grant, cooperative agreement, or other transaction depending upon the nature of the work proposed, the required degree of interaction between parties, and other factors. 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. The Government reserves the right to remove proposers from award consideration should the parties fail to reach agreement on award terms, conditions and cost/price within a reasonable time or the proposer fails to timely provide requested additional information.

As of the date of publication of this BAA, DARPA expects that program goals for this BAA may be met by proposers intending to perform 'fundamental research,' i.e., basic or applied research performed on campus 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. Notwithstanding this statement of expectation, DARPA is not prohibited from considering and selecting research proposals that, while perhaps not qualifying as 'fundamental research' under the foregoing definition, still meet the BAA criteria for submissions. If proposals are selected for award that offer other than a fundamental research solution, then DARPA will either work with the proposer to modify the proposed statement of work to bring the research back into line with fundamental research or else the proposer will agree to restrictions in order to receive an award. See Section VI.B.4 for further information on fundamental, non-fundamental and restricted research. In all cases, the DARPA contracting officer shall have sole discretion to select award instrument type and to negotiate all instrument provisions with selectees.

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. Historically Black Colleges and Universities (HBCUs), Small Businesses, Small Disadvantaged Businesses and Minority Institutions (MIs) are encouraged to submit proposals and join others in submitting proposals; however, no portion of this announcement will be set aside for these organizations' participation due to the impracticality of reserving discrete or severable areas of this research for exclusive competition among these entities.

Federally Funded Research and Development Centers (FFRDCs) and Government entities (Government/National laboratories, military educational institutions, etc.) are subject to applicable direct competition limitations and cannot propose to this BAA in any capacity unless they address the following conditions. FFRDCs must clearly demonstrate that the proposed work is not otherwise available from the private sector AND must also provide a letter on letterhead from their sponsoring organization citing the specific authority establishing their eligibility to propose to government solicitations and compete with industry, and compliance with the associated FFRDC sponsor agreement and terms and conditions. This information is required for FFRDCs proposing to be prime or subcontractors. 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 (as well as, where relevant, contractual authority) establishing their ability to propose to Government solicitations. At the present time, DARPA does not consider 15 U.S.C. 3710a to be sufficient legal authority to show eligibility. While 10 U.S.C. 2539b may be the appropriate statutory starting point for some entities, specific supporting regulatory guidance, together with evidence of agency approval, will still be required to fully establish eligibility. DARPA will consider eligibility submissions on a case-by-case basis; however, the burden to prove eligibility for all team members rests solely with the Proposer.

B. Procurement Integrity, Standards of Conduct, Ethical Considerations, and Organizational Conflicts of Interest

Current federal employees are prohibited from participating in particular matters involving conflicting financial, employment, and representational interests (18 USC 203, 205, and 208). The DARPA Program Manager for this BAA is (Maj Chris Schulz, PhD, USAF). Once the proposals have been received, and prior to the start of proposal evaluations, the Government will assess potential conflicts of interest and will promptly notify the Proposer if any appear to exist. (Please note, the Government assessment does NOT affect, offset, or mitigate the Proposer's own duty to give full notice and planned mitigation for all potential organizational conflicts, as discussed below.)

Without prior approval or a waiver from the DARPA Director, in accordance with FAR 9.503, a Contractor cannot simultaneously provide scientific, engineering, technical assistance (SETA) or similar support and also be a technical performer. Therefore, all Proposers as well as proposed subcontractors and consultants must affirm whether they (their organizations and individual team members) are providing SETA or similar support to any DARPA technical office(s) through an active contract or subcontract. All affirmations must state which office(s) the Proposer, subcontractor, consultant, or individual supports and identify the prime contract number(s). Affirmations shall be furnished at the time of proposal submission. All facts relevant to the existence or potential existence of organizational conflicts of interest (FAR 9.5) must be disclosed. The disclosure must include a description of the action the Proposer has taken or proposes to take to avoid, neutralize, or mitigate such conflict. If in the sole opinion of the Government after full consideration of the circumstances, a proposal fails to fully disclose potential conflicts of interest and/or any identified conflict situation cannot be effectively mitigated, the proposal will be rejected without technical evaluation and withdrawn from further consideration for award.

If a prospective Proposer believes that any conflict of interest exists or may exist (whether organizational or otherwise) or has questions on what constitutes a conflict of interest, the Proposer should promptly raise the issue with DARPA by sending his/her contact information and a summary of the potential conflict to the BAA mailbox before time and effort are expended in preparing a proposal and mitigation plan.

C. Cost Sharing/Matching

Cost sharing is not required for this particular program; however, cost sharing will be carefully considered where there is an applicable statutory condition relating to the selected funding instrument (e.g., for any Other Transactions under the authority of 10 U.S.C. § 2371). Cost sharing is encouraged where there is a reasonable probability of a potential commercial application related to the proposed research and development effort.

D. Other Eligibility Criteria (optional)

Collaborative Efforts

Collaborative efforts/teaming are encouraged.

IV. APPLICATION AND SUBMISSION INFORMATION

A. Address to Request Application Package

This solicitation contains all information required to submit a proposal. No additional forms, kits, or other materials are needed. This notice constitutes the total BAA. No additional information is available, nor will a formal Request for Proposal (RFP) or additional solicitation regarding this announcement be issued. Requests for same will be disregarded.

B. Content and Form of Application Submission

1. Security and Proprietary Issues

NOTE: If proposals are classified, the proposals must indicate the classification level of not only the proposal itself, but also the anticipated award document classification level.

The Government anticipates proposals submitted under this BAA will be unclassified. However, if a proposal is submitted as “Classified National Security Information” as defined by Executive Order 13526, then the information must be marked and protected as though classified at the appropriate classification level and then submitted to DARPA for a final classification determination.

Security classification guidance via a DD Form 254, “DoD Contract Security Classification Specification,” will not be provided at this time, since DARPA is soliciting ideas only. After reviewing the incoming proposals, if a determination is made that the award instrument may result in access to classified information, a DD Form 254 will be issued and attached as part of the award.

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

Classified submissions shall be in accordance with the following guidance:

Confidential and Secret Collateral Information: Use classification and marking guidance provided by previously issued security classification guides, the DoD Information Security Manual (DoDM 5200.01, Volumes 1 - 4), and the National Industrial Security Program Operating Manual (DoD 5220.22-M) when marking and

transmitting information previously classified by another Original Classification Authority. Classified information at the Confidential and Secret level may be submitted via ONE of the two following methods:

1. 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.

