



Broad Agency Announcement

Silicon-based Photonic Analog Signal Processing
Engines with Reconfigurability (Si-PhASER)

Microsystems Technology Office

DARPA-BAA-08-38

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DARPA Microsystems Technology Office (MTO)

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Part One: Overview Information

- **Federal Agency Name** – Defense Advanced Research Projects Agency (DARPA), Microsystems Technology Office (MTO)
- **Funding Opportunity Title** – Silicon-based Photonic Analog Signal Processing Engines with Reconfigurability (Si-PhASER)
- **Announcement Type** – Broad Agency Announcement (BAA)
- **Funding Opportunity Number** – **DARPA-BAA-08-38**
- **Catalog of Federal Domestic Assistance Numbers (CFDA)** – 12.910 Research and Technology Development
- **Dates**
 - Proposal Due Date: July 14, 2008
- **Concise description of the funding opportunity--** DARPA is soliciting innovative research and development (R&D) proposals in the area of Silicon-based Photonic Analog Signal Processing Engines with Reconfigurability (Si-PhASER). The overall goal is the creation of novel silicon Photonic Integrated Circuit (PIC) elements and associated programmable filter array concepts, which can be fabricated in a CMOS-compatible process, and that enable high-throughput, low-power signal processors which overcome the limits of conventional electronic DSP technology.
- **Types of instruments that may be awarded** -- Procurement contract, grant, cooperative agreement or other transaction.
- **Agency contact**

The BAA Coordinator and/or Program Manager for this effort can be reached at:

ATTN: DARPA-BAA-08-38
FAX: 703-696-2206
EMAIL: BAA08-38@darpa.mil

Part Two: 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/>, and Grants.gov website at <http://www.grants.gov/>. The following information is for those wishing to respond to the BAA.

DARPA is soliciting innovative research proposals in the area of Silicon-based Photonic Analog Signal Processing Engines with Reconfigurability (Si-PhASER). The overall goal is the creation of novel silicon Photonic Integrated Circuit (PIC) elements and associated programmable filter array concepts, which are fabricated in a CMOS-compatible process, and that enable high-throughput, low-power signal processors which overcome the limits of conventional electronic DSP technology. Si-PhASER technology will be an enabler for anticipated future applications that have ultra-high throughput sensor signal processing requirements, but are highly constrained in size weight and power (SWaP). DARPA envisions that successful Si-PhASER programs will establish PIC technology as a scalable platform for signal processing applications requiring greater than Tera-operations per second (TOPS) per Watt (W) of effective computing throughput. A key element of the new Si-PhASER PIC technology will be programmability. Programmable PICs will enable circuits that are flexible and scalable enough to synthesize filters whose characteristics are specific to a variety of applications, and which may also be reconfigured at real-time rates for anticipated applications that require adaptive filter characteristics.

Proposed Si-PhASER R&D should investigate innovative approaches that enable revolutionary advances in science, devices, circuits, and computing systems. Specifically excluded is R&D that primarily results in incremental or evolutionary improvements to the existing state of practice.

Proposed research should investigate innovative approaches that enable revolutionary advances in science, devices, or systems. Specifically excluded is research that primarily results in evolutionary improvements to the existing state of practice.

DARPA seeks innovative proposals in the following Areas of Interest:

Technical Area One: *Demonstration of photonic filtering technology:* Si-PhASER will require innovative approaches to design and fabricate reconfigurable Unit Cells that, when combined into a dense PIC array, will scale to meet the challenge problem performance metrics.

Technical Area Two: Filter Algorithms: Successful Si-PhASER programs will require an understanding of the Unit Cell array scaling to high-order filters. A filter synthesis tool that simulates high-order filter algorithms based on the Unit Cell characteristics is required to verify a test and evaluation approach that can achieve 95% chip yield and predict performance for military sensor processing applications.

BACKGROUND AND DESCRIPTION

As PIC technology advances – with ever-increasing density and complexity of devices and circuits – DARPA is reexamining analog Optical Signal Processing (OSP) as a possible approach to realizing high-throughput filters for small-platform sensor processing applications. Of specific interest are high-bandwidth problems for which electronic analog-to-digital converters (ADCs) cannot achieve the desired dynamic range (DR), and where, therefore, performing the needed computations *in the analog domain* may prove advantageous. Programmable PIC-based OSP architectures may enable reconfigurable time-domain analog filters that can be rapidly programmed for real-time applications – in a manner similar to digital electronic DSP technology, such as FPGAs and FIR filters, but with unprecedented high data throughput, reconfiguration speed, DR, and low SWaP.

