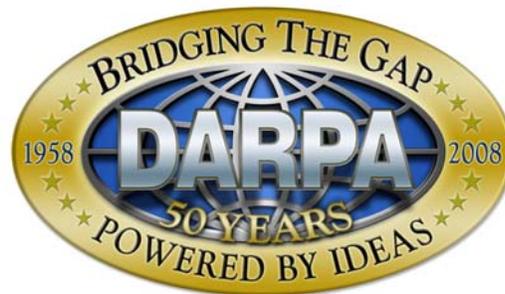


**BAA 08-03**

**Analog-to-Information (A-to-I)  
Receiver Development Program**



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## Part One: Overview Information

- **Federal Agency Name** – Defense Advanced Research Projects Agency (DARPA)/  
Microsystems Technology Office (MTO)
- **Funding Opportunity Title** – Analog-to-Information Receiver Development  
Program (A-to-I)
- **Announcement Type** – Initial Announcement
- **Funding Opportunity Number** – BAA 08-03
- **Catalog of Federal Domestic Assistance Numbers (CFDA)** – N/A
- **Important Dates**
  - Proposal due no later than 4:00 p.m. Eastern Time on **Friday, December 21, 2007**
- **Anticipated individual awards** – Multiple awards are anticipated.
- **Types of instruments that may be awarded** -- Procurement contract, grant,  
cooperative agreement or other transaction.
- **The technical POC for this effort is:**  
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## Part Two: Full Text of Announcement

### **SECTION I: FUNDING OPPORTUNITY DESCRIPTION**

The Defense Advanced Research Projects Agency (DARPA) 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 proposals for the design and demonstration of innovative high dynamic range, broadband digital receiver systems based on Analog-to-Information Converter (AIC) technology. AIC-based receivers offer the potential for high dynamic range digitization and broad unambiguous frequency coverage using encoded sampling at sub-Nyquist effective sampling rate. With suitably implemented decoding, AICs allow accurate reconstruction of signals of interest, enabling novel digital receivers that provide dramatically increased performance over traditional approaches at a given level of mixed-signal technology.

The recently concluded DARPA Analog-to-Information (A-to-I) Study Phase Program<sup>1</sup> evaluated AIC concepts, fundamental performance bounds, and preliminary implementation strategies including<sup>2</sup> finite rate of innovation, non-linear encodings, and compressive sampling. This study indicated significant promise for AIC technologies in a variety of stressing RF applications in which the useful information bandwidth is less than the overall bandwidth of regard. In these cases A-to-I enabled substantially reduced sampling rates compared to standard Analog-to-Digital Converters (ADC) implementing the usual quantized Shannon representation, i.e., uniform discretized samples at or greater than the Nyquist rate of the bandwidth of regard. Furthermore, the study established that AIC output data is automatically compressed relative to Nyquist rate data; in remote sampling applications this may also provide reduced transmission bandwidth and/or onboard digital compression requirements.

To exploit these promising attributes, DARPA is soliciting research proposals for an A-to-I Receiver Development program leading to effective designs for innovative AIC-based digital receiver systems and subsequent demonstrations of prototypes of these systems in stressing RF applications of interest to the DoD. Significant advantages over traditional approaches will be established by quantitative evaluation and testing on representative simulated and actual RF environments.

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<sup>1</sup> For background information on the A-to-I study program see, for example, <http://www.darpa.mil/mto/programs/atoi/index.html>, as well as the archived solicitation for the study program: <http://www.darpa.mil/mto/solicitations/baa05-35/index.html>.

<sup>2</sup> These concepts represent relatively new fields of research. While no primary reference books have been published at this time, numerous resources detailing theory and application are available on the internet.

Proposed research must develop and apply innovative A-to-I approaches to obtain revolutionary advances in data conversion and digital receiver performance. Specifically excluded is research that primarily results in evolutionary improvements to the existing state of practice in ADCs and digital RF receiver technology.

