

Broad Agency Announcement

Self-HEALing mixed-signal Integrated Circuits
(HEALICs)

Microsystems Technology Office

DARPA-BAA-08-40

May 19 2008



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Part I: Overview Information

- **Federal Agency Name** – Defense Advanced Research Projects Agency (DARPA), Microsystems Technology Office (MTO)
- **Funding Opportunity Title** – Self-HEALing mixed-signal Integrated Circuits (HEALICs)
- **Announcement Type** – Initial Announcement
- **Funding Opportunity Number** – Broad Agency Announcement (BAA) 08-40
- **Catalog of Federal Domestic Assistance Numbers (CFDA)** – 12.910 Research and Technology Development
- **Dates**
 - Proposal Abstract Due Date and time –4:00 PM EST July 9, 2008
 - Proposal Due Date and time – 4:00 PM EST September 3, 2008
 - Proposer’s Day – June 19, 2008
- **Concise description of the funding opportunity** – DARPA is soliciting innovative research and development (R&D) proposals in the area of self-healing mixed signal Integrated Circuits (ICs)/Systems-on-a-Chip (SoCs). The goal of the program is the development of techniques to maximize the number of fully operational mixed-signal SoCs on an individual wafer that meet all performance goals in the presence of extreme process variations and environmental conditions.
- **Anticipated individual awards** – Multiple awards are anticipated.
- **Types of instruments that may be awarded** – Procurement contract, grant, cooperative agreement or other transaction.
- **Agency contact**
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Part II: Full Text of Announcement

I. FUNDING OPPORTUNITY DESCRIPTION

The Defense Advanced Research Projects Agency often selects its research efforts through the Broad Agency Announcement (BAA) process. The BAA will appear first on the FedBizOpps website, <http://www.fedbizopps.gov/>, 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 and development (R&D) proposals in the area of self-healing mixed signal integrated circuits (ICs)/Systems-on-a-Chip (SoCs). The goal of the program is the development of techniques to maximize the number of fully operational mixed-signal SoCs on an individual wafer that meet all performance goals in the presence of extreme process variations and environmental conditions. These approaches are intended to be independent of fabrication process or technology node. A self-healing integrated circuit is defined as a design that is able to sense undesired circuit/system behaviors and correct them automatically. Proposed research should investigate robust control algorithms that are the foundation of such a design. Proposed approaches are to specifically address process technology variability, but it is expected that the impact of environmental variations and ageing would be addressed as well.

DARPA anticipates that a number of commercial companies which do not typically engage in government business will be interested in this research opportunity since it is envisioned that the resulting technology will have significant dual use applications. DARPA would like to bring to the attention of these potential proposers the award instruments available to those who are unable to accept contracts based on the Federal Acquisition Regulation (FAR) and Defense Federal Acquisition Regulation Supplement (DFARS). In addition to legal authority to enter into contracts and grants, DARPA has been granted broad authority to enter into "innovative agreements and other transactions" to support research and development activities. These instruments are discussed in detail in Sec. IV B (5) of this BAA, beginning on page 22.

Background

Advances in integrated circuit technologies have enabled the single-chip integration of multiple analog and digital functions, resulting in complex mixed-signal Systems-on-a-Chip (SoCs). Such mixed-signal SoC designs are well suited for meeting the stringent and unique requirements of current and future Department of Defense (DoD) electronic Microsystems. SoC design offers: potentially lower costs achieved through reduced packaging, wire bonding, etc. requirements; smaller form factor; lower interconnect parasitics; and higher communication speeds between system sub-blocks. Example DoD applications include mobile and low-power software defined and cognitive radios, high-speed digital signal processing (DSP), and RF sensor systems. High performance SoC

designs have been made feasible by the increased speed and higher density available in modern nanometer-scale IC processes.

A major consequence, however, of the drive towards ever smaller transistor gate lengths is an exponential increase in intra-wafer and intra-die process variations. Process variation has a direct and measurable impact on circuit performance; often designers must relax desired performance goals to guarantee a sufficient post-fabrication yield. Figure 1 shows the widening gap between the exponential increase in performance predicted by Moore's Law and the actual measured performance due to variability as silicon CMOS technology scales. The core goal of the HEALICs program is to regain this lost performance. However, the technology developed under this program is expected to address environmental variations and ageing as well. Consequently, the long-term reliability of DoD electronic systems is expected to be significantly enhanced.