OR

2. Mailed via appropriate U.S. Postal Service methods (e.g., (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.

The inner envelope shall be addressed to:

Defense Advanced Research Projects Agency
ATTN: Tactical Technology Office
Reference: BAA 12-57
675 North Randolph Street
Arlington, VA 22203-2114

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
675 North Randolph Street
Arlington, VA 22203-2114

All Top Secret materials: Top Secret information should 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.

Special Access Program (SAP) Information: SAP information must be transmitted via approved methods. Prior to transmitting SAP information, contact the DARPA SAPCO at 703-526-4052 for instructions.

Sensitive Compartmented Information (SCI): SCI must be transmitted via approved methods. Prior to transmitting SCI, contact the DARPA Special Security Office (SSO) at 703-526-4052 for instructions.

Proprietary Data: All proposals containing proprietary data should have the cover page and each page containing proprietary data clearly marked as containing

proprietary data. It is the Proposer's responsibility to clearly define to the Government what is considered proprietary data.

Proposers must have existing and in-place prior to execution of an award, approved capabilities (personnel and facilities) to perform research and development at the classification level they propose. It is the policy of DARPA to treat all proposals as competitive information, and to disclose their contents only for the purpose of evaluation. Proposals will not be returned. The original of each proposal 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 at this office within 5 days after unsuccessful notification.

2.

2. Abstract Submission Information

Proposers who choose to use abstracts are strongly encouraged to submit an abstract in advance of a full proposal. This procedure is intended to minimize unnecessary effort in proposal preparation and review. The time and date for submission of abstracts is specified in Section C below. DARPA will acknowledge receipt of the submission and assign a control number that should be used in all further correspondence regarding the abstract.

For Abstracts Being Submitted as Hard Copies/On CD-ROM:

An original and (number of copies requested, but no more than nine (9) copies of the abstract and two (2) electronic copies of the abstract [in PDF (preferred)] on a CD-ROM shall be submitted.

Upon review, DARPA will provide written feedback on the likelihood of a full proposal being selected and the time and date for submission of a full proposal, which may differ from the originally published date below.

Please describe other available abstract submission methods here, if applicable.

3. Abstract Format

Abstracts are encouraged in advance of full proposals in order to provide potential proposers with a rapid response to minimize unnecessary effort. Abstracts should follow the same general format as described for Volume I under PROPOSAL FORMAT (see below), but include ONLY Sections I and II. (However, no formal transmittal letter is required.) The cover sheet should be clearly marked "ABSTRACT" and the total length should not exceed 15 pages, excluding cover page and official transmittal letter. All pages shall be printed on 8-1/2 by 11 inch paper with type not smaller than 12 point. Smaller font may be used for figures, tables and charts. The page limitation for abstracts includes all figures, tables, and charts. No formal transmittal letter is required. All abstracts must be written in English.

DARPA will respond to abstracts with a statement as to whether DARPA is interested in the idea. DARPA will attempt to reply to abstracts via letter within thirty (30) calendar days of receipt. Should a proposer be discouraged from submitting a full proposal, the letter must contain feedback for the proposer regarding the rationale for the decision not to recommend a full proposal be submitted. Abstracts will be reviewed in the order they are received. Early submissions of abstracts and full proposals are strongly encouraged because selections may be made at any time during the period of solicitation. Regardless of DARPA's response to an abstract, proposers may submit a full proposal. DARPA will review all full proposals submitted using the published evaluation criteria and without regard to any comments resulting from the review of an abstract.

4. Proposal Submission Information

Proposers are required to submit proposals by the time and date specified in the BAA in order to be considered during the initial round of selections. DARPA may evaluate proposals received after this date for a period up to one year from date of posting on FedBizOpps and Grants.gov. Ability to review late submissions remains contingent on availability of funds.

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.

Restrictive notices notwithstanding, proposals may be handled, for administrative purposes only, by a support contractor. This support contractor is prohibited from competition in DARPA technical research and is bound by appropriate nondisclosure requirements. Proposals and abstracts may not be submitted by fax or e-mail; any so sent will be disregarded.

Proposals not meeting the format described in the BAA may not be reviewed.

For Proposers Submitting ONLY Full Proposals, as Hard Copies/ On CD-ROM:

Proposers must submit an original and number of copies requested, but no more than nine (9) of the full proposal and two (2) electronic copies of the full proposal [in PDF (preferred)] on a CD-ROM. Each copy must be clearly labeled with BAA **-**, proposer organization, proposal title (short title recommended), and Copy _ of 2.

For Proposers Posting to Grants.Gov:

Grant or cooperative agreement proposals may only be submitted to DARPA through Grants.gov or in hard-copy. Grant or cooperative agreement proposals may not be submitted through any other means (including T-FIMS and other comparable systems). If proposers intend to use Grants.gov as their means of submission, then they must submit their entire proposal through Grants.gov; applications cannot be submitted in part to Grants.gov and in part as a hard-copy. Proposers using the Grants.gov APPLY do not submit paper proposals in addition to the Grants.gov APPLY electronic submission.

Proposers must complete the following steps in the order listed below before submitting proposals on Grants.gov (these steps are also detailed at www.grants.gov/applicants/get_registered.jsp):

- Proposers must obtain a DUNS number
- Proposers must register their organization in the Central Contractor Registration (CCR) <https://www.bpn.gov/ccr/default.aspx>
- Proposers must register the Authorized Organization Representative (AOR) in Grants.gov
- Proposers must have the organization's E-BIZ point of contact authorize the AOR to submit applications.

Once Grants.gov has received a proposal submission, Grants.gov will send two email messages to advise proposers as to whether or not their proposals have been validated or rejected by the system; IT MAY TAKE UP TO TWO DAYS TO RECEIVE THESE EMAILS. The first email will confirm receipt of the proposal by the Grants.gov system; this email only confirms receipt, not acceptance, of the proposal. The second will indicate that the application has been successfully validated by the system prior to transmission to the grantor agency or has been rejected due to errors. If the proposal is validated, then the proposer has successfully submitted their proposal. If the proposal is rejected, the proposer will have to resubmit their proposal. Once the proposal is retrieved by DARPA, the proposer will receive a third email from Grants.gov. To avoid missing deadlines, proposers should submit their proposals in advance of the final proposal due date with sufficient time to receive confirmations and correct any errors in the submission process through Grants.gov. For more information on submitting proposals to Grants.gov, visit the Grants.gov submissions page at: http://grants.gov/applicants/apply_for_grants.jsp.