### **Background and A-to-I Vision**

Analog-to-digital conversion is key to transducing analog information from complex RF environments into the digital domain for analysis and exploitation, especially in modern digital receiver concepts where it is deployed as close as possible to the antenna interface. Conversion of the received signal early in the receiver chain captures fragile signal information as quickly as possible into the stable digital format and permits digital signal processing (DSP) to replace more expensive and less precise analog front-end processing prevalent in more traditional receivers. The tremendous flexibility, precision, and affordability of modern DSP suggests many advantages for digital receivers, including frequency/bandwidth agility, software defined multifunctionality, increased precision and reliability in separating desired signals from interference and background clutter, as well as seamless integration with subsequent digital processing for signal exploitation.

These advantages are purchased at the cost of burdening the ADC with conversion of the entire bandwidth of interest at a linear dynamic range sufficient to accurately capture the high variability of signal strengths present. DoD applications are particularly stressing in this regard: it may be desirable to search very large bandwidths (1 GHz and up) for a few weak target signals hidden within a dominant complex background of strong interference, jammers, and clutter. The masking effect of these interferers is compounded by the receiver's own imperfections, which tend to spread some of the energy from the interferers around the band, potentially obscuring the true signal(s) of interest. DoD applications may require ADCs providing a linear dynamic range approaching 100dB or more over broad bandwidths in order to capture both weak signals and strong interferers without excessive distortion.

Requirements of this sort pose a significant challenge to hardware implementations of high precision Shannon-based conversion. For example, high dynamic range conversion of instantaneous bandwidths in the GHz range may require sampling rates of multiple gigasamples per second with a sample aperture jitter held to a tenth of a picosecond or less. Other implications for hardware include stringent limits on sources of noise and nonlinearities. These challenges help explain why surveys<sup>3</sup> of high speed ADC technology indicate that current capabilities fall well short of needs and moreover are advancing at a slow rate. These analyses indicate that many years

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<sup>3</sup> See for example H. Walden. "Analog-to-digital converter survey and analysis," IEEE Journal on Selected Areas in Communication, 17(4):539-550, April 1999 and "Performance trends for analog-to-digital converters," IEEE Commun. Mag., Feb. 1999, pp. 96-101; B. Le et al. "Analog-to-Digital Converters," IEEE Signal Processing Magazine, November 2005, pp. 69-77.

of further investment in technology will be required in order to meet the performance expected for many current DoD high precision, broad-band applications.

Furthermore, even if ADC technology *could* be instantly advanced to meet these requirements, the resulting data volume would pose significant challenges to downstream digital manipulation. Already some of today's receivers produce data so fast that it is difficult to even transfer or store. Often much of this carefully digitized data is of low value in applications and, in practice, is eliminated by digital compression and extraction algorithms right after conversion. In effect, expensive state-of-the-art mixed signal hardware is employed to produce a glut of data of which most is immediately discarded by costly and power-hungry digital processors.

This inefficiency is generally viewed as inevitable since, prior to digitization, it is unknown where and how the compressible salient information is embedded in the broad bandwidth of the RF environment. Computation would seem to be required in order to find and winnow out this relatively sparse information from the mass of broad band clutter and noise; to ensure the critical information is detected and/or recovered, conventional wisdom dictates that all the input data must be accurately measured and digitized by a fast ADC before the useful parts can be extracted by digital processing.

The fast sampling rate of the conventional ADC (and all the technological challenges of implementing it) is set by Shannon's sampling theorem to be proportional to the bandwidth of the RF environment of interest. This approach exploits only the minimal prior knowledge concerning the RF environment. The fundamental question of A-to-I is whether it is possible to reduce the sampling rate to the generally much lower rate of the sparse information of interest embedded within the broad bandwidth of the RF environment, and to do so without incurring significant performance loss. A-to-I aims to exploit only a bit more knowledge than the ADC: specifically, that the interesting information is somehow compressible relative the overall data bandwidth. A-to-I does not require prior understanding of the details of the embedding of that information within the band of regard.

