Broad Agency Announcement

Nitride Electronic NeXt-Generation Technology (NEXT)

Microsystems Technology Office

DARPA-BAA 09-16

November 19, 2008

(As Amended on 15 December 2008)

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Part One: Overview Information

- **Federal Agency Name** – Defense Advanced Research Projects Agency (DARPA), Microsystems Technology Office (MTO)
- **Funding Opportunity Title –** Nitride Electronic NeXt-Generation Technology (NEXT)
- **Announcement Type –** Initial Broad Agency Announcement
- **Funding Opportunity Number –** DARPA Broad Agency Announcement (BAA) 09-16
- **Catalog of Federal Domestic Assistance Numbers (CFDA)** – 12.910 Research and Technology Development (Only for grants and cooperative agreements; for BAA's that will not result in grants or cooperative agreements, write "Not applicable.")
- **Dates**
  - Posting Date – November 19, 2008
  - Industry Day – December 3, 2008
  - Proposal Abstract Due Date – December 19, 2008
  - Proposal Due Date – February 17, 2009
- **Concise description of the funding opportunity -** DARPA is soliciting innovative research proposals in the area of advanced nitride electronics. Proposed research should investigate innovative approaches that enable revolutionary advances in nitride electronic devices and integrated circuits resulting in their ability to operate at very high frequencies while maintaining extremely favorable voltage breakdown characteristics. Specifically excluded is research that primarily results in evolutionary improvements to the existing state of practice.
- **Anticipated individual awards** – Multiple awards are anticipated.
- **Types of instruments that may be awarded** -- Procurement contract, grant, cooperative agreement or other transaction.
- **Agency contact**
  - Point of Contact:
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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 advanced nitride electronics. Proposed research should investigate innovative approaches that enable revolutionary advances in nitride electronic devices and integrated circuits resulting in their ability to operate at very high frequencies while maintaining extremely favorable voltage breakdown characteristics. Specifically excluded is research that primarily results in evolutionary improvements to the existing state of practice.

A. Background and Description

Key performance parameters for transistors in RF, digital and high-speed mixed-signal applications include cut-off frequencies, current drive capability (or output charging rate) and voltage drive capability (maximum output voltage swing). The unity current gain cut-off frequency (f_T) is proportional to the reciprocal of the transit time, τ, the effective time required by charges to transit the channel. The output current drive is proportional to Q, the charge in the channel, and is inversely proportional to τ. Reduction in τ has been the fundamental driver responsible for dimension scaling in silicon-based transistors, which has seen the physical size of the gate shrink from hundreds of micrometers (μm) in the 1950's to about 35 nm in the most current 45-nm node Si MOSFET transistors. Dimension scaling has in fact been the primary means by which Si electronics has over the last 50 years maintained the celebrated "Moore's Law" performance improvements, with its enormous implications to both the military and commercial electronics.

As its gate length has been reduced, the speed of the Si MOSFET, as measured by device characteristics such as the unity current gain cut-off frequency (f_T) or unity power gain cut-off frequency (f_{max}), has commensurately increased. The f_T's of the latest generation MOSFETs already exceed 200 GHz and the latest International Technology Roadmap for Semiconductors roadmap projects this value will achieve 490 GHz for the 25-nm scaling node. However, this speed improvement has not been without significant performance penalty. Since the maximum electric field that can be supported before avalanche breakdown, E_{BK}, is a fundamental material property, the physical scaling of the device has concurrently reduced the maximum voltage that can be applied to the drain before breakdown, V_{BK}. The so-called Johnson Figure of Merit (JFoM), the product of f_T and V_{BK}, is limited to about 0.3 THz-V in Si. Thus, the same roadmap also predicts that 25-nm Si MOSFETs will have V_{BK} much less than 1 V.