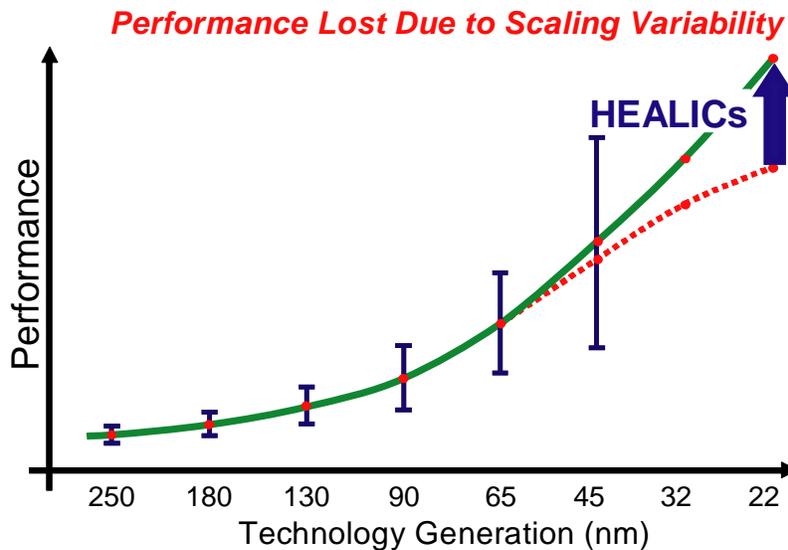


Figure 1: Widening gap in lost performance for future CMOS technology nodes^{1,2}.

Process variability in deep submicron fabrication processes leads to large variances in critical transistor parameters such as L_{eff} and V_{th} . As a result, circuit performance will vary significantly, and some circuits may even cease to operate at all. The challenge for designers in leading-edge technologies is to devise strategies to yield a large number of high-performing chips per wafer in the presence of large process variability. Yield, in this sense, is defined as the number of die per wafer that meet *all* predefined performance metrics divided by the number of total testable die per wafer.

Traditional corner-based design techniques require coverage of an extensive parameter space that becomes intractable for large designs. Mixed-signal SoCs are particularly vulnerable due to the complex integration of numerous individual sub-blocks that can vary greatly in noise characteristics and operating frequency. Additional complications

¹ From the 2007 Edition of the International Technology Roadmap for Semiconductors and IBM.

² J. Srinivasan, et al, "The impact of technology scaling on lifetime reliability," in *2004 International Conference on Dependable Systems and Networks*, June 2004, pp. 177-186.

such as ageing, environmental conditions, and DoD requirements for extended life and reliability can contribute to further reduce yield.

A variety of approaches have been proposed for managing process variation in future technology nodes. One approach is to aggressively improve the fabrication process in order to better control process variations, but this approach is ultimately limited. A second approach is to implement improved Design-for-Yield (DFY) procedures, which focus considerable effort in designing and laying out circuits to minimize the impact of process variability. There has been a significant investment of effort in these areas by the commercial industry.

An alternative approach, advocated in this program, is to add control circuitry that will compensate for the process and environmental variations *in situ*. This control circuitry can be applied at both the sub-block and system level allowing the designer to focus on the performance goals and not on yield related issues. The central idea is to accept the process variations and environmental conditions as they are and allow the control system to correct for them. This new DARPA initiative focuses on mitigating the potential for post-fabrication mixed-signal IC failure to yield by designing circuits capable of *self-healing* through various control mechanisms. This initiative is not limited to any particular type of circuit or control approach. Rather, it aims to develop techniques and technologies that allow any mixed-signal design to be runtime corrected at the SoC level.

Figure 2 shows conceptually the impact of the HEALICs technologies envisioned for this program. Without self-healing, very few die on the wafer are able to meet the HEALICs target performance specification; with self-healing activated, the measured distribution of die for a particular performance metric is greatly narrowed and shifted such that a much greater number of the die now meet that particular metric. This visualization is conceptual in nature; it is recognized that some metrics may require performance within a certain range of a particular value, while others may simply require that the value be maximized (or minimized). In addition, it should be noted that the self-healing circuitry would be expected to address *all applicable performance metrics*, each of which would have its own distribution in the presence of process variations.

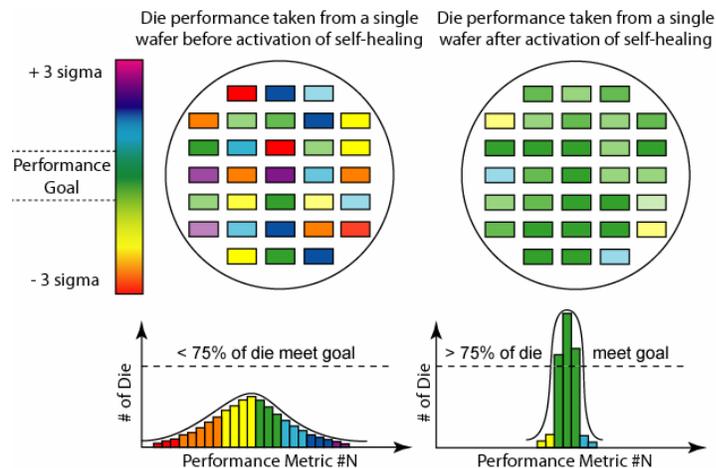


Figure 2: Die performance before and after activation of self-healing circuitry.