These ideas will lead to AICs that perform as if it were possible to directly acquire just the important information about the signals; in effect not acquiring that part of the data that would eventually just be 'thrown away' by digital compression of a traditional ADC output. As manmade signals are essentially always significantly compressible in some representation, this represents a dramatic potential benefit for many applications. By focusing mixed signal hardware resources on the relevant information content embedded within a wideband high dynamic range RF environment and spending commensurately less attention on its remaining noise and interference content, A-to-I could significantly reduce the front-end complexity and cost by measuring just the relevant information. The reduced output data volume also reduces downstream digital processing complexity and improves inference through dimensionality reduction. Analog-to-Information presents a compelling vision of

combining sensing and processing in order to significantly simplify and improve both.

DARPA's recently concluded Analog-to-Information study has provided extensive theoretical evidence supporting this concept.<sup>1</sup> The study determined fundamental bounds on the scaling of A-to-I measurement resources with the information content of an RF environment, in contrast to the usual practice in Nyquist-rate ADCs of scaling measurement with the overall bandwidth of the RF environment that the information is embedded in. Implementation issues were also examined, using simulation and even some simple hardware demonstrations for several different A-to-I protocols. These were found to be generally practicable for various RF environments while indeed using relatively limited prior knowledge about the class of signal to be acquired: basically just the knowledge that the signal of interest would be compressible within a certain representation. Some of the AIC techniques considered in the study are universal, meaning that the compressive representation need not be known in advance.

A-to-I's weak dependence on prior knowledge is in marked contrast with conventional wideband approaches like de-ramp processors, which employ a specialized analog front end to reduce sampling requirements using rather specific attributes of a small class of signals. Compared to these concepts, A-to-I is attractive for its potential use in very general and highly capable receivers which do not require an elaborate complex of multiple specialized and highly tuned front-end analog components.

Most of the AIC techniques evaluated to date can be characterized as encoded sampling schemes which fold the bandwidth of regard via sub-Nyquist sampling. However, rather than simply subsampling the bandwidth, specially coded measurements are made, creating distinctive signatures for the signals of interest which persist after folding. This encoding enables the reconstruction (decoding) of the signals of interest from the folded signal environment, an undetermined inversion regularized by various known constraints including sparsity. Promising encoding schemes studied include various instantiations of compressive sampling, finite rate of innovation, and nonlinear coding of various sorts.

A variety of algorithms for extracting the information of interest from the encoded compressed measurements have been characterized in terms of their computational complexity and dynamic range performance as a function of the particular level of information required. The study also considered the potential role of adaptivity in A-to-I conversion including agile "analog-to-feature" converters, predictive encoders, and up-to-date interference cancellers which actively modify their decoding and/or encoding approach in response to estimates of the environmental state. While more complicated than the non-adaptive approaches, they may realize even greater reduction of sampling when used in conjunction with some of the novel concepts for non-adaptive A-to-I conversion.

The A-to-I study program has indicated significant promise exists for AICs. There are now several different A-to-I concepts, each with its associated theoretical performance bounds as well as preliminary understanding of practical implementation issues, including the impacts of hardware imperfections, high dynamic range environments, environmental variability, and computational complexity. These early steps allow one to project a potential for dramatic impact of A-to-I technology on hard real world problems. We now can envision practical A-to-I based digital receiver system solutions offering the following key attributes:

- High performance in challenging broad-band high dynamic range RF environments
- Universality (or sufficient flexibility)
  - Applicable to a broad class of signals of interest and RF background scenarios
  - Suitable for a variety of applications of DoD interest
- Practical and realizable hardware advantages over Nyquist rate converters for given applications
  - Reduced effective complexity/increased robustness over comparable ADC solutions
  - Full system advantages over ADC based solution: from RF through back-end
  - Robust to variations and non-idealities (noise, jitter, spurs)
  - Soft degradation with departure from assumptions (such as sparsity)
- Real time performance

The next challenge lies in advancing our current preliminary A-to-I concepts and theoretical performance projections into a well-developed design discipline, leading to rigorous demonstrations of the advantages of A-to-I receiver systems over conventional ADC based approaches.

### **A-to-I Receiver Development Program Objectives**

DARPA seeks to advance from the current theoretical promise of A-to-I concepts to a state of practical technological utility. Sufficiently matured A-to-I technology may then be applied to challenging DoD problems to provide significant advances in digital receivers, capable of accurate extraction of useful information from broad band RF environments crowded with a large dynamic range of diverse signals and interference.