DARPA envisions that the Si-PhASER high-performance generalized analog photonic filtering architectures will emerge as integrated arrays of interconnected analog processing “Unit Cells,” that perform programmable, ultra-high throughput (i.e., with single channel bandwidths exceeding 10 GHz), high DR (e.g., 60 dB), signal processing functions. PIC-enabled OSP, based on programmable arrays of Unit Cells, may achieve high computational throughput (e.g., greater than 10^{12} equivalent digital operations per second) and high DR filtering in the analog domain, while maintaining the flexibility, size, weight, and power of a typical single Silicon DSP integrated circuit chip.

DARPA is soliciting proposals for PIC concepts that are fabricated in a CMOS-compatible process and are based on arrays of Unit Cells that perform reconfigurable time-domain filtering to enable Silicon-based Photonic Analog Signal-Processing Engines with Reconfigurability (Si-PhASER). Of particular interest to the Si-PhASER program are architectures that perform finite impulse response (FIR) and infinite impulse response (IIR) filtering for sensor signals in the 10-200 GHz range, where high DR is needed, but high-resolution ADC technology does not exist. It is envisioned that high DR and low-power-consuming filtering operation can be achieved by remaining in the analog domain for the “high-bandwidth” elements of the needed filtering. By channelizing and filtering the ultra-high bandwidth signals, it is envisioned that Si-PhASER circuits will exploit the inherent processing gain and efficiency of analog OSP and thereby provide a significant reduction in the sampling and throughput rates needed for succeeding steps. Therefore the Si-PhASER concept may be viewed as a means to reducing information content while the signals are still in the analog domain, in order to, in succeeding steps, allow high-precision sampling at lower rates, with final processing carried out with conventional digital signal

processing (DSP) techniques. The potential effective computational throughput of such filters on a PIC chip is projected to well-exceed one TOPS, where, for convenience, an operation is taken here to be an equivalent fixed point 8-bit multiply and accumulate (MAC) function. Such performance is beyond the projected capabilities of Silicon-based DSP technology.

It is envisioned that Si-PhASER arrays may be configured in one-, two-, or possibly even three-dimensional arrays of Unit Cells that are interconnected with a network of integrated waveguides. Active elements within the Unit Cells will be electronically adjustable to enable programmable and reconfigurable filters. Various Unit Cell configurations may be possible to realize FIR and IIR filters. For example, Si-PhASER Unit Cells may utilize resonant and/or path-length dependent delays to realize time domain filtering. Depending on the selected Unit Cell configuration, lattice and/or direct-form filter configurations may be achieved. In all potential architectures, it is essential that the Si-PhASER PIC array be tightly integrated with low-power electronic control elements to exploit the high-density tunable Unit Cells, which enable programmable FIR/IIR filters of high-order for ultra-high bandwidth signals in a small volume package.

The Si-PhASER program will focus on the development and experimental characterization of the Unit Cell of a PIC array, with performance goals that validate scalability to PIC-based implementation of filter circuits. Such PIC technology should be scalable to contain 256 Unit Cells per PIC and higher, and achieve ultimate chip yields of > 95%.

PROGRAM REQUIREMENTS

Challenge Problem:

To motivate, bound, and assist in the definition of the technical goals for the Si-PhASER Unit Cells, the following “challenge problem” filter is provided. It is expected that proposals will address how their proposed unit cell designs, when placed in an array and integrated with electronic control, will enable the achievement of the Si-PhASER filter challenge problem with respect to the performance metrics stated below. (Note: Although implementing the challenge problem filter is not a requirement for the Si-PhASER program, it provides an important context within which to define and develop the Si-PhASER Unit Cells and the time-domain processing array architecture within which the Unit Cells will function.) The envisioned ultimate Si-PhASER filter (i.e. challenge problem filter) should be able to perform FIR/IIR broadband filtering (with 10 GHz bandwidth and greater), have high dynamic range (a minimum of 60 dB SFDR at 10 GHz), and have high agility in filter reconfiguration (100 ns update time). More specifically, the challenge problem filter is represented by a: 64-order filter which channelizes the signal to a programmable 50 MHz (3 dB) bandwidth window, with 60 dB isolation from the remainder of the 10 GHz band. Furthermore, the center frequency of the 50 MHz channel should be continuously tunable over the entire 10 GHz band. In addition, it must