We can visualize the self-healing process as a feedback control mechanism (Figure 3). At the global level, terminal circuit performance is measured and compared against an “ideal” behavioral model of circuit performance. The goal of the feedback network is to drive the error between the measured and “ideal” states to zero. An analogy from biomedicine is that of a “mental image” of an appendage that the brain uses to compare against sensory inputs when controlling that appendage. Since process variation would likely cause random errors in both the controlled system and in the controller itself, a robust stochastic control mechanism is suggested. Since significant variation in parameters and statistics is expected, both will likely need to be estimated in order to adapt state estimator gains and model coefficients accordingly. This may require the use of “parameter-adaptive extended” state estimators and dual-control strategies. As part of dual-control strategies, probing control (which addresses parameter variations) and cautious control (which addresses noise statistics) would be used in addition to a nominal control strategy.

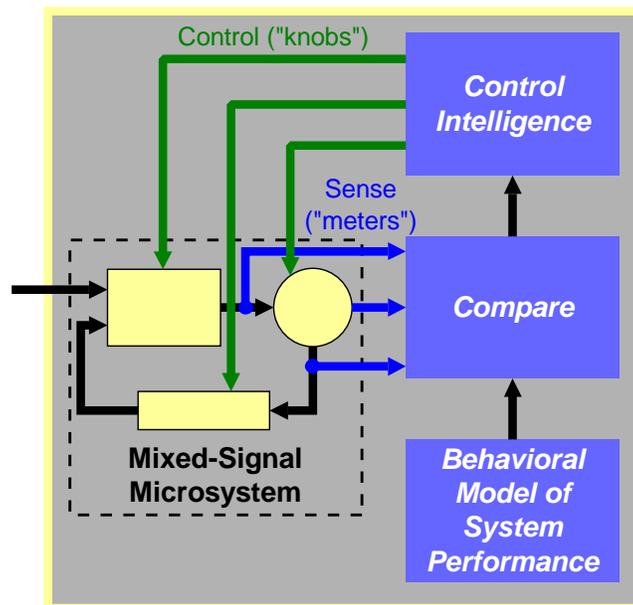


Figure 3: Representation of self-healing feedback network.

Previous research has shown that parameter tuning and other correction strategies have been effective at increasing performance in the presence of process and environmental variation for individual sub-blocks such as RF amplifiers and voltage controlled oscillators (VCOs), synthesizer charge-pumps, and SRAM cells. Resiliency in digital circuits and future multicore processors is also a key theme of the DARPA/SRC funded Focus Center Research Program. The focus of this program is integrating on-chip a comprehensive suite of controls capable of healing the *entire* mixed-signal IC/SoC in the presence of extreme variability. This self-healing suite should be implemented within a minimum die area and power overhead, and it should address a wide range of possible process and variations, and ultimately environmental variations and ageing.

Program Requirements

Proposers are expected to provide in their proposal a complex mixed-signal SoC design (for example, a digital signal processing chip with on-chip data conversion, or a single-chip radio platform for wireless communications) that has been determined through manufacturing or simulation experience to either not be practical due to processing technology variability or realized with extremely poor (near zero) performance yield as measured by performer-specified target performance metrics. This SoC will serve as the “baseline” design, and the complexity of this baseline design and associated metrics should be clearly presented in the proposal.

Performers will be expected to demonstrate that, without changing process technology or baseline circuit architecture, the performance yield of the baseline SoC can be dramatically increased by the introduction and activation of on-chip self-healing and control circuitry.

“Performance yield” is defined as the number of die per wafer that meet *all* of the performer-defined target metrics meeting or exceeding *all* performance metrics for the proposed IC design divided by the total number of die baseline dies without self-healing circuitry per wafer, N_0 .

The performance yield *without* self-healing is D_0/N_0 , where D_0 is the number of *baseline* circuit die which meet all proposed performance metrics. The performance yield *with* self-healing is D_{HEALICS}/N_0 , where D_{HEALICS} is the number of *self-healing* die which meet all proposed performance metrics with self-healing activated. Performance yield with self healing is referenced to the number of baseline die N_0 in order to account for the potentially reduced number of self-healing die per wafer due to the additional die area required for the self healing circuitry.

The intent is to significantly increase the number of die per wafer meeting all the performance metrics as a result of the added circuitry. A statistically significant number of die should be tested for the calculation of the performance yield.