The next step towards the A-to-I vision is the design and demonstration of brassboard prototypes of advanced A-to-I digital receivers providing dramatic improvements in performance and form factor over current state of the art solutions for challenging DoD applications. This step will be realized in a development program primarily

concerned with the practical and affordable mechanization of A-to-I receiver designs demonstrating significant advantages over conventional ADC approaches. DARPA is soliciting proposals addressing the following goals of the A-to-I Receiver Development program:

1. Develop and exercise a practical design capability for AICs and associated digital receivers.
2. Determine specific opportunities and approaches for employing that capability to fundamentally transform current approaches to specific RF challenge problems.
3. Design, construct, and demonstrate innovative AIC-based digital receiver prototypes which address one or more of these challenge problems and quantitatively demonstrate performance far in excess of standard ADC-based approaches (if any) to these problems.

Development will be conducted in two phases. Phase I will be dedicated to the detailed design of the prototype AIC receivers and validation of their projected performance through detailed simulation, possibly augmented by measurements of a few critical front-end components. For designs judged sufficiently successful and promising by the government review team, a possible Phase II will address the construction of brassboard receivers and evaluation of these in realistic demonstration environments.

Proposers should describe in detail one or more challenging scenarios of significant DoD interest along with detailed design concepts for revolutionary A-to-I digital receivers addressing them. The proposal must present detailed test, evaluation, and demonstration plans. The projected performance of the proposed A-to-I receiver design must be clearly and convincingly shown to offer significant advantage over performance achievable using the current state of the art.

### ***Challenge Problems***

A variety of potential RF challenge problems provide good targets for illustrating advantages of A-to-I solutions over conventional state of the art with respect to dynamic range, bandwidth of regard, and/or power efficiency. A few challenging RF scenarios where A-to-I concepts are projected to offer significant advantages, include:

- High band electronic surveillance measures (ESM)/electronic intelligence (ELINT)/communications intelligence (COMINT) scenario: **pulsed emitters (down to sub-microsecond or better), low-probability of intercept (LPI) signals, some communications signals.** Design universal receiver providing 70 dB of dynamic range over 10 GHz effective instantaneous bandwidth (EIBW)<sup>4</sup> or better.

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<sup>4</sup> The effective instantaneous bandwidth (EIBW) is the instantaneous bandwidth (IBW) which the AIC can reconstruct unambiguously.

- Low band COMINT/ELINT scenario dense **communications environment, some pulsed radar signals**. Design receiver providing 80 dB of dynamic range at 1 GHz effective EIBW or better.
- Low band communications and SIGINT in low power personal digital assistant (PDA) form factor. 200 MHz EIBW, 90 dB dynamic range.

These scenarios are offered only as indications of the range of possible challenge problem areas, and should not be construed as a definitive list of A-to-I application challenges. Proposers must offer a detailed description and rationale for each particular choice of scenario, its DoD relevance, and their proposed methods for quantitatively evaluating their receiver design against it in simulation at the end of Phase I. Proposers must also describe detailed description of their plans for quantitative evaluations of their Phase II brassboard system in lab and chamber testing, and/or live field tests representative of their scenario.

#### ***Figures of Merit for A-to-I Receivers***

The performance targets of proposed A-to-I receiver designs should be quantified with respect to standard metrics relevant to each proposer's chosen challenge application area(s). Examples of application-specific figures of merit may include:

- probabilities of detection and correct classification vs. false alarm and misclassification rates
- mean-squared error of reconstruction
- bit error rate for communication

For some projects it may also be useful to quantify total power, size, and weight. Proposers should also state explicitly if the functions of the receiver (reconstruction, detection, parameter estimation, etc.) can be performed in real-time and quantify output latency.

The predicted performance of proposed A-to-I designs should be compared in detail to the current capabilities of state-of-the-art solutions for the relevant application area. This comparison should be done with the same set of metrics. Successful proposals must make a technically convincing case that their approach will lead to dramatic quantitative advances with respect to these metrics as compared with what is achievable using state-of-the-art conventional ADCs. The same metrics will also be used for quantifying progress towards the performance targets in program simulations and demonstrations at the end of Phase I and II respectively.