For many RF and analog electronic applications, such V_{BK} values greatly restrict the dynamic range of the circuit and represent a severe limitation. It is highly desirable in mixed signal electronics, for example, to have transistors capable of accommodating voltage swings of 10V or more. The performance of other RF circuit elements, such as mixers, can be directly related to the dynamic range of the device. For such applications, dimension scaling represents a paradox: necessary to achieve the desired frequency performance, but detrimental with respect to dynamic range.

This program will open a path to overcome this dilemma by developing a revolutionary new device technology to simultaneously achieve extremely high speed and large voltage swing (JFoM > 5 THz-V) in a small, manufacturable transistor.

It has long been recognized that "III-V" compound semiconductor materials, such as GaAs, InP and GaN, offer significant material advantages relative to silicon. For example, E_{BK} for GaN is about 40 x 10^5 V/cm, or about 7X higher than measured for Si. The peak carrier velocities in a nitride have been measured to be about 2.5 x 10^7 cm/s, or about 2.5 times higher than Si, which has very significant implications with regard to the minimum transit times possible in scaled devices. While the electron mobility is not as high in GaN as in other III-V materials (e.g., InGaAs), if device dimensions can be kept short enough, then the effect of the higher saturation velocity will dominate the device performance. Maximum charge densities that can be achieved in a two dimensional electron gas (2DEG) are also significantly higher in GaN than in other III-V semiconductors such as GaAs, InP or InGaAs. Thermal conductivity of the substrate, typically silicon carbide, is considerably higher than either Si or other III-V materials as well. Taken together, these materials characteristics suggest that nitrides offer extraordinary potential for high-speed, high-performance transistor devices.

Ultra high breakdown field has been the primary motivation for the extensive interest in GaN transistors for microwave frequency power amplifiers (PAs). DARPA has sponsored such development through the Wide Band Gap Semiconductors for RF Applications (WBGS-RF) program. The High Electron Mobility Transistor (HEMT) devices developed under that effort have been characterized by relatively large gate-to-source spacing (several μm), wide gate length (>100nm), and very high breakdown voltage (~100V). What has not yet been exploited is the potential for nitrides to achieve extremely high speed performance while maintaining their favorable JFoM breakdown performance. This will be the major goal of this program.

But in order to be useful for mixed-signal and other important military applications, a next-generation nitride electronic technology must achieve a number of additional requirements. Nearly all GaN HEMTs to date have operated in depletion mode (D-mode), but the development of a stable enhancement mode (E-mode) operation will be essential. This will offer many important practical advantages in circuit applications, including greater simplicity in mixed-signal and RF circuits and the ability to implement Enhancement/Depletion (E/D) logic capability (direct-coupled FET logic). Further, large scale integration of hundreds to thousands of transistors demands a manufacturing technology that can achieve high yield. Uniformity of transistors is particularly

important for mixed-signal electronics and further underscores the need to develop a robust, manufacturable device process.

The impact of the technology to be developed in NEXT will be profound, leading to dramatic improvements in the performance of RF and mixed-signal electronic circuits. These will include active mixers, digital-to-analog converters, and direct digital synthesizers. The robust nitride electronic technology to be developed in this program will be a key enabler for the next-generation of military electronics.

B. Program Objective

The objective of the Nitride Electronic NeXt-Generation Technology (NEXT) program is to develop a revolutionary nitride transistor technology that simultaneously provides extremely high-speed and high-voltage swing (JFoM > 5 THz-V) in a process consistent with large scale integration in enhancement/depletion (E/D) mode logic circuits of 1000 or more transistors. Accomplishment of this goal will be validated through the demonstration of specific Program Process Control Monitor (PCM) Test Circuits (see Table 1 below).