Technical Areas

DARPA seeks innovative proposals for self-healing technologies that will lead to dramatic increases in performance yield achieved using leading-edge technology. DARPA believes that, to achieve this objective, the following areas need to be addressed. Proposers are strongly encouraged to address all these areas in their proposals since they are intimately related.

The areas of interest are as follows:

Technical Area One: Self-Healing Mixed-Signal SoC Design and Modeling

Understanding and design of sensing (“meters”) and control (“knobs”) paths for the proposed mixed-signal SoC. Microsystem-level (e.g. behavioral) modeling, and understanding of mapping between local/global parameters and model performance.

Technical Area Two: Architectures and Algorithms for Self-Healing

Performers are not limited to any specific control architecture or algorithm. DARPA is primarily interested in techniques that address process variation, and ultimately environmental variations and ageing, for mixed-signal SoCs. Control mechanisms should be stable and designed such that the settling time for the transition from suboptimal to optimal operation be as short as possible. The proposed architectures and algorithms should be adaptable to other circuit applications and technologies.

Technical Area Three: Power and Die Efficient Implementation of Self-Healing Architectures and Algorithms

Implementation of mixed-signal circuitry and integrated control suite in leading-edge technology with a minimum of die area and power overhead. Power overhead must be considered for all possible modes of operation of the circuit (e.g. transmit, receive, and idle modes of a radio transceiver). Area efficient implementations are critical for maintaining fabrication throughput and low cost.

Program Phases

The HEALICs program will consist of two phases. The length of each phase should be proposed based on the approach and effort needed. The focus of each phase is described below:

Phase I. Demonstration of self-healing mixed-signal core: Performers will identify a set of key sub-blocks of the target mixed-signal core in their proposal. Relevant sub-blocks are anticipated to have transistor counts in the 100-1,000 range. Performers will design and fabricate sub-blocks with local self-healing control. Based on these sub-block designs performers will develop robust global self-healing control algorithms for integration with the previously demonstrated sub-blocks into a complex mixed-signal design. The resulting mixed-signal IC is anticipated to have transistor counts in the 1,000-10,000 range. Successful demonstration will be the measured increase in performance yield of the mixed-signal IC to >75% upon activation of self-healing. The additional power consumption overhead with self-healing should be minimal but no more than 10% over that of the baseline design. Performers should also provide a credible plan to increase performance yield to >95% in Phase II.

Phase II. Demonstration of complete self-healing mixed-signal SoC: Performers will integrate the previously demonstrated self-healing mixed-signal core into the larger proposed SoC with potentially large digital content. The SoC design is anticipated to have transistor counts in the 100,000-1M range. Successful demonstration will be the measured increase in performance yield of the mixed-signal SoC to >95% upon

activation of self-healing. The additional power consumption overhead with self-healing should be no more than 5% over that of the baseline design.

For instance, an example could be a mm-wave radio transceiver, where the Phase I demonstration would be a mm-wave synthesizer core with demonstrated self-healing, while the Phase II demonstration would be the full radio transceiver SoC based on the Phase I synthesizer. Another example could be a DSP video compression chip, where the Phase I demonstration would be an integrated A/D converter with demonstrated self-healing, while the Phase II demonstration would be the full DSP video compression microsystem based on the Phase I A/D converter. These possible examples are discussed further below, but they should not be interpreted as the only circuit types of interest to DARPA.

An additional desirable outcome of this program is the development of self-healing mixed-signal IP core libraries that could be made available to DoD designers. Proposers are encouraged to consider this and, if applicable, to incorporate this aspect into their proposal as part of the discussion of plans and capabilities for technology transition.

Program Go/No-Go Goals (Metrics)

Table 1 summarizes the Go/No-Go metrics as presented in the above section.

Table 1. Go/No-Go Metrics

Metric	Phase I: Mixed-Signal Core	Phase II: Mixed-Signal SoC
Performance Metrics that Define Performance Yield	Performer Defined and Circuit Specific	Performer Defined and Circuit Specific
Performance Yield	> 75% of die per wafer meet all performance specs	> 95% of die per wafer meet all performance specs
Power Consumption Overhead	< 10% over baseline circuit	< 5% over baseline circuit

In addition to the mixed-signal core/SOC performance metrics, proposers are expected to define in their proposal a set of metrics specifically for the self-healing architectures. Example metrics include (but are not limited to) the settling time of any corrective actions taken by the circuitry (e.g. how many clock cycles are required for the self-healing circuit to perform its intended action).

Performers will provide a list of all standard system modes of operation. They will measure power consumption in each *with and without self-healing* so that the specified power consumption overhead may be verified.