In addition to application/scenario-specific figures of merit pertinent to a specific design, the anticipated performance of all proposed designs must also be evaluated using the following commonly applicable metrics: the effective RF band of regard

and the effective dynamic range achievable for digitizing meaningful signals of interest at a given dissipated power, within realistic and representative clutter and noise scenarios. The performance quantification of performer's design and its comparison to the performance of conventional state of the art must also be given in terms of the general figure of merit

$$FOM = \frac{2^{ENOB} EIBW}{Power_{dissipation}}$$

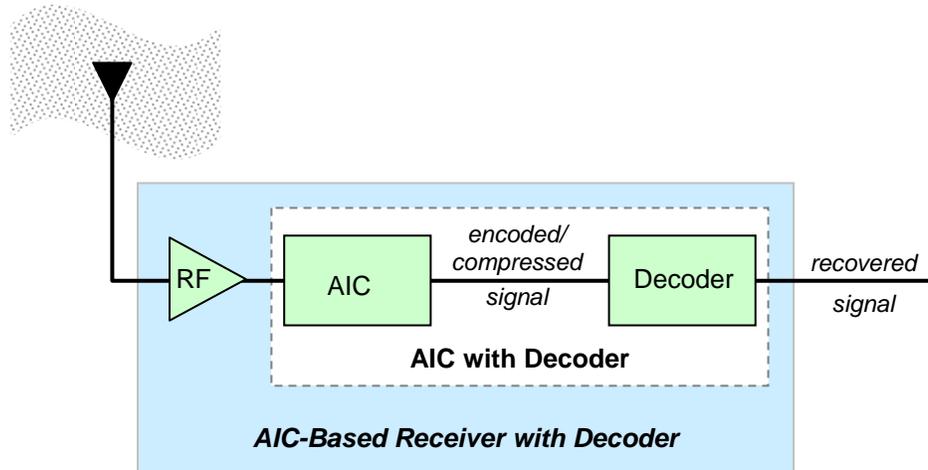
where ENOB is the effective number of bits of dynamic range provided over the effective instantaneous bandwidth (EIBW) of regard. This is to be calculated assuming full reconstruction of the signals of interest. Any dependence on the sparsity and spectral occupancy of the environment should be thoroughly discussed. The specific definition(s) and mechanism(s) employed for evaluating the dynamic range<sup>5</sup> should be explained and justified in detail by the proposer.

For some applications and operational concepts the decoder power may not be a stringent limit, so proposers may also wish to report the power dissipation of their AIC and receivers without counting the decoder. This information can be conveniently summarized in the form of tables (sufficiently annotated) such as the example below. For comparison purposes, proposers should develop and present analogous tables for the performance conventional state-of-the-art approaches that could reasonably be applied towards the same DoD challenge problem as their proposed design.

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<sup>5</sup> For each design/application, the dynamic range and Figures of Merit incorporating it should be provided using all relevant measures and tests, eg. SNR, single and multiple tone SFDR, and so forth.



| Parameter   | Analog-to-Information Converter |                  | AIC-based Receiver System |                           |
|---|---------------------------------|------------------|---------------------------|---------------------------|
|   | AIC without Decoder             | AIC plus Decoder | AIC Receiver Subsystem    | AIC Receiver plus Decoder |
| Dynamic Range (ENOB)                              |                                 |                  |                           |                           |
| Frequency Band of Regard ( $f_{min} - f_{max}$ )  |                                 |                  |                           |                           |
| Power Dissipation                                 |                                 |                  |                           |                           |
| $FOM = \frac{2^{ENOB} EIBW}{Power_{dissipation}}$ |                                 |                  |                           |                           |

Proposers may also wish to report estimated effective FOM for other functions such as detection, classification, and parameter estimation which may arise in their particular application scenario.

### Technical Areas of Interest

DARPA is primarily interested in integrated projects addressing all research and development activities required to design, construct, and demonstrate innovative A-to-I receivers and to convincingly establish their advantages over conventional approaches in meaningful and challenging DoD RF applications.