simultaneously perform a 32-point correlation on a signal within the channel. The filter must maintain the input 60 dB SFDR and consume less than 1 Watt of total power consumption – this includes the modulated laser source, filter control, and post detection electronic ADC function. In explaining how a given Si-PhASER concept would be used to implement the given challenge problem filter, proposers should discuss the details of the filter design trade-offs. This discussion should include typical filter fidelity measures, such as the slopes of the pass-band roll off, pass-band and stop-band ripple, and sensitivity of filter response to variations in programmable (e.g., filter weights) and non-programmable (e.g., temperature, process non-uniformities) parameters. It is envisioned that the ultimate Si-PhASER chip may contain as many as 10 such filters and achieve 95% yield of usable Unit Cells within the chip.

Unit Cell Description:

The primary focus of the Si-PhASER program is on development and demonstration Unit Cell. A successful proposal will therefore define a Si-PhASER Unit Cell and demonstrate how, when arrayed in a high-density CMOS-compatible PIC chip and integrated with electronic control, it would enable the achievement of the Si-PhASER filter challenge problem performance metrics stated above. It is the burden of the proposer to clearly explain how an array of Unit Cells can scale to meet the overall filter performance in terms of dynamic range, throughput, power consumption, and yield. Unit cell designs which are fabricated in a CMOS compatible process – a fabrication process flow which can be readily transferred to a CMOS foundry for fabrication – are most desired.

The Unit Cell may be defined as the minimum, or near-minimum, configuration of photonic devices which can be programmed to demonstrate a basic one-pole (e.g., band-pass) and one-zero (e.g., notch) filter performance; although not necessarily at the same time. In this context, the Unit Cell nominally consists of a low-order array of active elements (e.g., a 2x2 arrays of connected programmable active elements) that are linked via integrated waveguides and the necessary splitter and coupler elements. The tunable active elements provide the reconfigurable filter weights that govern the location of the poles and zeros in the ultimate filter. The waveguide layout and topology define the fixed-delay, feed-forward, and feedback paths needed to realize high-order filters. Successful proposals must define and validate Unit Cell-level milestones by linking them to the filter-level metrics outlined in the challenge problem.

Reiterated, successful proposals will:

- Define a novel analog photonic “Unit Cell,” which can be fabricated in a CMOS compatible process, and that can be readily transferred to a CMOS foundry for fabrication, It is envisioned that the Unit Cell is nominally comprised of a sub-array of waveguide-connected programmable active elements. As an example, a Unit Cell might consist of a 2x2 array of

active modulator and/or gain elements that are connected within a waveguide grid and have sufficient optical input and output ports to perform basic filtering operations on their own or be connected within a large array of Unit Cells to implement arbitrarily complex filters. The Unit Cell should be externally linkable with integrated waveguides, which allow it to function as a building block in programmable PIC arrays for generalized high-order FIR/IIR Filters;

- Develop a program plan that will permit the fabrication, testing, and evaluation of the Unit Cell;
- Describe how the Unit Cell, when arrayed within a high-density PIC, will scale and meet the Si-PhASER filter challenge problem. Here, envisioned supporting tasks include developing a filter synthesis tool to demonstrate how Unit Cells will perform in the context of generalized high-order filters, and how they will be programmed and tested at the chip-level to ensure high yield. Linking the Si-PhASER filter concept to real or projected military applications and requirements is encouraged in order to maximize the eventual performance benefits of the Si-PhASER-based filtering architecture;
- Describe the technical approach that will be implemented in experimentally demonstrating the Unit Cell performance milestones.

Unit Cell Milestones:

Proposers must define their Unit Cell and describe in detail how the performance metrics of the Unit Cells will satisfy the requirements of the challenge problem. Though the performance parameters will depend on the particular architecture proposed, DARPA envisions some common performance metrics and some metrics specific to the proposed architecture. Common performance metrics include:

- Microwave operating Bandwidth: > 10 GHz;
- 2-tone SFDR: > 55 dB, with a stretch goal of 60 dB;
- Average Unit Cell power consumption < 25 mW;
- Unit cell yield of 95 %, where yield is defined as the number of Unit Cells on a wafer whose characteristics are those listed above, all within +/- 5%;
- Demonstration of Unit Cells with basic one-pole band-pass and a one-zero notch performance.

Metrics specific to the architecture proposed will vary but should also be chosen as to satisfy the requirements of the challenge problem.