Proposers electing to submit grant or cooperative agreement proposals as hard copies must complete the SF 424 R&R form (Application for Federal Assistance, Research and Related) available on the Grants.gov website http://www.grants.gov/agencies/aapproved_standard_forms.jsp#2.

Technical support for Grants.gov submissions may be reached at 1-800-518-4726 or support@grants.gov.

For All:

All administrative correspondence and questions on this solicitation, including requests for information on how to submit an abstract or full proposal to this BAA, should be directed to one of the administrative addresses below; e-mail or fax is preferred. (Add administrative addresses here, including the DARPA technical office website for retrieving the BAA.) DARPA intends to use electronic mail and fax for correspondence regarding BAA XX-XX. Proposals and abstracts may not be submitted by fax or e-mail; any so sent will be disregarded. DARPA encourages use of the Internet for retrieving the BAA and any other related information that may subsequently be provided.

For Proposers Submitting proposals through T-FIMS

Proposals sent in response to BAA xx-xx must be submitted through T-FIMS. See <https://baat.darpa.mil> for more information on how to request an account, upload proposals, and use the T-FIMS tool. Because proposers using T-FIMS may encounter heavy traffic on the web server, and T-FIMS requires a registration and certificate installation for all proposers, proposers should not wait until the day the proposal is due to create an account in T-FIMS and submit the proposal.

For Proposers Submitting to an Electronic Business Application (excluding TFIMS) (Not Submitting Hard Copies/CD-ROM):

All proposals submitted electronically by means of an Electronic Business Application Tool or proposal submission web site (not including Grants.gov or TFIMS) must be encrypted using WinZip or PKZip with 256-bit AES encryption. Only one zipped/encrypted file will be accepted per proposal and proposals not zipped/encrypted will be rejected by DARPA. An encryption password form must be completed and emailed to (DARPA-SN-12-48@DARPA.mil) at the time of proposal submission.

Note the word "PASSWORD" must appear in the subject line of the above email and there are minimum security requirements for establishing the encryption password. Failure to provide the encryption password may result in the proposal not being evaluated.

5. Full Proposal Format

All full proposals must be in the format given below. Nonconforming proposals may be rejected without review. Proposals shall consist of two volumes. All pages shall be printed on 8-1/2 by 11 inch paper with type not smaller than 12 point. Smaller font may be used for figures, tables and charts. The page limitation for full proposals includes all figures, tables, and charts. Volume I, Technical and Management Proposal, may include an attached bibliography of relevant technical papers or research notes (published and unpublished) which document the technical ideas and approach upon which the proposal is based. Copies of not more than three (3) relevant papers can be included with the submission. The bibliography and attached papers are not included in the page counts

given below. The submission of other supporting materials along with the proposals is strongly discouraged and will not be considered for review. Section II of Volume I, Technical and Management Proposal, shall not exceed 15 pages. Maximum page lengths for each section are shown in braces { } below. All full proposals must be written in English.

a. Volume I, Technical and Management Proposal

Section I. Administrative {not included in the page count}

A. Cover sheet to include:

- (1) BAA number
 - (2) Technical area
 - (3) Lead Organization submitting proposal
 - (4) Type of business, selected among the following categories: “LARGE BUSINESS”, “SMALL DISADVANTAGED BUSINESS”, “OTHER SMALL BUSINESS”, “HBCU”, “MI”, “OTHER EDUCATIONAL”, OR “OTHER NONPROFIT”
 - (5) Contractor’s reference number (if any)
 - (6) Other team members (if applicable) and type of business 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), total funds requested from DARPA, and the amount of cost share (if any)
- AND
- (10) Date proposal was submitted

B. Official transmittal letter

C. Table of Contents

Section II. Executive Summary of Proposal {Part II+Part III not to exceed 75 pages}

This section provides a short overview of the proposed technology, relevancy to the Design Reference Mission, development approach, as well as an introduction to the associated technical and management issues. This section should also briefly discuss the proposer’s relevant experience, and provide a top-level description of tasks, schedule and cost for each phase. Further elaboration should be provided in Section III.

Note: The Executive Summary should not have any unique information not contained in the Detailed Proposal Information.

Section III. Detailed Proposal Information {Part II+Part III not to exceed 75 pages}

This section provides the detailed discussion of the specific technical aspects of the proposal. Part III should be organized into the following sections:

- Technical Innovation
- Technology Development Approach
- Statement of Work (SOW), Integrated Master Schedule (IMS), and Milestones
- Technical Team, Capability and Related Experience
- Potential Contribution and Relevance to DARPA Mission
- Intellectual Property

A. Technical Innovation

The proposal should describe the innovations in the proposed technology in relation to the program goals and objectives, discuss how the proposed technology solution advances the state of the art, and discuss proposed performance metrics. The proposal should also discuss the technical risks associated with the development of the proposed technology and whether there is sufficient technical payoff to warrant any risk.

B. Technology Development Approach

The proposal should describe in detail the proposed approach to developing the technology in relation to the overall program goal, and Phase I and Phase II objectives. The proposer's development approach should describe any major technical risks, the tasks necessary to address risks, the associated schedule to complete the tasks, and the deliverables that will be provided. The proposal should also describe any innovative methods for developing the proposed technology.

C. Statement of Work (SOW), Integrated Master Schedule (IMS), and Milestones

1. SOW. {Not included in page count}

The SOW should describe all of the tasks the proposer will perform in order to achieve the program objectives. This section should define the tasks to be performed to WBS level 3 (or more detailed if desired), with task descriptions included. Phase I tasks should be clearly delineated from Phase II tasks. Deliverables for each phase should be clearly defined. Do not include any proprietary information in the SOW.

2. IMS. {Not included in page count}

The IMS should provide a detailed integrated schedule of all activities, with the critical path identified. Phase I activities should be clearly delineated from Phase II activities.

3. Milestones. {Not included in page count}

Measurable milestones for the proposed research 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.

D. Technical Team, Capability and Related Experience

The proposer should describe the proposed technical team, team organization and qualifications of key personnel to accomplish the work proposed. The team's technical and management experience on similar efforts should also be described. In addition, any facilities that are necessary for the execution of the proposed effort should be described.

E. Potential Contribution and Relevance to DARPA Mission

The proposer should describe the potential contribution and relevancy of the proposed technology to the IH Design Reference Mission and the extent to which the proposed technology enables the development of future long range hypersonic prompt global reach systems.

F. Intellectual Property {Not included in page count}

The proposer should describe the proposed approach to intellectual property rights, together with supporting rationale of claims for work associated with this research effort in which the Government will acquire less than Government purpose rights. See Section VIII. A. and B. for presentation guidance.