C. Technical Areas of Interest

DARPA seeks innovative proposals in the following Technical Areas of Interest. **A proposal must address both Technical Areas of Interest in a comprehensive manner. Proposals that fail to do so will be considered not responsive.**

Technical Area I: Highly-Scaled Nitride High Electron Mobility Transistor (HEMT) E/D Processes. This Area will develop processes that enable highly scaled Enhancement-mode (E-mode) and Depletion-mode (D-mode) operation HEMT devices. The proposer will demonstrate manufacturable processes which allow the physical dimensions of a HEMT to be significantly reduced. This is expected to result in a reduction of transit time and increase of the device f_T while simultaneously achieving high breakdown voltage (i.e., maintaining JFoM performance). Approaches may include (but are not necessarily limited to) self-aligned device fabrication, such as employed in modern Si MOSFET processes, and aggressive lithography to achieve ultra short gate lengths. Specific technical challenges to be addressed include:

1. ***Reduction of Access Resistance***. Approaches will need to achieve extremely low access resistance between the transistor source and drain electrodes and the channel. This will necessitate achieving both very low ohmic contact resistances at the source and drain contacts as well as minimizing the resistance of the extension region between these electrodes and the channel. Approaches may include (but are not necessarily limited to) epitaxial re-growth techniques at source and drain contacts, the use of ion implantation, methods to engineer and optimize the work function, and highly scaled topologies to minimize the extension distance.

2. ***Minimization of Gate Extension***. The gate extension (defined as the effective channel length minus the physical gate length) adversely contributes to the effective transit time and so must be reduced or eliminated. This will require the minimization of the drain-side depletion region without sacrificing carrier velocity. A related challenge will be to optimize the electric field profile along the channel without sacrificing reliability.

3. ***Control of Device Capacitances.*** To achieve high current drive capability, gate capacitance must be increased appropriately as the device is scaled while maintaining or reducing all other parasitic capacitances. Possible approaches may include (but are not limited to) the use of high-K gate dielectric in combination with a low parasitic electrode, epitaxial designs to minimize channel thickness, and laterally asymmetric channel doping.

4. ***Enhancement-Mode Operation.*** Development of a stable, reliable E-mode transistor capable of achieving high drain current is needed. Possible approaches may include (but are not limited to) novel multilayer GaN heterojunctions, surface treatments, and alternate materials orientation.

5. ***Uniformity and Yield.*** The highly-scaled nitride device processes developed should be manufacturable and consistent with high uniformity at high yield. Special attention should be devoted to assuring that both device designs and manufacturing approaches are consistent with achieving high device yields.

Technical Area II: Large Scale Integration. This Area will demonstrate technologies to achieve circuits of significant complexity (~1000 transistor devices or more). Specific challenges to be addressed include:

1. ***Monolithic Integrated Circuit Process.*** A process to integrate large number of highly-scaled nitride transistors into functional monolithic circuits must be achieved. This will require development of accurate transistor device models (both small signal and large signal) and of a high-yield multi-level interconnect process compatible with a minimal device pitch.

2. ***Test Circuits***. Approaches for realizing the required Program Test Circuits with performance consistent with meeting the program's metrics (see section D below) must be developed.

D. Program Organization and Metrics

The program will be conducted in three Phases, each having definite, measurable metrics, the most critical of which are designated as Go/No-Go (GNG) Metrics. These will be:

1. ***Phase I: Highly-Scaled E/D Nitride Electronics.*** The performer will develop manufacturable processes to achieve high speed, high JFoM devices for both E-

mode and D-mode operation. The performer will demonstrate the ability to combine these devices into a small logic circuit (on the order of 10 transistors).

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2. ***Phase II: Advanced E/D Nitride Electronics.*** The performer will further improve the speed of the E-mode and D-mode devices and will demonstrate the capability to combine these devices into moderate-sized logic circuits (on the order of 100 transistors).

3. ***Phase III: Yield and Uniformity Enhancement.*** The performer will realize significant improvements in the yield and uniformity of the nitride transistors as well as the necessary circuit integration processes to enable large scale integration (logic circuit on the order of 1000 transistors).