High-order filter synthesis

High-order time-domain filters, as mentioned in the challenge problem, are those filters that exhibit multiple poles and zeros in the frequency response. For convenience here, we define the filter order for FIR filters to be the number of zeros,

whereas for an IIR filter, the filter order is defined to be the sum of the number of poles and zeros. The challenge problem requires the ability to realize a programmable 64-order filter by concatenating arrays of proposed Unit Cells. To validate the Unit Cell's ability to be used as a building block for high-order filters, a filter synthesis tool must be developed within the Si-PhASER program. This tool will be used to simulate high-order filter performance based on the Unit Cell characteristics. This tool will also be used to predict experiment performance of the single Unit Cell's performance in the Si-PhASER program. With the above specified Unit Cell yield requirement of 95%, this simulation tool may also provide a means to validate the ability of the proposer's Si-PhASER array concept to achieve arbitrary filters by configuring the array of Unit Cells in a manner which avoids "known bad" cells in order to ultimately achieve 95% yield at the chip level, as well as at the Unit Cell level. Filter chip yield may be estimated by statistical inferences based on the Unit Cell yield, filter reconfigurability, and redundancy arguments for the case of known-bad Unit Cells. The filter synthesis tool should be configured to facilitate the evaluation of projected performance of the Si-PhASER filter for realistic military applications. In addition to validating basic projected filtering performance, the tool will be used, in part, to develop a transition plan (which will be part of a deliverable), whose purpose is to define a path toward eventual development of the Si-PhASER technology for specific military applications.

Test and Evaluation

Validation of the Unit Cell milestones will be characterized experimentally with a modulated 10 GHz optical source and detector exhibiting greater than 60 dB SFDR. Unit Cell yield will be established by fabricating a sufficient number of Unit Cells to test and verify performance – where yield is defined as the number of Unit Cells on a wafer whose characteristics are those listed above, all within +/- 5%. Successful proposals will specify detailed testing methodologies for each Unit Cell milestone.

DELIVERABLES

The primary deliverables for the Si-PhASER program are the final experimental demonstration of the Unit Cell concept (via fabrication, test, and evaluation), and a final technical report, which includes the transition plan. Programs with a proposed period-of-performance of one year or more should also include, as deliverables, an interim program review and report that would occur near the middle of the overall program.

PROGRAM SCOPE

The Si-PhASER program will consist of a single phase whose focus is on the development and demonstration of the Unit Cell. Supporting tasks will include the development and demonstration of a filter synthesis software tool, and a related transition plan. Proposers must define a realistic schedule and budget to meet the milestone and deliverable schedule. It is recommended that the proposed program plan include interim

milestones at approximately the halfway point of the program. Multiple awards are anticipated. Collaborative efforts/teaming including different expertise such as, but not limited to: photonic and electronic device design, fabrication, and packaging; filter design and integration; and military sensor processing system analysis are strongly encouraged. Cost sharing is not required and is not an evaluation criterion, but is encouraged where there is a reasonable probability of a potential commercial application related to the proposed research and development effort.

II. AWARD INFORMATION

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 the Source Selection Authority later determines them 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. If the proposed effort is inherently divisible and nothing is gained from the aggregation, proposers should consider submitting it as multiple independent efforts. 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.

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. Independent proposals from Government/National laboratories may be subject to applicable direct competition limitations, though certain Federally Funded Research and Development Centers are excepted per P.L. 103-337§ 217 and P.L 105-261 § 3136. Proposers from Government/ National Laboratories must provide documentation to DARPA to establish

that they are eligible to propose and have unique capabilities not otherwise available in private industry.

Foreign participants and/or individuals may participate to the extent that such participants comply with any necessary Non-Disclosure Agreements, Security Regulations, Export Control Laws, and other governing statutes applicable under the circumstances.

1. 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 Dr. Michael Haney. Once the proposals have been received and prior to the start of proposal evaluations, the Government will assess whether any potential conflict of interest exists in regards to the DARPA Program Manager, as well as those individuals chosen to evaluate proposals received under this BAA. The Program Manager is required to review and evaluate all proposals received under this BAA and to manage all selected efforts. The Program Manager for this BAA has a financial investment interest in E.I. du Pont de Nemours and Company and is a detailee to DARPA under the Intergovernmental Personnel Act (IPA) from the University of Delaware and, as such, is highly likely to have a conflict of interest with respect to proposals utilizing these institutions as a performer. Proposers should carefully consider the composition of their performer team before submitting a proposal to this BAA.