Section IV. Additional Information {not included in the page count}

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

b. Volume II, Cost Proposal – {No Page Limit}

Cover sheet to include:

- (1) BAA number;
- (2) Technical area;
- (3) Lead Organization submitting proposal;
- (4) Type of business, selected among the following categories: "LARGE BUSINESS", "SMALL DISADVANTAGED BUSINESS", "OTHER SMALL BUSINESS", "HBCU", "MI", "OTHER EDUCATIONAL", OR "OTHER NONPROFIT";
- (5) Contractor's reference number (if any);
- (6) Other team members (if applicable) and type of business 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-award—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;
- (17) TIN number; and
- (18) Cage Code;
- (19) Subcontractor Information; and
- (20) Proposal validity period.

The Government requests and recommends that tables included in the cost proposal also be provided in MS Excel™ format with calculations formulae intact to allow traceability of the cost proposal numbers across the prime and subcontractors. If the PDF submission differs from the Excel submission, the PDF will take precedence. Each copy must be clearly labeled with the DARPA BAA number, proposer organization, and proposal title (short title recommended).

The Government also requests and recommends that the Cost Proposal include MS Excel file(s) that provide traceability between the Bases of Estimate (BOEs) and the proposed costs across all elements and phases. This includes the calculations and adjustments that are utilized to generate the Summary Costs from the source labor hours, labor costs, material costs, etc. input data. It is requested that the costs and Subcontractor proposals be readily traceable to the Prime Cost Proposal in the provided MS Excel file(s). The Government prefers receiving cost data as Excel files; however, this is not a requirement.

Detailed cost breakdown to include: (1) total program cost 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; (2) major program tasks by fiscal year; (3) an itemization of major subcontracts and equipment purchases; (4) an itemization of any information technology (IT) purchase, as defined in FAR Part 2.101; (5) a summary of projected funding requirements by month; and (6) the source, nature, and amount of any industry cost-sharing; and (7) identification of pricing assumptions of which may require incorporation into the resulting award instrument (e.g., use of Government Furnished Property/Facilities/Information, access to Government Subject Matter Expert/s, etc.). The prime contractor is responsible for compiling and providing all subcontractor proposals for the Procuring Contracting Officer (PCO). Subcontractor proposals should include Interdivisional Work Transfer Agreements

(ITWA) or similar arrangements. Where the effort consists of multiple portions which could reasonably be partitioned for purposes of funding, these should be identified as options with separate cost estimates for each. NOTE: for IT and equipment purchases, include a letter stating why the proposer cannot provide the requested resources from its own funding.

Supporting cost and pricing information in sufficient detail to substantiate the summary cost estimates in B. above. Include a description of the method used to estimate costs and supporting documentation. Note: “cost or pricing data” as defined in FAR Subpart 15.4 shall be required if the proposer is seeking a procurement contract award of \$700,000 or greater unless the proposer requests an exception from the requirement to submit cost or pricing data. “Cost or pricing data” are not required if the proposer proposes an award instrument other than a procurement contract. All proprietary subcontractor proposal documentation, prepared at the same level of detail as that required of the prime shall be provided to the Government either by the prime contractor or by the subcontractor organization when the proposal is submitted. Subcontractor proposals submitted to the Government by the prime contractor should be submitted in a sealed envelope that the prime contractor will not be allowed to view. The subcontractor must provide the same number of hard copies and/or electronic proposals as is required of the prime contractor.

NOTE: PROPOSERS ARE CAUTIONED THAT EVALUATION RATINGS MAY BE LOWERED AND/OR PROPOSALS REJECTED IF SUBMITTAL INSTRUCTIONS ARE NOT FOLLOWED.

For information on 845 Other Transaction Authority for Prototypes (OTA) agreements, refer to http://www.darpa.mil/Opportunities/Contract_Management/Other_Transactions_and_Technology_Investment_Agreements.aspx. All proposers requesting an 845 Other Transaction Authority for Prototypes (OTA) agreement must include a detailed list of milestones. Each such milestone must include the following: milestone description, completion criteria, due date, payment/funding schedule (to include, if cost share is proposed, contractor and Government share amounts). It is noted that, at a minimum, such milestones should relate directly to accomplishment of program technical metrics as defined in the BAA and/or the proposer’s proposal. Agreement type, fixed price or expenditure based, will be subject to negotiation by the Agreements Officer; however, it is noted that the Government prefers use of fixed price milestones with a payment/funding schedule to the maximum extent possible. Do not include proprietary data. If the proposer requests award of an 845 OTA agreement as a nontraditional defense contractor, as so defined in the OSD guide entitled “Other Transactions (OT) Guide For Prototype Projects” dated January 2001 (as amended) (<http://www.acq.osd.mil/dpap/Docs/otguide.doc>), information must be included in the cost proposal to support the claim. Additionally, if the proposer plans requests award of an 845 OTA agreement, without the required one-third (1/3) cost share, information must be included in the cost proposal supporting that there is at least one non-traditional defense contractor participating to a significant extent in the proposed prototype project.

4. Submission Dates and Times

a. Proposal Date

The full proposal (original and designated number of hard and electronic copies) must be submitted to DARPA/TTO, 675 North Randolph Street, Arlington, VA 22203-2114 (Attn.: TBA) on or before TBA, local time, (TBA), in order to be considered during the initial round of selections; however, BAA-XX-XX will remain open until final closing time and date. Proposals may be submitted at any time from issuance of this announcement through (final closing time and date); however, proposers are warned that the likelihood of funding is greatly reduced for proposals submitted after the initial closing date deadline.

DARPA will post a consolidated Question and Answer response after (TBA), before final full proposals are due. In order to receive a response to your question, submit your question by (TBA) to the (DARPA-BAA-XX-XX@darpa.mil).

DARPA will acknowledge receipt of complete submissions via email and assign control numbers that should be used in all further correspondence regarding proposals.

Failure to comply with the submission procedures may result in the submission not being evaluated.

5. Intergovernmental Review

Not Applicable.

6. Funding Restrictions

Not Applicable.