Example 1: Self-Healing Wideband mm-Wave Transceiver

An example SoC design is the wideband mm-wave transceiver represented in Figure 4. The transceiver consists of a single-conversion radio with an integrated mixed-signal synthesizer core. Each of the synthesizer sub-blocks shown in Figure 4 (QVCO, prescaler, charge pump, etc.) may contribute to variations in the key performance

parameters of the synthesizer mixed-signal core. These components may need to be individually sensed and controlled in order to achieve the performance goals for the overall synthesizer IC.

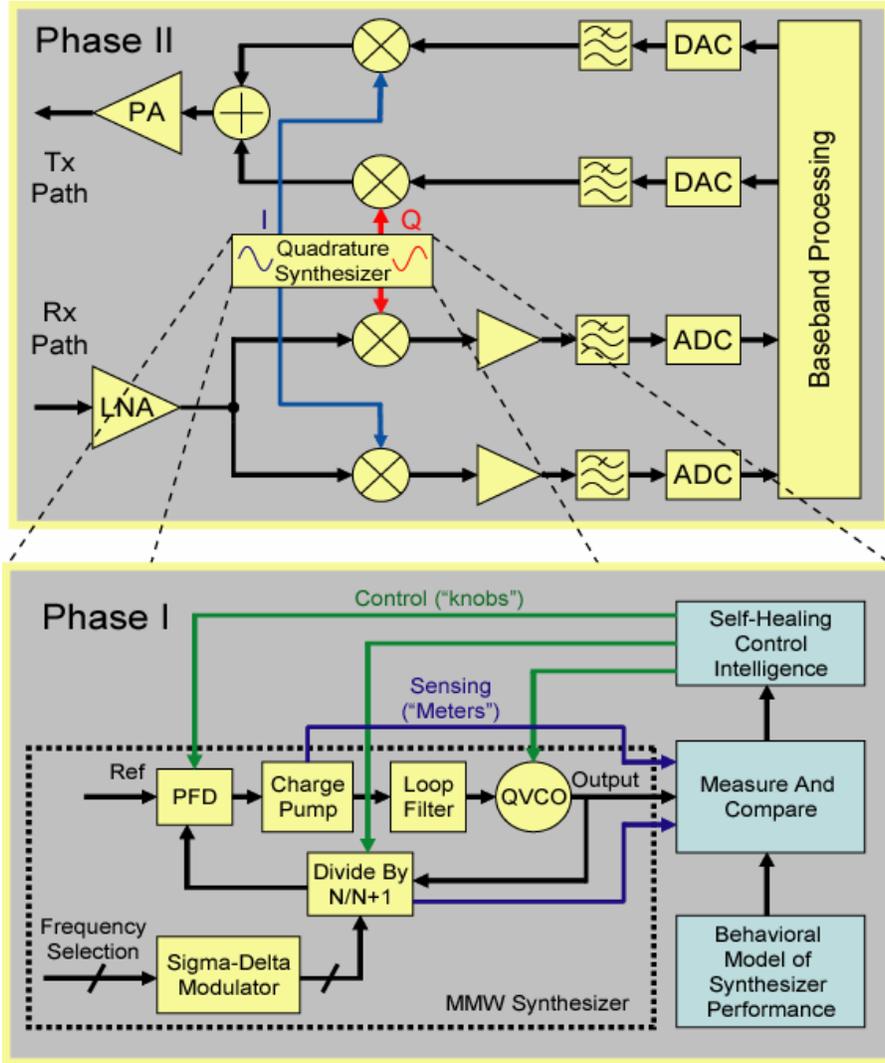


Figure 4: Self-healing millimeter wave transceiver and integrated frequency synthesizer.

Table 2 lists some example metrics for the mixed-signal core and for the overall SoC that could be affected by process variation, and, thus, should be addressed by the self-healing circuitry.

Table 2: Example mixed-signal core and SoC metrics.

Example Synth. Metrics	Example Trans-ceiver Metrics
• Phase Noise	• Tx Power
• Spurs	• Noise Figure
• Settling Time	• I/Q Mismatch
• Power Consumption	• Phase Noise
	• Gain

Example 2: Self-Healing Video Compression DSP

A second example of an SoC design subject to potential decreases in performance yield due to process variation is a video compression DSP shown in Figure 5.