All Proposers and proposed subcontractors must affirm whether they are providing scientific, engineering, and technical assistance (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 supports and identify the prime contract numbers. 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 shall include a description of the action the Proposer has taken or proposes to take to avoid, neutralize, or mitigate such conflict. In accordance with FAR 9.503 and without prior approval or a waiver from the DARPA Director, a Contractor cannot simultaneously be a SETA and Performer. Proposals that fail to fully disclose potential conflicts of interests and/or do not have plans to mitigate this conflict will be returned 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), the Proposer should promptly raise the issue with DARPA by sending Proposer's contact information and a summary of the potential conflict by email to the mailbox address for this BAA at BAA08-38@darpa.mil, before time and effort are expended in preparing a proposal and mitigation plan. If, in the sole opinion of the Government after full consideration of the circumstances, any conflict

situation cannot be effectively mitigated, the proposal may be returned without technical evaluation and withdrawn from further consideration for award under this BAA.

B. 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.

C. Other Eligibility Criteria (optional)

1. Collaborative Efforts

Collaborative efforts/teaming are encouraged. A website (<http://www.davincinetbook.com/teams>) has been established to facilitate formation of teaming arrangements between interested parties. Specific content, communications, networking, and team formation are the sole responsibility of the participants. Neither DARPA nor the Department of Defense (DoD) endorses the destination web site or the information and organizations contained therein, nor does DARPA or the DoD exercise any responsibility at the destination. This website is provided consistent with the stated purpose of this BAA.

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. Proposal Information

Proposers are required to submit full proposals at the time and date specified in the BAA in order to be considered during the initial round of selections; however, proposals received after this deadline may be received and evaluated up to one year from date of posting on FedBizOpps and Grants.gov. Full proposals submitted after the due date stated in the BAA or due date otherwise specified by DARPA may be selected contingent on the 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 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 Posting to Grants.Gov:

Proposers may elect to use the Grants.gov APPLY function if the applicant is seeking a grant or cooperative agreement. The APPLY function replaces the proposal submission process that other proposers follow. The APPLY function does not affect the proposal content or format. The APPLY function is electronic; proposers do not submit paper proposals in addition to the Grants.gov APPLY electronic submission.

For All:

All administrative correspondence and questions on this solicitation, including requests for information on how to submit a proposal abstract or full proposal to this BAA, should be directed to BAA08-38@darpa.mil. DARPA intends to use electronic mail and fax for correspondence regarding DARPA-BAA-08-38. Proposals 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 DARPA-BAA-08-38 must be submitted through T-FIMS. See <https://www.tfims.darpa.mil/baa/> 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. All proposers using T-FIMS must also encrypt the proposal, as per the instructions below.

For Proposers Submitting to an Electronic Business Application such as the T-FIMS BAA Tool (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) 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 BAA08-38@darpa.mil at the time of proposal submission. See <https://www.tfims.darpa.mil/baa/> for the encryption password form.

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. For further information and instructions on how to zip and encrypt proposal files, see <https://www.tfims.darpa.mil/baa/>.

2. 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. Except for the attached bibliography and Section I, Volume I shall not exceed {52} number pages. Maximum page lengths for each section are shown in braces { } below. All full proposals must be written in English.

3. Volume I, Technical and Management Proposal

Section I. Administrative

A. {1} 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. {1} Official transmittal letter.

Section II. Summary of Proposal

{4} This should clearly and concisely summarize the following:

- A. Innovative claims for the proposed research. This section is the centerpiece of the proposal and should succinctly describe the uniqueness and benefits of the proposed approach relative to the current state-of-art alternate approaches.
- B. The quantitative end-of-program performance goals and the key milestones associated with the development effort.
- C. Deliverables associated with the proposed research and the plans and capability to accomplish technology transition. Include in this section a summary of proprietary claims to the results, prototypes, intellectual property, or systems supporting and/or necessary for the use of the research, results, and/or prototype. If there are not proprietary claims, this should be stated.
- D. An explanation of how the goals compare to what has already been demonstrated.