Each Phase will culminate in specified demonstration(s), which will serve to validate that the goals of that Phase have been achieved and that the performer has met the GNG metrics. Proposers should describe, in detail, within their proposal how they plan to evaluate the demonstration circuits so that they can demonstrate that they have met all of the GNG requirements. Performers are expected to meet or exceed **all** GNG Metrics shown in Table 1 by the conclusion of each Phase. Proposers may, at their option, propose more ambitious values for any of the GNG Metrics than those indicated in Table 1. In general, proposals committing to the most aggressive GNG Metrics in each Phase will be preferred, provided that the risk in delivering the stated metrics, as described in the proposal, is considered reasonable by the reviewers.

Table 1: Program GNG Metrics

	Metric	Unit	Phase I	Phase II	Phase III
Performance	D-mode f_T	GHz	300	400	500
	D-mode f_{max}	GHz	350	450	550
	D-mode Johnson FoM (1)	THz•V	5	5	5
	E-mode f_T	GHz	200	300	400
	E-mode f_{max}	GHz	250	350	450
	E-mode Johnson FoM (1)	THz•V	5	5	5
Yield	Transistor yield (2)	%	50 (3)	75 (3)	95 (4)
	PCM yield (5)	%	30 (6)	30 (7)	70 (8)
Uniformity	σ (V_{TH}) (9)	mV	50 (3)	40 (3)	30 (4)
	σ (f_T) (9)	GHz	50 (3)	40 (3)	30 (4)
	σ (f_{osc}) (9)	%	15 (6)	10 (7)	5 (8)
	Degradation Time (10)	Hrs	>10	>100	>1000

(1) Johnson Figure of Merit = (breakdown voltage) x (f_T)
(2) Yield defined as fraction of devices tested that meet f_T metric.

(3) Test sample: at least 100 devices on a single wafer.
(4) Test sample: at least 100 devices/wafers over a lot of at least 5 wafers.
(5) Yield defined as fraction of process control monitors (PCMs) tested that achieve at least 80% of designed frequency.
(6) PCM to be a 5-stage ring oscillator. Test sample: at least 20 PCMs on a single wafer.
(7) PCM to be a 51-stage ring oscillator. Test sample: at least 20 PCMs on a single wafer.
(8) PCM to be a 501-stage ring oscillator. Test sample: at least 20 PCMs/wafer over a lot of at least 5 wafers.
(9) The standard deviation of the stated parameter.
(10) Minimum test time for PCM under normal operating conditions until failure condition observed. Test sample: 20 PCMs. Failure condition: Failure of a single PCM or degradation of average frequency changes by 20%.

In addition to GNG Metrics, proposers are requested to propose additional metrics ("Proposer-Defined Metrics"). Such metrics may be specific to the particular approach and should provide insight into some of the secondary performance goals, particularly device goals, expected to be met by the end of each Phase consistent with achieving the program GNG Metrics.

Proposers must define a realistic schedule and budget that meets the metric and deliverable requirements. The proposed period of performance for each of these Phases and metric schedule will be included by Proposers within their technical proposals and will be factors considered as part of the source selection process (see below). In general, shorter Phases are preferable, but each Phase should clearly be adequate in duration to meet its objectives, assuming reasonable risks and at a reasonable cost. Proposals should discuss plans for managing these factors. Program plans should include Proposer-Defined Metrics every six months.

E. Deliverables

The primary deliverables for each Phase of the NEXT program will be:

1. **Wafer deliverables.** At least two processed wafers should be delivered to the government each quarter containing both nitride-based devices (both E- and D-mode) and PCM circuits representative of the current state of the performers' device and monolithic integrated circuit processes.

2. **GNG deliverables**. In addition to the above, the performers should by the end of each Phase deliver one wafer (for Phases I and II) or one lot of five wafers (for Phase III) containing both E- and D-mode devices and PCM circuits. These deliverables will be used by the government to validate performance relative to the program GNG metrics.