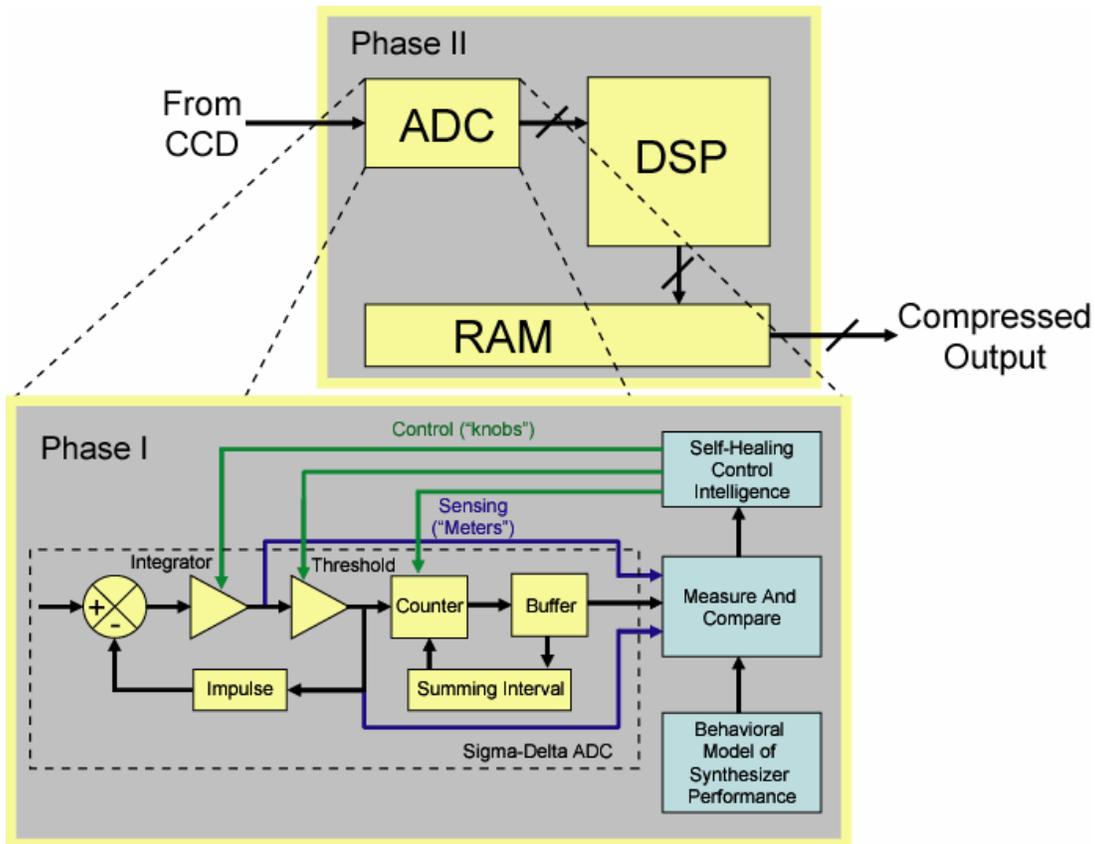


Figure 5: Self-healing video compression microsystem.

As in Example 1, each sub-block is potentially vulnerable to performance degradation due to process variations, particularly at the transistor sizes needed for high-speed applications. For instance, nonlinearity of the front-end ADC can corrupt image quality as measured by the image Peak Signal to Noise Ratio (PSNR). Effective self-healing techniques should demonstrate a considerable increase in PSNR for a given benchmark video input with a minimum increase in die area and power consumption.

Table 3 lists some example metrics for the mixed-signal core and for the overall SoC that could be affected by process variation, and, thus, should be addressed by the self-healing circuitry.

Table 3: Example mixed-signal core and SoC metrics.

Example ADC Metrics	Example DSP Metrics
• Effective # of Bits	• PSNR
• Sample Rate	• Compression Linearity
• Power Consumption	

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 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 in Section V. labeled “Application Review Information,” 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 who are 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.) 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, Dr. Sanjay Raman, is a detailee to DARPA under the Intergovernmental Personnel Act (IPA) from the Virginia Polytechnic Institute and State University and, as such, is highly likely to have a conflict of interest with respect to proposals utilizing that institution 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 BAA08-40@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.

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. Abstract and Proposal Information

Proposers who wish to submit proposals 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. 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. Selection 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.

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 one of the administrative addresses below; e-mail or fax is preferred.

Fax: (703) 248-8062 (Addressed to: DARPA/MTO, BAA 08-40)

Email: BAA08-40@darpa.mil

DARPA intends to use electronic mail and fax for correspondence regarding DARPA-BAA-08-40. 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-08-40 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:

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 BAA08-40@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 format as described for Volume I under PROPOSAL FORMAT (see below), but include ONLY Sections I and II. The cover sheet should be clearly marked “PROPOSAL ABSTRACT” and the total length should not exceed 15 pages, excluding cover page and official transmittal letter. All pages shall be printed on 8-1/2 by 11 inch paper with type not smaller than 12 point. Smaller font may be used for figures, tables and charts. The page limitation for 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

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 55 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

Section I. Administrative {2 pages}

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 {Not more than 15 pages total}