V. APPLICATION REVIEW INFORMATION

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

(a) Overall Scientific and Technical Merit; (b) Potential Contribution and Relevance to the DARPA Mission; (c) Realism of Proposed Schedule; (d) Proposer's Capabilities and/or Related Experience; (e) Plans and Capabilities to Accomplish Technology Transition; and (f) Cost Realism

(a) Overall Scientific and Technical Merit

The proposed technical approach is feasible, achievable, complete and supported by a proposed technical team that has the expertise and experience to accomplish the proposed tasks. Task descriptions and associated technical elements provided are complete and in

a logical sequence with all proposed deliverables clearly defined such that a final outcome that achieves the goal can be expected as a result of award. The proposal identifies major technical risks and planned mitigation efforts are clearly defined and feasible.

(b) Potential Contribution and Relevance to the DARPA Mission

The potential contributions of the proposed effort with relevance to the national technology base will be evaluated. Specifically, DARPA's mission is to maintain the technological superiority of the U.S. military and prevent technological surprise from harming our national security by sponsoring revolutionary, high-payoff research that bridges the gap between fundamental discoveries and their application.

(c) Cost Realism

The objective of this criterion is to establish that the proposed costs are realistic for the technical and management approach offered, as well as to determine the proposer's practical understanding of the effort. The proposal will be reviewed to determine if the costs proposed are based on realistic assumptions, reflect a sufficient understanding of the technical goals and objectives of the BAA, and are consistent with the proposer's technical approach (to include the proposed Statement of Work). At a minimum, this will involve review, at the prime and subcontract level, of the type and number of labor hours proposed per task as well as the types and kinds of materials, equipment and fabrication costs proposed. 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. The evaluation criterion 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.

(d) Realism of Proposed Schedule

The proposer's abilities to aggressively pursue performance metrics in the shortest timeframe and to accurately account for that timeframe will be evaluated, as well as proposer's ability to understand, identify, and mitigate any potential risk in schedule.

(e) Proposer's Capabilities and/or Related Experience

The proposer's prior experience in similar efforts must clearly demonstrate 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.

(f) Plans and Capability to Accomplish Technology Transition

The proposer will be evaluated on their capability to transition the technology to the research, industrial, and/or operational military communities in such a way as to enhance U.S. defense. In addition, the evaluation will take into consideration the extent to which

the proposed intellectual property (IP) rights will potentially impact the Government's ability to transition the technology.

A. Review and Selection Process

Evaluation of proposals will be accomplished through a scientific/technical review of each proposal. 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, all factors considered, including the potential contributions of the proposed work to the overall research program and the availability of funding for the effort. DARPA's intent is to review proposals as soon as possible after they arrive; however, proposals may be reviewed periodically for administrative reasons.

It is the policy of DARPA to ensure impartial, equitable, comprehensive proposal evaluations and to select the source (or sources) whose offer meets the Government's technical, policy, and programmatic goals. Pursuant to FAR 35.016, the primary basis for selecting proposals for acceptance shall be technical, importance to agency programs, and fund availability. In order to provide the desired evaluation, qualified Government personnel will conduct reviews and (if necessary) convene panels of experts in the appropriate areas.

Proposals will not be evaluated against each other since they are not submitted in accordance with a common work statement. For evaluation purposes, a proposal is the document described in "Proposal Information", Section IV.B.. Other supporting or background materials submitted with the proposal will be considered for the reviewer's convenience only and not considered as part of the proposal.

Restrictive notices notwithstanding, proposals may be handled for administrative purposes by support contractors. These support contractors are prohibited from competition in DARPA technical research and are bound by appropriate non-disclosure requirements.

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.

It is the policy of DARPA to treat all proposals as competitive information and to disclose their contents only for the purpose of evaluation. No proposals will be returned. After proposals have been evaluated and selections made, the original of each proposal received will be retained at DARPA and all other copies will be destroyed.

VI. AWARD ADMINISTRATION INFORMATION

A. Selection Notices

As soon as the evaluation of a proposal is complete, the proposer will be notified that 1) the proposal has been selected for funding pending contract negotiations, or 2) the proposal has not been selected. These official notifications will be sent e-mail to the Technical 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. Human Use

All research involving human subjects, to include use of human biological specimens and human data, selected for funding must comply with the federal regulations for human subject protection. Further, research involving human subjects that is conducted or supported by the DoD must comply with 32 CFR 219, *Protection of Human Subjects* (http://www.access.gpo.gov/nara/cfr/waisidx_07/32cfr219_07.html) and DoD Directive 3216.02, *Protection of Human Subjects and Adherence to Ethical Standards in DoD-Supported Research* (<http://www.dtic.mil/whs/directives/corres/pdf/321602p.pdf>).

Institutions awarded funding for research involving human subjects must provide documentation of a current Assurance of Compliance with Federal regulations for human subject protection, for example a Department of Health and Human Services, Office of Human Research Protection Federal Wide Assurance (<http://www.hhs.gov/ohrp>). All institutions engaged in human subject research, to include subcontractors, must also have a valid Assurance. In addition, personnel involved in human subjects research must provide documentation of completing appropriate training for the protection of human subjects.

For all proposed research that will involve human subjects in the first year or phase of the project, the institution must provide evidence of or a plan for review by an Institutional Review Board (IRB) upon final proposal submission to DARPA. The IRB conducting the review must be the IRB identified on the institution's Assurance. The protocol, separate from the proposal, must include a detailed description of the research plan, study population, risks and benefits of study participation, recruitment and consent process, data collection, and data analysis. Consult the designated IRB for guidance on writing the protocol. The informed consent document must comply with federal regulations (32

CFR 219.116). A valid Assurance along with evidence of appropriate training all investigators should all accompany the protocol for review by the IRB.

In addition to a local IRB approval, a headquarters-level human subjects regulatory review and approval is required for all research conducted or supported by the DoD. The Army, Navy, or Air Force office responsible for managing the award can provide guidance and information about their component's headquarters-level review process. Note that confirmation of a current Assurance and appropriate human subjects protection training is required before headquarters-level approval can be issued.

The amount of time required to complete the IRB review/approval process may vary depending on the complexity of the research and/or the level of risk to study participants. Ample time should be allotted to complete the approval process. The IRB approval process can last between one to three months, followed by a DoD review that could last between three to six months. No DoD/DARPA funding can be used towards human subjects research until ALL approvals are granted.

3. Animal Use

Any Recipient performing research, experimentation, or testing involving the use of animals shall comply with the rules on animal acquisition, transport, care, handling, and use in: (i) 9 CFR parts 1-4, Department of Agriculture rules that implement the Laboratory Animal Welfare Act of 1966, as amended, (7 U.S.C. 2131-2159); (ii) the guidelines described in National Institutes of Health Publication No. 86-23, "Guide for the Care and Use of Laboratory Animals"; (iii) DoD Directive 3216.01, "Use of Laboratory Animals in DoD Program."