In addition to these items, deliverables should include intermediate reports at quarterly intervals and a final technical report that contains a plan for transitioning program achievements to be used in DoD systems.

II. AWARD INFORMATION

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

The Government reserves the right to select for negotiation all, some, one, or none of the proposals received in response to this solicitation, and to make awards without discussions with proposers. The Government also reserves the right to conduct discussions if it is later determined to be necessary. If warranted, portions of resulting awards may be segregated into pre-priced options. Additionally, DARPA reserves the right to accept proposals in their entirety or to select only portions of proposals for award. In the event that DARPA desires to award only portions of a proposal, negotiations may be opened with that proposer. 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. 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.

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 and applied research in science and engineering, the results of which ordinarily are published and shared broadly within the scientific community, as distinguished from proprietary research and from industrial development, design, production, and product utilization the results of which ordinarily are restricted for proprietary or national security reasons. 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. In all cases, the 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 can clearly demonstrate the work is not otherwise available from the private sector AND they also provide written documentation citing the specific statutory authority (as well as, where relevant, contractual authority) establishing their eligibility 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.

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.

Applicants considering classified submissions (or requiring access to classified information during the life-cycle of the program) shall ensure all industrial, personnel, and information system processing security requirements are in place and at the appropriate level (e.g., Facility Clearance (FCL), Personnel Security Clearance (PCL), certification and accreditation (C&A)) and any Foreign Ownership Control and Influence (FOCI) issues are mitigated prior to such submission or access. Additional information on these subjects can be found at: www.dss.mil.

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. Mark Rosker. As of the date of first publication of the BAA, the Government has not identified any potential conflicts of interest involving this program manager. 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.) The Program Manager is required to review and evaluate all proposals received under this BAA and to manage all selected

efforts. 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 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), 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 BAA09-16@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 rejected 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

1. 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 12958 as amended, 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.

Proposers choosing to submit a classified proposal from other classified sources must first receive permission from the respective Original Classification Authority in order to use their information in replying to this BAA. Applicable classification guide(s) should also be submitted to ensure the proposal is protected at the appropriate classification level.

Classified submissions shall be appropriately and conspicuously marked with the proposed classification level and declassification date. Submissions requiring DARPA to make a final classification determination shall be marked as follows:

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

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 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 be 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 address to:

Defense Advanced Research Projects Agency
ATTN: Microsystems Technology Office (MTO)
Reference: DARPA-BAA-09-16
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: 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 571 218-4842 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 703-248-7213 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.

Security classification guidance via 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 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. Abstract and Proposal Information

Proposers who choose to use abstracts are strongly encouraged to submit a proposal 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 proposal 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 proposal abstract.

DARPA will respond to proposal abstracts with a statement as to whether DARPA is interested in the idea. DARPA will attempt to reply to proposal abstracts within thirty (30) calendar days of receipt. Proposal abstracts will be reviewed in the order they are received. Early submissions of proposal 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 a proposal 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 a proposal abstract.

Proposers are required to submit full 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 proposed 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 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.

Proposers must complete the following steps 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/CCRSearch/Search.aspx)
- Proposers must obtain a user name and password with an E-Authentication provider
- 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.

Grant or cooperative agreement proposals may only be submitted to DARPA through Grants.gov. Grant or cooperative agreement proposals may not be submitted through any other means (including hardcopy, T-FIMS or 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.

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 BAA09-16@darpa.mil. DARPA intends to use electronic mail for correspondence regarding DARPA-BAA-09-16. Proposals and proposal 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 DARPA-BAA-09-16 must be submitted through T-FIMS (unless Grants.gov is used). 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.