Proposers should address all aspects of such a project in a comprehensive manner. In particular, proposals should describe plans and capabilities for performing full trade-space analyses for A-to-I designs capable of meeting the requirements of specific applications. These analyses should be carried out in the context of the full RF chain. Proposers should also describe their approach for assembling and testing cost-effective brassboard prototype receivers. Proposers must demonstrate a detailed understanding of RF environments and scenarios of interest to the DoD, provide

detailed technical rationale for their particular choice of RF challenge problem(s), and provide detailed plans for constructing and conducting convincing demonstrations of their receiver's performance advantages over state-of-the-art solutions capability when applied to their choice of challenge problems.

While significant theoretical groundwork has already been done in the A-to-I study phase, there are still many remaining research directions where further innovation could enable effective AIC designs. A few representative research topics of possible interest for this program include:

- A-to-I encoder/decoder co-design for improved dynamic range and reduced computational complexity.
- More structured encoding schemes that possibly enable higher dynamic range and more readily interpretable output.
- Mechanisms for improving performance of A-to-I receivers by taking advantage of ancillary measurements, prior knowledge, and assumptions about signals of interest and the background RF environment.
- Adaptation of the A-to-I encoding and decoding schemes, with strong emphasis on those which minimize front-end complexity.
- Mechanisms for implementing extensions of compressive sampling ideas to relatively crowded bands, perhaps involving robust partial cancellation of strong interferers and other adaptation.
- Performance of exploitation tasks in the A-to-I converter.
- Multi-channel compressive sampling.
- Agile systems that automatically determine the degree of signal compressibility and adjust AIC sampling parameters accordingly.

### **A-to-I Receiver Development Program Structure**

The A-to-I Receiver Development Program will create and evaluate A-to-I receiver designs offering significant advantages over conventional receivers in challenging RF scenarios of high interest to the DoD. Each Proposer may describe more than one design and evaluation project, but each truly different design should be priced as a separate option.

The program will be conducted in two phases. The first will accomplish design and validation of simulated AIC receivers. For designs judged sufficiently successful and promising by the government review team, a second phase will create a brassboard receiver and evaluate its performance advantages in realistic test and demonstration environments.

Each phase will have definite and measurable milestones. Each phase will culminate in specified demonstration(s) that will serve to validate that the objectives of that phase have been achieved.

***Phase I Objectives and Go/No-Go evaluation***

A-to-I designs will be formulated, finalized, and their performance established in detailed simulation studies representative of challenging DoD RF application scenarios of the proposer's choice. Performers may wish to prototype critical hardware components of their design in order to retire risk early; models based on performance measurements of these components should be incorporated into the simulation of the overall receiver. Go/No-Go will be determined based on comprehensive and convincing demonstration through detailed simulation (incorporating measurements as appropriate) that a particular receiver design meets or exceeds the aggressive performance goals projected for it in the proposal. Additional factors in the government Go/No-Go review will include the projected practicality, affordability, and form factor of the receiver designs, the measured performance of any hardware prototypes constructed, and the realism and DoD relevance of the simulated test environment and evaluation conducted.

The Go/No-Go comparison between proposed and simulated performance will be made in terms of the general FOM (see "Figures of Merit" section above), as well as the key application-specific figures of merit pertinent to the proposer's particular RF challenge problem or problems. Therefore, proposers must clearly spell out the performance goals for their design or designs in terms of these figures of merit. To the extent possible, proposers are encouraged to present this information with the aid of tables like those described in the "Figures of Merit" section above, and to also include a comprehensive tabular comparison to conventional state-of-the-art receiver approaches that could be reasonably applied to the same RF challenge problem.

The realism, comprehensiveness, and relevance to applications of the proposed evaluation and demonstration procedures will be a key factor in both proposal evaluation and in the Phase I Go/No-Go determination. Proposers should describe in detail their specific plans for the end-of-phase evaluation and demonstration of their designs, including details of the simulated signal environments used and the particular testing methods used to determine the performance with respect to the various figures of merit.