For submissions containing animal use, proposals should briefly describe plans for Institutional Animal Care and Use Committee (IACUC) review and approval. Animal studies in the program will be expected to comply with the PHS Policy on Humane Care and Use of Laboratory Animals, available at <http://grants.nih.gov/grants/olaw/olaw.htm>.

All Recipients must receive approval by a DoD certified veterinarian, in addition to an IACUC approval. No animal studies may be conducted using DoD/DARPA funding until the USAMRMC Animal Care and Use Review Office (ACURO) or other appropriate DoD veterinary office(s) grant approval. As a part of this secondary review process, the Recipient will be required to complete and submit an ACURO Animal Use Appendix, which may be found at https://mrmc-www.army.mil/index.cfm?pageid=Research_Protections.acuro&rn=1.

4. Publication Approval

It is the policy of the Department of Defense that the publication of products of fundamental research will remain unrestricted to the maximum extent possible. The definition of Contracted Fundamental Research is:

“Contracted Fundamental Research includes [research performed under] grants and contracts that are (a) funded by budget category 6.1 (Basic Research), whether performed by universities or industry or (b) funded by budget category 6.2 (Applied Research) and performed on-campus at a university. The research shall not be considered fundamental in those rare and exceptional circumstances where the applied research effort presents a high likelihood of disclosing performance characteristics of military systems or manufacturing technologies that are unique and critical to defense, and where agreement on restrictions have been recorded in the contract or grant.” Such research is referred to by DARPA as “Restricted Research.”

Pursuant to DoD policy, research performed under grants and contracts that are (a) funded by budget category 6.2 (Applied Research) and NOT performed on-campus at a university or (b) funded by budget category 6.3 (Advanced Research) does not meet the definition of fundamental research. Publication restrictions will be placed on all such research.

1. It is anticipated that awards for both Fundamental and Restricted Research may be made as a result of this BAA. Appropriate clauses will be included in resultant awards for Restricted Research to prescribe publication requirements and other restrictions, as appropriate. DARPA does not anticipate applying publication restrictions of any kind to Fundamental Research to each individual award that may result from this BAA.

Proposers are advised if they propose grants or cooperative agreements, DARPA may elect to award other award instruments due to the need to apply publication or other restrictions. DARPA will make this election if it determines that the research resulting from the proposed program 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 and will be considered Restricted Research.

For certain research projects, it may be possible that although the research being performed by the Prime Contractor is Restricted Research, a subcontractor may be conducting Contracted Fundamental Research. In those cases, it is the Prime Contractor’s responsibility to explain in their proposal why its subcontractor’s effort is Contracted Fundamental Research.

The following same or similar provision will be incorporated into any resultant Restricted Research or Non-Fundamental Research procurement contract or other transaction:

There shall be no dissemination or publication, except within and between the Contractor and any subcontractors, of information developed under this contract

or contained in the reports to be furnished pursuant to this contract without prior written approval of DARPA's Public Release Center (DARPA/PRC). All technical reports will be given proper review by appropriate authority to determine which Distribution Statement is to be applied prior to the initial distribution of these reports by the Contractor. With regard to subcontractor proposals for Contracted Fundamental Research, papers resulting from unclassified contracted fundamental research are exempt from prepublication controls and this review requirement, pursuant to DoD Instruction 5230.27 dated October 6, 1987.

When submitting material for written approval for open publication, the Contractor/Awardee must submit a request for public release to the PRC and include the following information: 1) Document Information: document title, document author, short plain-language description of technology discussed in the material (approx. 30 words), number of pages (or minutes of video) and document type (briefing, report, abstract, article, or paper); 2) Event Information: event type (conference, principle investigator meeting, article or paper), event date, desired date for DARPA's approval; 3) DARPA Sponsor: DARPA Program Manager, DARPA office, and contract number; and 4) Contractor/Awardee's Information: POC name, e-mail and phone. Allow four weeks for processing; due dates under four weeks require a justification. Unusual electronic file formats may require additional processing time. Requests can be sent either via e-mail to prc@darpa.mil or via hard copy to 675 North Randolph Street, Arlington VA 22203-2114, telephone (571) 218-4235. Refer to http://www.darpa.mil/NewsEvents/Public_Release_Center/Public_Release_Center.aspx for information about DARPA's public release process.

5. Export Control

The following clause will be included in all procurement contracts, and may be included in Other Transactions as deemed appropriate:

(a) *Definition.* "Export-controlled items," as used in this clause, means items subject to the Export Administration Regulations (EAR) (15 CFR Parts 730-774) or the International Traffic in Arms Regulations (ITAR) (22 CFR Parts 120-130). The term includes:

1) "Defense items," defined in the Arms Export Control Act, 22 U.S.C. 2778(j)(4)(A), as defense articles, defense services, and related technical data, and further defined in the ITAR, 22 CFR Part 120.

2) "Items," defined in the EAR as "commodities", "software", and "technology," terms that are also defined in the EAR, 15 CFR 772.1.

(b) The Contractor shall comply with all applicable laws and regulations regarding export-controlled items, including, but not limited to, the requirement for contractors to

register with the Department of State in accordance with the ITAR. The Contractor shall consult with the Department of State regarding any questions relating to compliance with the ITAR and shall consult with the Department of Commerce regarding any questions relating to compliance with the EAR.

(c) The Contractor's responsibility to comply with all applicable laws and regulations regarding export-controlled items exists independent of, and is not established or limited by, the information provided by this clause.

(d) Nothing in the terms of this contract adds, changes, supersedes, or waives any of the requirements of applicable Federal laws, Executive orders, and regulations,

including but not limited to—

(1) The Export Administration Act of 1979, as amended (50 U.S.C. App. 2401, *et seq.*);

(2) The Arms Export Control Act (22 U.S.C. 2751, *et seq.*);

(3) The International Emergency Economic Powers Act (50 U.S.C. 1701, *et seq.*);

(4) The Export Administration Regulations (15 CFR Parts 730-774);

(5) The International Traffic in Arms Regulations (22 CFR Parts 120-130);

and (6) Executive Order 13222, as extended;

(e) The Contractor shall include the substance of this clause, including this paragraph (e), in all subcontracts.