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 BAA09-16@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. Proposal Abstract Format

Proposal abstracts are encouraged in advance of full proposals in order to provide potential proposers with a rapid response to minimize unnecessary effort. Proposal abstracts should follow the same general structure described for Volume I (see section II & III), but are expected to provide a concise summary rather than extensive detail. The proposal abstract should provide schedule and cost information. The maximum page lengths for each section shown in braces { } below can be neglected; however, **the total length excluding the cover sheet shall not exceed ten (10) pages.** The cover sheet should be clearly marked "PROPOSAL ABSTRACT." All pages shall be formatted to 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 proposal abstracts includes all figures, tables, and charts. No formal transmittal letter is required. All proposal abstracts must be written in English.

3. 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 formatted to 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 fifty-seven (57) number pages. Maximum page lengths for each section are shown in braces { } below. All full proposals must be written in English.

4. Volume I, Technical and Management Proposal

{2} Section I. Administrative

A. Cover sheet to include:
   (1) BAA number (DARPA-BAA-09-16)
   (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.

{3}Section II. Executive Summary

This section should provide a clear and concise summary of the following:

- Identification of key technical challenges
- A description of the unique technical solutions and approaches being proposed
- Innovative claims for the proposed programs
- Comparison with current state-of-the-art and to alternate approaches
- Quantitative, end-of-program performance goals and the Proposer-Defined Metrics and GNG Metrics associated with the development effort (in tabular form)
- Technology transfer path.
- Contractor capabilities, experience and past achievements that support the contention that the contractor can meet the program's goals
- Budget summary by task and calendar year (in tabular form)

Section III. Detailed Proposal Information

A. {20} **Technical Approach & Rationale.** This section should: (1) identify the key technical challenges to realizing the goals of the NEXT program, (2) present a description of the innovative technical solutions and approaches being proposed, and (3) provide a clear rationale as to what makes the proposed approaches advantageous. This section should demonstrate that the proposer has a clear and comprehensive understanding of the state-of-the-art of relevant electronic devices, integration circuits, simulation and design, and test. It should provide sufficient technical detail to permit full evaluation of the feasibility of the proposed technical approach.

B. {9} **Program Plan & Risk Assessment.** A narrative explaining the explicit timelines and quantitative metrics by which progress toward the proposed goals can be evaluated. The proposed period of performance of each phase, and the

overall program, should be clearly stated. Metrics (including both Proposer-Defined Metrics and GNG Metrics) should be presented in a tabular form. Performance metrics must be associated with demonstrable, quantitative measures of performance, and should be summarized in a single table. Periodic, **Proposer-Defined Metrics should be stated for each six month period beginning six months after the start of the effort. The narrative plan should include a specific test plan detailing how all metrics will be accurately measured**. This section should also include a description of the major technical risk elements specific to the proposed approach, an estimate of the risk magnitude for each such element, and specific plans to mitigate each risk. Proposers should clearly define all deliverables associated with the proposed research; all proprietary assertions to intellectual property of all types, including any background inventions, should be set forth in detail. (See Section VIII "Intellectual Property.")

C. {3} **Teaming & Management Plan.** A clearly defined organization chart for the program team which includes the programmatic relationship and a summary of each member's roles and responsibilities. Additionally, a narrative discussing (1) the proposers teaming strategy/rationale; (2) the specific roles and responsibilities of the team members; (3) the unique capabilities of the team members; and (4) the proposers team management approach.

D. {3} **Technology Transition & Business Plan.** Description of the results, products, transferable technology, and expected technology transfer path. The discussion should highlight the specific classes of systems expected to benefit from the technology developments and the advantages that will be afforded from their use. See also Section VIII "Intellectual Property."

E. {4} **Capabilities.** A section describing relevant prior work, the background, qualifications and relevant experience of team member organizations (prime and sub) and key individuals to be assigned to the program and the facilities and equipment to be utilized. This section should provide clear evidence that the contractor team has the experience, personnel and capabilities required to meet the program's goals. Please do not attach supporting material (CDs, movies, etc.) to the proposal, except as noted in Section IV below.