Section III. Detailed Proposal Information

- A. {8} **Statement of Work (SOW)** - In plain English, clearly define the technical tasks/subtasks to be performed, their durations, and dependencies among them. The page length for the SOW will be dependant on the amount of the effort. The SOW must not include proprietary information. For each task/subtask, provide:
 - A general description of the objective (for each defined task/activity);
 - A detailed description of the approach to be taken to accomplish each defined task/activity);
 - Identification of the primary organization responsible for task execution (prime, sub, team member, by name, etc.);
 - The exit criteria for each task/activity - a product, event or milestone that defines its completion.
 - Define all deliverables (reporting, data, reports, software, etc.) to be provided to the Government in support of the proposed research tasks/activities.
- B. {15} **Technical Rationale & Approach.** A concise section outlining the scientific and technical challenges, unique approaches, and potential anticipated technical solutions to the challenges that will be addressed. This statement should demonstrate that the proposer has a clear understanding of the state-of-the-art; and should provide sufficient technical details so as to permit complete evaluation of the feasibility of the idea.

- C. {7 + 1 for table} **Program Plan & Risk Assessment.** A narrative explaining the explicit timelines, milestone achievements, and quantitative metrics by which progress toward the goals can be evaluated. This plan should include a specific and detailed test plan detailing how performance of milestones will be measured. The proposed period of performance of the overall program should be clearly stated. Milestones must be associated with demonstrable, quantitative measures of performance, and should be summarized in a single table. **Measurable milestones should occur every six months after start of effort.** This section should also identify major technical risk elements specific to the proposed approach, estimate the risk magnitude for each such element, and describe specific plans to mitigate risk. Proposers shall clearly define all deliverables associated with the proposed research; all proprietary assertions to intellectual property of all types, including any background inventions, shall be set forth in detail. (See Volume 2, Section D, Intellectual Property.)
- D. {2} **Technology Transfer.** Description of the results, products, transferable technology, and expected technology transfer path.
- E. {3} **Teaming & Management Plan.** A management plan that describes how the different members of the team will collaborate to demonstrate viable solutions to the program challenges.
- F. {5} **Capabilities.** A section describing relevant prior work, the background, qualifications and relevant experience of key individuals to be assigned to the program and the facilities and equipment to be utilized. Please do not attach supporting material (CDs, movies, etc.) to the proposal, except as noted in Section IV below.
- G. {5} **Slide Summary.** PowerPoint-type slides (i.e., landscape formatted for presentation) that succinctly highlight the major aspects of the proposal in a manner suitable for presentation to DARPA management.

Section IV. Additional Information

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.

4. 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-fee, cost sharing contract – no fee, or other type of procurement contract (*specify*), grant, cooperative agreement, 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.

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 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) purchase¹; (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

• ¹ IT is defined as “any equipment, or interconnected system(s) or subsystem(s) of equipment that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information by the agency. (a) For purposes of this definition, equipment is used by an agency if the equipment is used by the agency directly or is used by a contractor under a contract with the agency which – (1) Requires the use of such equipment; or (2) Requires the use, to a significant extent, of such equipment in the performance of a service or the furnishing of a product. (b) The term “information technology” includes computers, ancillary, software, firmware and similar procedures, services (including support services), and related resources. (c) The term “information technology” does not include – (1) Any equipment that is acquired by a contractor incidental to a contract; or (2) Any equipment that contains imbedded information technology that is used as an integral part of the product, but the principal function of which is not the acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information. For example, HVAC (heating, ventilation, and air conditioning) equipment such as thermostats or temperature control devices, and medical equipment where information technology is integral to its operation, are not information technology.”

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 include Interdivisional Work Transfer Agreements (ITWA) or similar arrangements. If seeking a procurement contract, the prime contractor shall provide a cost reasonableness analysis of proposed subcontractor prices. Such analysis shall indicate the extent to which the prime contractor has negotiated subcontract prices. 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.

NOTE: The FY08 Defense Appropriations Act caps indirect cost rates for any procurement contract, grant or agreement using 6.1 Basic Research FY08 Funding at 35% of the total cost of the award. Total costs include all bottom line costs. Indirect costs are all costs of a prime award that are Facilities and Administration costs (for awardees subject to the cost principles in 2 CFR part 220) or indirect costs (for awardees subject to the cost principles in 2 CFR part 225 or 230 or 48 CFR part 32). If DARPA anticipates using 6.1 funding for this effort, the Contractor must be made aware that total negotiated indirect cost rates may not exceed 35% of the total cost of the award. The cost limitations do not flow down to subcontractors. The original text of the Act can be found at Department of Defense Appropriations Act of 2008, Pub. L. No. 110-116, §8115, http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_cong_public_laws&docid=f:publ116.110

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 \$650,000 or greater unless the proposer request an exception from the requirement to submit cost of pricing data. “Cost or pricing data” are not required if the proposer proposes an award instrument other than a procurement contract (e.g., a grant, cooperative agreement, or other transaction.) All proprietary subcontractor proposal documentation, prepared at the same level of detail as that required of the prime, of which cannot be uploaded to TFIMS shall be made immediately available to the Government, upon request, under separate cover (i.e., mail, electronic/email, etc.), either by the Proposer or by the subcontractor organization.