- A. {3} Innovative claims for the proposed research. This section is the centerpiece of the proposal and should succinctly describe the uniqueness and benefits of the proposed approach relative to the current state-of-art alternate approaches.
- B. {2} Deliverables associated with the proposed research and the plans and capability to accomplish technology transition and commercialization. Include in this section all proprietary claims to the results, prototypes, intellectual property, or systems supporting and/or necessary for the use of the research, results, and/or prototype. If there are not proprietary claims, this should be stated.
- C. {1} Cost, schedule and payable milestones for the proposed research, including estimates of cost for each task in each year of the effort delineated by the prime and major subcontractors, total cost and company cost share, if applicable. **Measurable critical milestones should be proposed by the proposer.** These payable milestones should enable and support a go/no go decision for the next part of the effort. Additional interim non-critical management milestones are also highly encouraged at a regular interval.
- D. {5} Technical rationale, technical approach, and constructive plan for accomplishment of technical goals in support of innovative claims and deliverable production. (In the full proposal, this section should be supplemented by a more detailed plan in Section III.)
- E. {2} General discussion of other research in this area.
- F. {1} A clearly defined organization chart for the program team which includes, as applicable: (1) the programmatic relationship of team member; (2) the unique capabilities of team members; (3) the task of responsibilities of team members; (4) the teaming strategy among the team members; and (5) the key personnel along with the amount of effort to be expended by each person during each year.
- G. {1} Penta-Chart (powerpoint-type slide formatted for presentation): Please use the specific layout of the attached template (Attachment 1).

Section III. Detailed Proposal Information {not more than 38 pages}

- 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. 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.

*Note: It is recommended that the SOW should be developed so that each Phase of the program is separately defined. **Do not include any proprietary information in the SOW.***

- B. {1} Description of the results, products, transferable technology, and expected technology transfer path enhancing that of Section II. B. See also VI (B)(2) “Intellectual Property.”
- C. {15} Detailed technical rationale & approach enhancing that of Section II. 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. Additionally, comparison with other ongoing research shall be provided indicating advantages and disadvantages of the proposed effort.
- D. {4} Program plan & risk assessment enhancing that of Section II. 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.
- E. {2} Discussion of proposer’s previous accomplishments and work in closely related research areas.
- F. {1} Description of the facilities that would be used for the proposed effort.
- G. {3} Detail support enhancing that of Section II, including formal teaming agreements which are required to execute this program.
- H. {4} Cost schedules and milestones for the proposed research, including estimates of cost for each task in each year of the effort delineated by the primes and major subcontractors, total cost, and any company cost share. **Measurable critical milestones should be proposed by the proposer.** These milestones should enable and support a go/no go decision for the next part of the effort. Additional interim non-critical management milestones are also highly encouraged at regular intervals. 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. Additionally, proposals should clearly explain the technical approach(es) that will be employed to meet or exceed each program metric and provide ample justification as to why the approach(es) is/are feasible.

Section IV. Additional Information

A. 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-fee (CPFF), cost-award—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.

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) purchase; (5) a summary of projected funding requirements by month; and (6) the source, nature, and amount of any industry cost-sharing; and (7) identification of pricing assumptions of which may require incorporation into the resulting award instrument (e.g., use of Government Furnished Property/Facilities/Information, access to Government Subject Matter Expert/s, etc.). The prime contractor is responsible for compiling and providing all subcontractor proposals for the Procuring Contracting Officer (PCO). Subcontractor proposals 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.

DARPA is able to obtain its research support through a variety of legal instruments and flexible arrangements, to include use of Other Transaction Agreements (OTAs). OTA’s are potentially applicable to a wide variety of DARPA programs. They are likely to be particularly applicable to support dual-use technologies (those with commercial non-military potential as well as potential military applications), consortia or multi-party

agreements, and work supported by multiple funding sources. Because OTA's are not traditional procurement contracts, DARPA is not required to include the traditional FAR and DFARS clauses in these agreements, but is free to negotiate provisions that are mutually agreeable to both the Government and the consortium of companies entering into the agreement. Proposals may, but need not, state that an OTA rather than a contract or grant is desired. Furthermore, DARPA does not enter into OTA's when a contract or grant is feasible or appropriate. See FAR 35.003 for Government-wide policy on use of contracts for research and development. Potential proposers are encouraged to visit the DARPA Contracts Management Office home page (<http://www.darpa.mil/cmo/>) for more information regarding the use of OTA's. Included at this site is a web version of the Institute for Defense Analyses study, "Participant Views of Advanced Research Projects Agency 'Other Transactions'" (<http://www.darpa.mil/body/d1793/index.html>). This study was published in November 1995, and released in January 1996. It presents the results of a survey of organizations that have participated in DARPA research projects conducted with "other transactions."