F. {1} **Cost Summary.** Cost summary schedules for the proposed research, including estimates, by Phase, of cost for each task in each year of the effort delineated by the primes and major subcontractors, total cost, and any company cost share. Payable milestones (descriptions, exit criteria, etc.), if proposed, must not include proprietary information. 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.

G. **{7} Statement of Work (SOW).** In plain English, clearly define the technical tasks/subtasks to be performed, their durations, and dependencies amongst them. The SOW **must not** include proprietary information. The SOW **must** be developed so that each phase of the program is separately defined. The SOW **must** include, for each phase, a table defining the program metrics to be achieved. 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, hardware, software, etc.) to be provided to the Government.

H. {5} Summary Slide(s). PowerPoint-type slide (s) (i.e., landscape formatted for presentation) that succinctly highlights the major aspects of the proposal, including all program metrics (including proposer defined metrics, if applicable), in a manner suitable for presentation to DARPA management. PowerPoint slides included in the technical proposal should also be submitted separately in PowerPoint format.

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.

5. 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-free (CPFF), cost-contract—no 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.

The proposers cost volume shall provide cost and pricing information, or other than cost or pricing information if the total price is under $650,000, in sufficient detail to substantiate the program price proposed (e.g., realism and reasonableness). In doing so, the proposer shall provide a detailed cost breakdown by phase, task and month. The breakdown shall include, at a minimum, the following major cost items: direct labor (labor categories and labor hours per category); subcontracts (by subcontractor); material/equipment; other direct costs (travel, computer usage fee's, etc.), and indirect charges (rates and factors such as Overhead, G&A, Fringe Benefits, etc.). Proposers are encouraged to provide the aforementioned cost breakdown as an editable MS Excel spreadsheet with tabs (material, travel, ODCs) provided as necessary. Additionally, the proposer shall provide (1) a summary of total program costs by phase and task, (2) an itemization of major subcontracts, (3) a priced Bill-of-Materials (BOM) clearly identifying, for each item proposed, the source of the unit price (i.e., vendor quote, engineering estimate, etc.) and the type of property (i.e., material, equipment, special test equipment, plant equipment, information technology (IT)[1], etc.); (4) the source, nature, and amount of any industry cost-sharing; and (5) 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.). Where the effort consists of multiple portions which could

[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, or 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, is not information technology.

reasonably be partitioned for purposes of funding, these should be identified as options with separate cost estimates for each.

The proposer shall provide a detailed description of the methods used to estimate costs, to include, at a minimum: 1) substantiation of all rates and factors, and 2) labor and material estimates supported by a narrative basis-of-estimate (BOE) providing sufficient detail to substantiate cost estimates. The prime contractor is responsible for compiling and providing, as part of its proposal submission to the Government, subcontractor proposals prepared at the same level of detail as that required of the prime. 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. All proprietary subcontractor proposal documentation which cannot be uploaded to TFIMS as part of the proposers submission, 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 – this does not relieve the proposer from the requirement to include, as part of their TFIMS submission, subcontract proposals that do not include proprietary pricing information (rates, factors, etc.).

If seeking a procurement contract and items of Contractor Acquired Property are proposed, exclusive of material, the proposer shall clearly demonstrate that the inclusion of such items as Government Property is in keeping with the requirements of FAR Part 45.102. For IT purchases, all proposers shall include a letter stating why the proposer cannot provide the requested resources from its own funding.

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 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 (e.g., a grant, cooperative agreement, or other transaction.) Those proposing a grant or cooperative agreement may follow/use the application instructions/form templates (i.e., DARPA BAA Form Package) provided as part of the BAA posting to grants.gov; however, the costing details requested above should be provided to the maximum extent possible.