C. Submission Dates and Times

1. Full Proposal Date

The full proposal (original and designated number of hard and electronic copies) must be submitted to DARPA/MTO, 3701 North Fairfax Drive, Arlington, VA 22203-1714 (Attn.: DARPA-BAA-08-38) on or before 4:00 p.m., Eastern Daylight time, July 14, 2008, in order to be considered during the initial round of selections; however, proposals received after this deadline may be received and evaluated up to one year from date of posting on FedBizOpps (30 May 2009); however, proposers are warned that the

likelihood of funding is greatly reduced for proposals submitted after the initial closing date deadline. Full proposals submitted after the due date specified in the BAA or due date otherwise specified by DARPA after review of proposal abstracts may be selected contingent upon the availability of funds.

DARPA will post a consolidated Questions and Answers document before final proposals are due. In order to allow the Government enough time to provide a response to questions prior to the proposal due date, offerors are encourage submit questions by no later than July 1, 2008 to BAA 08-38@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.

D. Intergovernmental Review (if applicable)

Not Applicable

V. APPLICATION REVIEW INFORMATION

A. Evaluation Criteria

Evaluation of proposals will be accomplished through a scientific/technical review of each proposal using the following criteria, in order of descending importance: (a) Ability to meet Program Go/No-Go Metrics; (b) Overall Scientific and Technical Merit; (c) Potential Contribution and Relevance to the DARPA Mission; (d) Realism of Proposed Schedule; (e) Proposer's Capabilities and/or Related Experience; (f) Plans and Capability to Accomplish Technology Transition; and (g) Cost Realism. 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. The following are descriptions of the above listed criteria:

(a) Ability to meet program Go/No-Go Metrics

Regarding the Common Performance Metrics (Government Defined Metrics), the feasibility and likelihood of the proposed approach for satisfying the program go/no-go metrics are explicitly described and clearly substantiated. Regarding the Architecture Specific Metrics (Proposer Defined Metrics), the proposed approach establishes clear and well defined technical/research metrics satisfying the objectives of the challenge problem. The proposal reflects a mature and quantitative understanding of the program go/no-go metrics, the statistical confidence with which they may be measured, and their relationship to the concept of operations that will result from successful performance in the program.

(b) 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 product 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.

(c) 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 military use.

(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 capability to transition the technology to the research, industrial, and operational military communities in such a way as to enhance U.S. defense, and the extent to which intellectual property rights limitations creates a barrier to technology transition.

(g) 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. This will be principally measured by cost per labor-hour and number of labor-hours proposed. The evaluation criterion recognize 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. Cost reduction approaches that will be received favorably include innovative management concepts that maximize direct funding for technology and limit diversion of funds into overhead.

After selection and before award the contracting officer will negotiate cost/price reasonableness.

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. Award(s) may be made to any proposer(s) whose proposal(s) is determined selectable regardless of its overall rating.

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

B. Review and Selection Process

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. DARPA's intent is to review proposals as soon as possible after they arrive; however, proposals may be reviewed periodically for administrative reasons. 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. Upon completion of the source selection process, the original of each proposal received will be retained at DARPA and all other copies will be destroyed.

VI. AWARD ADMINISTRATION INFORMATION

A. Award 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 via U.S. mail and/or electronic mail to the Technical POC identified on the proposal coversheet.

B. Administrative and National Policy Requirements

1. Security

The Government anticipates that proposals submitted under this BAA will be unclassified. In the event that a proposer chooses to submit a classified proposal or submit any documentation that may be classified, the following information is applicable.

Security classification guidance on a DD Form 254 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. Proposers choosing to submit a classified proposal must first receive permission from the Original Classification Authority to use their information in replying to this BAA. Applicable classification guide(s) should be submitted to ensure that the proposal is protected appropriately.