6. Subcontracting

Pursuant to Section 8(d) of the Small Business Act (15 U.S.C. 637(d)), it is the policy of the Government to enable small business and small disadvantaged business concerns to be considered fairly as subcontractors to contractors performing work or rendering services as prime contractors or subcontractors under Government contracts, and to assure that prime contractors and subcontractors carry out this policy. Each proposer who submits a contract proposal and includes subcontractors is required to submit a subcontracting plan in accordance with FAR 19.702(a) (1) and (2) should do so with their proposal. The plan format is outlined in FAR 19.704.

7. Electronic and Information Technology

In compliance with Section 508 of the Rehabilitation Act (29 U.S.C. 794d) and FAR Subpart 39.2, if it is anticipated that this BAA will be used to procure electronic or information (EIT) technology, and the exceptions listed in FAR Subpart 39.204 do not apply, the following language must be included in the BAA:

All electronic and information technology acquired through this solicitation must satisfy the accessibility requirements of Section 508 of the Rehabilitation Act (29 U.S.C. 794d) and FAR Subpart 39.2. Each proposer who submits a proposal involving the creation or inclusion of electronic and information technology must ensure that Federal employees with disabilities will have access to and use of information that is comparable to the access and use by Federal employees who are not individuals with disabilities and members of the public with disabilities seeking information or services from DARPA will have access to and use of information and data that is comparable to the access and use of information and data by members of the public who are not individuals with disabilities.

8. Employment Eligibility Verification (For FAR-Based Awards Only)

If the award of any procurement contracts is anticipated, this clause must be included. However, if grants, cooperative agreements, or Other Transactions are the only award types anticipated, this clause will not be included.

As per FAR 22.1802, recipients of FAR-based procurement contracts must enroll as Federal Contractors in E-verify and use E-Verify to verify employment eligibility of all employees assigned to the award. All resultant contracts from this solicitation will include FAR 52.222-54, "Employment Eligibility Verification." This clause will not be included in grants, cooperative agreements, or Other Transactions.

9. Additional Requirements and Responsibilities relating to Alleged Crimes by or against Contractor Personnel in Iraq and Afghanistan (use if applicable)

The following clause will be used in all contracts performed in Iraq or Afghanistan. Contracts performed in Iraq or Afghanistan are contracts with the Department of Defense, a subcontract at any tier issued under such a contract, or a task order or delivery order at any tier issued under such contract, including a contract, subcontract, or task order or delivery order issued by another Government agency for the Department of Defense, if the contract, subcontract, or task order or delivery order involves work performed in Iraq or Afghanistan for a period longer than 14 days.

(a) The Contractor shall report to the appropriate investigative authorities, identified in paragraph (c) below, any alleged offenses under—

(1) The Uniform Code of Military Justice (chapter 47 of title 10, United States code) (applicable to contractors serving with or accompanying an armed force in the field during a declared war or a contingency operation); or

(2) The Military Extraterritorial Jurisdiction Act (chapter 212 of title 18, United States Code).

(b) The Contractor shall provide to all contractor personnel who will perform work on a contract in Iraq or Afghanistan, before beginning such work, information on the following:

(1) How and where to report an alleged crime described in paragraph (a) of this clause.

(2) Where to seek victim and witness protection and assistance available to contractor personnel in connection with an alleged offense described in paragraph (a) of this clause.

(c) The appropriate investigative authorities to which suspected crimes shall be reported include the following officials –

(i) US Army Criminal Investigations Division at <http://www.cid.army.mil/reportacrime.html>

(ii) Air Force Office of Special Investigations at <http://www.osi.andrews.af.mil/library/factsheets/factsheet.asp?id=14522>

(iii) Navy Criminal Investigative Service at <http://www.ncis.navy.mil/Pages/publicdefault.aspx>; or

(iv) To the command of any supported military element or the command of any base.

(d) Personnel seeking whistleblower protection from reprisals for reporting criminal acts shall seek guidance through the DoD Inspector General hotline at (800) 424-9098 or www.dodig.mil/HOTLINE/index.html. Personnel seeking other forms of victim or witness protections should contact the nearest military law enforcement office.

10. Central Contractor Registration (CCR) and Universal Identifier Requirements

Unless the proposer is exempt from this requirement, as per FAR 4.1102 or 2 CFR 25.110 as applicable, all proposers must be registered in the Central Contractor Registration (CCR) and have a valid Data Universal Numbering System (DUNS) number prior to submitting a proposal. Information on CCR registration is available at <http://www.ccr.gov>. All proposers must maintain an active CCR registration with current information at all times during which they have an active Federal award or proposal under consideration by DARPA. All proposers must provide the DUNS number in each proposal they submit.

DARPA cannot make an assistance award to a proposer until the proposer has provided a valid DUNS number and has maintained an active CCR registration with current information.

11. Reporting Executive Compensation and First-Tier Subcontract Awards

The FAR clause 52.204-10, "Reporting Executive Compensation and First-Tier Subcontract Awards," will be used in all procurement contracts valued at \$25,000 or more. A similar award term will be used in all grants and cooperative agreements.

12. Updates of Information Regarding Responsibility Matters (

FAR clause 52.209-9, Updates of Publicly Available Information Regarding Responsibility Matter, will be included in all contracts valued at \$500,000 where the contractor has current active Federal contracts and grants with total value greater than \$10,000,000.

13. Representation by Corporations Regarding Unpaid Delinquent Tax Liability or a Felony Conviction Under Any Federal Law

Each proposer must complete and return the representations in paragraph (b) below with their proposal submission.

(a) In accordance with sections 8124 and 8125 of Division A of the Consolidated Appropriations Act, 2012 (Pub. L. 112-74) none of the funds made available by that Act may be used to enter into a contract with any corporation that –

(1) Has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability, unless the agency has considered suspension or debarment of the corporation and made a determination that this further action is not necessary to protect the interests of the Government.

(2) Was convicted of a felony criminal violation under any Federal law within the preceding 24 months, where the awarding agency is aware of the conviction, unless the agency has considered suspension or debarment of the corporation and made a determination that this action is not necessary to protect the interests of the Government.

(b) The Offeror represents that –

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

(2) It is is not a corporation that was convicted of a felony criminal violated under Federal law within the preceding 24 months.

14. Cost Accounting Standards Notices and Certification (Deviation 2012-00003 (JAN 2012))

As per FAR 52.230-2, amended by Deviation 2012-00003 (JAN 2012), any procurement contract in excess of \$700,000 resulting from this solicitation will be subject to the requirements of the Cost Accounting Standards Board (48 CFR Chapter 99), except those contracts which are exempt as specified in 48 CFR 9903.201-1. Any offeror submitting a proposal which, if accepted, will result in a CAS compliant contract, must submit representations and a Disclosure Statement as required by 48 CFR 9903.202 detailed in FAR 52.230-2.