The FY2009 Defense Appropriations Act caps indirect cost rates for any procurement contract, grant or agreement using 6.1 Basic Research FY09 Funding at 35% of the total cost of the award. Total costs include all bottom line costs. For grants/agreement awardees subjection to cost principles in 2 CFR part 220 (Educational Institutions), indirect costs are all costs of a prime award that are Facilities and Administration costs. For grant/agreement awardees subject to the cost principles in 2 CFR part 225 (State, Local, and Indian Tribal Governments), 2 CFR par 230 (Non-profit Organizations) or 48 CFR part 23 (Federal Acquisition Regulation), indirect costs refer to any cost not directly identified with a single final cost objective, but identified with two or more final cost

objectives or with at least one intermediate cost objective. The cost limitations do not flow down to subcontractors.

C. Submission Dates and Times

1. Proposal Abstract Date

The proposal abstract must be submitted to DARPA/MTO through T-FIMS or Grants.gov on or before 4:00 p.m., local time, Wednesday, December 19, 2008. Proposal abstracts received after this time and date may not be reviewed.

2. Industry Day Date

DARPA intends to hold an Industry Day on or about December 3, 2008. At this event, the goals of the BAA will be reviewed, and potential proposers will have the opportunity to meet with other potential proposers and form teams. Individuals and firms interested in attending the Industry Day should send a request for information to BAA09-16@darpa.mil as soon as possible. Further details and updates to Industry Day will be posted on www.darpa.mil/mto/solicitations/ under BAA 09-16. DARPA reserves the right to limit the number of individuals attending from each organization, and the total number of individuals attending.

3. Full Proposal Date

The full proposal must be submitted to DARPA/MTO through T-FIMS or Grants.gov on or before 4:00 p.m., local time, Tuesday, February 17, 2009, 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. 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 Question and Answer document up through Tuesday, February 3, 2009. In order to receive a response to your question prior to the submission date, submit your question by Friday, January 30, 2009 to BAA09-16@darpa.mil.

The full proposal must be submitted in time to reach DARPA by February 17, 2009 (initial closing), in order to be considered during the initial evaluation phase; however, DARPA-BAA-09-16 will remain open until November 19, 2009. Proposals may be submitted at any time from issuance of this announcement through November 19, 2009; however, proposers are warned that the likelihood of funding is greatly reduced for proposals submitted after the initial closing date deadline.

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.

E. Funding Restrictions

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 Government defined go/no-go 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 proposal defined metrics (those proposed in addition to the Government's defined go/no-go metrics); the proposed approach establishes clear and well defined secondary performance metrics expected to be met by the end of each phase consistent with achieving the Government's program go/no-go metrics. 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 per task as well as the types and kinds of materials 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 Recommendation 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. 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. 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 email 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 periodic site visits at the Program Manager's discretion and periodic program reviews that may be held in the Washington, DC area, at the contractor's site, or at another location within the United States.

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.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.

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.amedd.army.mil/AnimalAppendix.asp

4. Publication Approval

It is the policy of the Department of Defense for products of fundamental research to remain unrestricted to the maximum extent possible. Contracted fundamental research:

> Includes research performed under grants and contracts that are (a) Basic Research"), whether performed by universities or industry or (b) applies research and performed on-campus at a university. The research shall not be considered fundamental in those rare and exception 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.

It is anticipated that the performance of research resulting from the BAA is expected to be fundamental research.

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 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 the DARPA Technical Information Officer (DARPA/TIO). 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. 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 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.

5. 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**.**

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.

C. Reporting

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

4. i-Edison

The award document for each proposal selected and 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

Administrative, technical or contractual questions should be sent via e-mail to BAA09-16@darpa.mil. If e-mail is not available, Attention: DARPA-BAA-09-16. All requests must include the name, email address, and phone number of a point of contact.

The technical POC for this effort is Mark Rosker
DARPA/MTO
ATTN: DARPA-BAA-09-16
3701 North Fairfax Drive
Arlington, VA 22203-1714

VIII. OTHER INFORMATION

A. Intellectual Property

1. Procurement Contract Proposers

a. 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."

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)

b. 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."

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

COMMERCIAL				
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)

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."

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.