Classified submissions shall be in accordance with the following guidance:

Collateral Classified Information: Use classification and marking guidance provided by previously issued security classification guides, the Information Security Regulation (DoD 5200.1-R), 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 only be mailed via U.S. Postal Service (USPS) Registered Mail or U.S. Postal Service 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 address to:

Defense Advanced Research Projects Agency
ATTN: Microsystems Technology Office
Reference: DARPA-BAA-08-38
3701 North Fairfax Drive
Arlington, VA 22203-1714

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
3701 North Fairfax Drive
Arlington, VA 22203-1714

All Top Secret materials should be hand carried via an authorized, two-person courier team to the DARPA CDR.

Special Access Program (SAP) Information: Contact the DARPA Special Access Program Central Office (SAPCO) 703-526-4052 for further guidance and instructions prior to transmitting SAP information to DARPA. Top Secret SAP, must be transmitted via approved methods for such material. Consult the DoD Overprint to the National Industrial Security Program Operating Manual for further guidance. *Prior to transmitting SAP material*, it is strongly recommended that you coordinate your submission with the DARPA SAPCO.

Sensitive Compartmented Information (SCI) Data: Contact the DARPA Special Security Office (SSO) at 703-812-1994/1984 for the correct SCI courier address and instructions. All SCI should be transmitted through your servicing Special Security Officer (SSO). SCI data must be transmitted through SCI channels only (i.e., approved SCI Facility to SCI facility via secure fax).

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 that the formal request is received at this office within 5 days after unsuccessful notification.

2. Intellectual Property

a. Procurement Contract Proposers

i. 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 source selection 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.”

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

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

ii. 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 source selection 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.”

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 source selection 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.”

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.

3. Meeting and Travel Requirements

There will be a program kickoff meeting and all key participants are required to attend. Performers should also anticipate periodic site visits at the Program Manager's discretion.

4. 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.dtic.mil/biosys/downloads/32cfr219.pdf>), 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/html2/d32162x.htm>).

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.

5. 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.amedd.army.mil/AnimalAppendix.asp>

6. Publication Approval

Proposers are advised if they propose grants or cooperative agreements, DARPA may elect to award other award instruments. 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.

The following provision will be incorporated into any resultant procurement contract or other transaction:

When submitting material for written approval for open publication as described in subparagraph (a) above, the Contractor/Awardee must submit a request for public release to the DARPA TIO 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 tio@darpa.mil or via 3701 North Fairfax Drive, Arlington VA 22203-1714, telephone (571) 218-4235. Refer to www.darpa.mil/tio for information about DARPA's public release process.

7. Export Control

Should this project develop beyond fundamental research (basic and applied research ordinarily published and shared broadly within the scientific community) with military or dual-use applications the following apply:

(1) The Contractor shall comply with all U. S. export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120 through 130, and the Export Administration Regulations (EAR), 15 CFR Parts 730 through 799, in the performance of this contract. In the absence of available license exemptions/exceptions, the Contractor shall be responsible for obtaining the appropriate licenses or other approvals, if required, for exports of (including deemed exports) hardware, technical data, and software, or for the provision of technical assistance.

(2) The Contractor shall be responsible for obtaining export licenses, if required, before utilizing foreign persons in the performance of this contract, including instances where the work is to be performed on-site at any Government installation (whether in or outside the United States), where the foreign person will have access to export-controlled technologies, including technical data or software.

(3) The Contractor shall be responsible for all regulatory record keeping requirements associated with the use of licenses and license exemptions/exceptions.

(4) The Contractor shall be responsible for ensuring that the provisions of this clause apply to its subcontractors.

8. 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.

C. Reporting

The number and types of reports will be specified in the award document, but will include as a minimum include a requirement for four DARPA Quarterly Technical/Financial Status Reports each year and a Final Report at the completion of the research project. 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.

1. Central Contractor Registration (CCR)

Selected proposers not already registered in the Central Contractor Registry (CCR) will be required to register in CCR prior to any award under this BAA. Information on CCR registration is available at <http://www.ccr.gov>.

2. Representations and Certifications

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

3. 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.

VII. AGENCY CONTACTS

Administrative, technical or contractual questions should be sent via e-mail to BAA08-38@darpa.mil. If e-mail is not available, fax questions to 703-696-2206, Attention: BAA 08-38. All requests must include the name, email address, and phone number of a point of contact.

The technical POC for this effort is
Dr. Michael Haney.
DARPA/Office
ATTN: DARPA-BAA-08-38
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