There are two types of commonly used OTA's awarded pursuant to 10 U.S.C. 2371: Other Transactions for Research and Other Transactions for Prototype Projects (a.k.a. "845's"). Of these two types of OTA's, the one most pertinent to this BAA is referred to as a Technology Investment Agreement (TIA) and is issued in accordance with Part 37 of the Department of Defense Grant and Agreement Regulations (DoDGARs) (<http://www.dtic.mil/whs/directives/corres/html/321006r.htm>). TIA's are assistance instruments used to stimulate or support research designed to: (a) reduce barriers to commercial firm's participation in defense research, to give the Department of Defense (DoD) access to the broadest possible technology and industrial base; (b) promote new relationships among performers in both the defense and commercial sectors of that technology and industrial base; and (c) stimulate performers to develop, use, and disseminate improved practices. As a matter of DoD policy, a TIA may be awarded only when one or more for-profit firms are to be involved either in the (1) performance of the research project; or (2) the commercial application of the research results (e.g. commercial transition partner). Also of importance is the requirement that, to the maximum extent practicable, the non-Federal parties carrying out a research project under a TIA are to provide at least half of the costs of the project – this being a statutory condition for any TIA, or Other Transaction Agreement in general, issued under the authority of 10 U.S.C. 2371. Such instruments can involve a single performer or multiple performers participating as a consortium (which are not required to operate as a separate legal entity) and the Generally Accepted Accounting Principle (GAAP) applies rather than the FAR or DFARS cost principles.

All proposers requesting an 845 Other Transaction Agreement for Prototypes (OTA) must include a detailed list of payment milestones. Each such payment milestone must include the following: milestone description, exit criteria, due date, milestone payment amount (to include, if cost share is proposed, contractor and government share amounts). It is noted that, at a minimum, such payable milestones should relate directly to accomplishment of program technical go/no-go criteria as defined in the BAA and/or the proposer's proposal. Agreement type, fixed price or expenditure based, will be subject to

negotiation by the Agreements Officer; however, it is noted that the Government prefers use of fixed price payable milestones to the maximum extent possible. If the proposer requests award of an 845 OTA as a nontraditional defense contractor, as so defined in the OSD guide entitled "Other Transactions (OT) Guide For Prototype Projects" dated January 2001 (as amended)(http://www.dau.mil/pubs/Online_Pubs.asp), information must be included in the cost proposal to support the claim. Additionally, if the proposer plans requests award of an 845 OTA, without the required one-third (1/3) cost share, information must be included in the cost proposal supporting that there is at least one non-traditional defense contractor participating to a significant extent in the proposed prototype project.

C. Submission Dates and Times

1. Proposal Abstract Due Date

The proposal abstract must be submitted to DARPA/MTO via T-FIMS on or before 4:00 p.m., Eastern Daylight Time (EDT), July 9, 2008. Proposal abstracts received after this time and date may not be reviewed.

2. Proposer's Day

DARPA intends to hold a Proposer's Day on or about June 19, 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. DARPA anticipates that participation in some or all of the event will be restricted to Citizens of the United States of America or U.S. permanent residents ('Green Card' holders). Individuals and firms interested in attending the Industry Day should send a request for information to BAA08-40@darpa.mil as soon as possible. Further details and updates to Industry Day will be posted on www.darpa.mil/mto/solicitations/ under BAA 08-40. DARPA reserves the right to limit the number of individuals attending from each organization, and the total number of individuals attending.

3. Full Proposal Due Date

The full proposal must be submitted to DARPA on or before 4:00 p.m., Eastern Daylight Time (EDT) time, September 3, 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. 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 adequate time to provide a response to questions prior to the proposal due date, proposers are encouraged to submit questions by no later than August 12, 2008. Submit your questions to BAA08-40@darpa.mil.

The full proposal must be submitted in time to reach DARPA by September 3, 2008 (initial closing), in order to be considered during the initial evaluation phase; however, DARPA-BAA-08-40 will remain open until 4:00 PM EDT May 19, 2009. Proposals may be submitted at any time from issuance of this announcement through 4:00 PM EDT May 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 Performance Yield and Power Consumption Overhead (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 Performance Metrics that Define Performance Yield (Proposer Defined Metrics), the proposed approach establishes clear and well defined go/no-go metrics to be used as exit and entry criteria for Government approval to progress through phases of the program. 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 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-08-40
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 Requirements

The number and types of reports will be specified in the award document. 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. Subject invention/patent reporting must be made via iEdison, the government's Web-based invention reporting system.

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 BAA08-40@darpa.mil. If e-mail is not available, fax questions to (703) 248-8062, Attention:

BAA 08-40. All requests must include the name, email address, and phone number of a point of contact.

The technical POC for this effort is:

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