C. Reporting

The number and types of reports will be specified in the award document, but will include as a minimum monthly/quarterly 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.

D. Electronic Systems

1. Representations and Certifications

In accordance with FAR 4.1201, prospective proposers shall complete electronic annual representations and certifications at <http://orca.bpn.gov>.

2. Wide Area Work Flow (WAWF)

Unless using another approved electronic invoicing system, performers will be required to submit invoices for payment directly via the Internet/WAWF at <http://wawf.eb.mil>. Registration to WAWF will be required prior to any award under this BAA.

3. T-FIMS (if applicable)

The award document for each proposal selected and funded will contain a mandatory requirement for four DARPA Quarterly Status Reports each year, one of which will be an annual project summary. These reports will be electronically submitted by each awardee under this BAA via the DARPA Technical – Financial Information Management System (T-FIMS). The T-FIMS URL and instructions will be furnished by the contracting agent upon award.

4. i-Edison

The award document for each proposal selected for funding will contain a mandatory requirement for patent reports and notifications to be submitted electronically through i-Edison (<http://s-edison.info.nih.gov/iEdison>) .

VII. AGENCY CONTACTS

Indicate here if there is a preferred method of communication (email, fax, U.S. Mail, etc).

Administrative, technical or contractual questions should be sent via e-mail to emailaddress@darpa.mil. If e-mail is not available, fax questions to fax number, Attention: BAA **-**. All requests must include the name, email address, and phone number of a point of contact.

Points of Contact

The technical POC for this effort is Name, fax: (703) 696-****, electronic mail: name@darpa.mil.

DARPA/Office

ATTN: BAA **-**

675 North Randolph Street
Arlington, VA 22203-2114

FAX

PHONE

EMAIL

VIII. OTHER INFORMATION

A. Intellectual Property Procurement Contract Proposers

1. Noncommercial Items (Technical Data and Computer Software)

Proposers responding to this BAA requesting a procurement contract to be issued under the FAR/DFARS shall identify all noncommercial technical data and noncommercial computer software that it plans to generate, develop, and/or deliver under any proposed award instrument in which the Government will acquire less than unlimited rights, and to assert specific restrictions on those deliverables. Proposers shall follow the format under DFARS 252.227-7017 for this stated purpose. In the event that proposers do not submit the list, the Government will assume that it automatically has “unlimited rights” to all noncommercial technical data and noncommercial computer software generated, developed, and/or delivered under any award instrument, unless it is substantiated that development of the noncommercial technical data and noncommercial computer software occurred with mixed funding. If mixed funding is anticipated in the development of

noncommercial technical data and noncommercial computer software generated, developed, and/or delivered under any award instrument, then proposers should identify the data and software in question, as subject to Government Purpose Rights (GPR). In accordance with DFARS 252.227-7013 Rights in Technical Data - Noncommercial Items, and DFARS 252.227-7014 Rights in Noncommercial Computer Software and Noncommercial Computer Software Documentation, the Government will automatically assume that any such GPR restriction is limited to a period of five (5) years in accordance with the applicable DFARS clauses, at which time the Government will acquire “unlimited rights” unless the parties agree otherwise. Proposers are admonished that the Government will use the list during the evaluation process to evaluate the impact of any identified restrictions and may request additional information from the proposer, as may be necessary, to evaluate the proposer’s assertions. If no restrictions are intended, then the proposer should state “NONE.” It is noted an assertion of “NONE” indicates that the Government has “unlimited rights” to all noncommercial technical data and noncommercial computer software delivered under the award instrument, in accordance with the DFARS provisions cited above. Failure to provide full information may result in a determination that the proposal is not compliant with the BAA – resulting in nonselectability of the proposal.

A sample list for complying with this request is as follows:

NONCOMMERCIAL

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. Commercial Items (Technical Data and Computer Software)

Proposers responding to this BAA requesting a procurement contract to be issued under the FAR/DFARS shall identify all commercial technical data and commercial computer software that may be embedded in any noncommercial deliverables contemplated under the research effort, along with any applicable restrictions on the Government’s use of such commercial technical data and/or commercial computer software. In the event that proposers do not submit the list, the Government will assume that there are no restrictions on the Government’s use of such commercial items. The Government may use the list during the evaluation process to evaluate the impact of any identified restrictions and may request additional information from the proposer, as may be necessary, to evaluate the proposer’s assertions. If no restrictions are intended, then the proposer should state “NONE.” Failure to provide full information may result in a determination that the proposal is not compliant with the BAA – resulting in nonselectability of the proposal.

A sample list for complying with this request is as follows:

COMMERCIAL			
Technical Data Computer Software To be Furnished With Restrictions	Basis for Assertion	Asserted Rights Category	Name of Person Asserting Restrictions
(LIST)	(LIST)	(LIST)	(LIST)

B. Non-Procurement Contract Proposers – Noncommercial and Commercial Items (Technical Data and Computer Software)

Proposers responding to this BAA requesting a Grant, Cooperative Agreement, Technology Investment Agreement, or Other Transaction for Prototype 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 those award instruments in question. This includes both Noncommercial Items and Commercial Items. Although not required, proposers may use a format similar to that described in Paragraphs 1.a and 1.b above. The Government may use the list during the evaluation process to evaluate the impact of any identified restrictions, and may request additional information from the proposer, as may be necessary, to evaluate the proposer’s assertions. If no restrictions are intended, then the proposer should state “NONE.” Failure to provide full information may result in a determination that the proposal is not compliant with the BAA – resulting in nonselectability of the proposal.

C. All Proposers – Patents

Include documentation proving your ownership of or possession of appropriate licensing rights to all patented inventions (or inventions for which a patent application has been filed) that will be utilized under your proposal for the DARPA program. If a patent application has been filed for an invention that your proposal utilizes, but the application has not yet been made publicly available and contains proprietary information, you may provide only the patent number, inventor name(s), assignee names (if any), filing date, filing date of any related provisional application, and a summary of the patent title, together with either: 1) a representation that you own the invention, or 2) proof of possession of appropriate licensing rights in the invention.

D. All Proposers – Intellectual Property Representations

Provide a good faith representation that you either own or possess appropriate licensing rights to all other intellectual property that will be utilized under your proposal for the DARPA program. Additionally, proposers shall provide a short summary for each item

asserted with less than unlimited rights that describes the nature of the restriction and the intended use of the intellectual property in the conduct of the proposed research

DRAFT