For any hardware component to be prototyped in Phase I, the proposal should quantitatively describe goals for its performance with respect to all appropriate key attributes (e.g. jitter, noise figure, bandwidth, dissipated power, etc.) that drive the ultimate receiver-level performance. The relationship of the component's performance to the ultimate system performance should be clearly explained in the proposal. The actual measured performance of such prototypes relative to the proposal's projected performance will be another important part of the Phase I Go/No-Go evaluation. If no hardware prototypes are to be developed in Phase I,

proposers must carefully justify this decision in terms of the risk to the overall project.

***Phase II Objectives and Final Demonstration***

Particular A-to-I receiver system design solutions must demonstrate in practice their capability to find useful information embedded in a variety of complex RF environments and to directly measure it in a more concentrated form than current practice allows. To this end Phase II will build a brassboard design and demonstrate it against realistic and challenging RF environments in simulator, chamber, and/or live field tests if necessary. Proposers should describe in detail how their prototype will be constructed and tested as well as a detailed plan for evaluating its performance against challenging scenarios of significant DoD interest.

In addition to demonstrating functionality of A-to-I based receiver systems, the A-to-I Program seeks to demonstrate the transition potential of this technology. Proposers should describe plans for pursuing transition to practice at the end of the program. Both DoD-specific and non-DoD applications may be considered.

***A-to-I Receiver Development Project Schedule and Budget***

Proposers must define a realistic schedule and budget that meets the milestone and deliverable requirements for each of the two phases of the A-to-I Receiver Development program described previously. The proposed period of performance and milestone schedule for each of the phases will be included by proposers within their technical proposals and will be factors considered as part of the source selection process. Although shorter phases are generally preferable, each phase must be adequate in duration and resources to meet its objectives, assuming reasonable risks and at a reasonable cost. Proposals should discuss plans for managing these factors. Program plans should include interim milestones for every six months.

Cost sharing is not required and is not an evaluation criterion, but is encouraged where there is a reasonable probability of a potential commercial application related to the proposed research and development effort.

***A-to-I Teaming Structure***

Teaming is strongly encouraged. It is anticipated that the development phase of A-to-I will engage the efforts of one or more integrated industry/academic teams with appropriate expertise and experience. This should include mathematical and signal processing expertise in sparse signal representations, optimization, signal processing, information theory, and statistical pattern recognition. It will also be essential for each team to possess detailed understanding of DoD wideband RF applications and challenges. Practical experience with design and evaluation of relevant RF, mixed signal, and digital components, sub-systems, and systems will be required for each team. Success in an A-to-I Receiver Development program will require a well-coordinated effort integrating small to moderate sized teams of investigators whose collective expertise spans these key areas. These multidisciplinary approaches will require a well-defined practical management structure for integrating and

coordinating efforts from researchers belonging to traditionally disparate communities.

Projects involving individual investigators or investigator teams of narrower expertise may possibly be considered if they show outstanding innovation and a strong potential applicability to the broad A-to-I goals, including a clear mechanism for ultimately integrating successful developments into a full A-to-I receiver/decoder system.

***A-to-I Receiver Development Program Deliverables***

Full details of receiver designs, analyses, performance characterization, and demonstrations will be provided privately to the DARPA Program Manager in a comprehensive final report for each phase of the program. This report must clearly describe performance in terms of the metrics previously discussed and comparison to state-of-the-art receivers utilized for similar applications. The report must identify conditions for which suggested approaches will be clearly advantageous relative to Shannon sampling, and quantify the advantage. Reports must clearly define all assumptions concerning required prior knowledge and assumptions about the signal of interest and the background RF environment. They should also identify and explain the potential role of any ancillary measurements used to identify, estimate, and possibly mitigate obvious signals and bands containing irrelevant energy.

Reports should describe, analyze, and sanity-check all technological strategies advanced in implementing and demonstrating A-to-I concepts. Reports should provide a clear and convincing case for the ultimate practicability for any design which promises significant advantages over a conventional baseline approach.

Relevant software and hardware prototypes may be subject to test and evaluation in qualified government facilities and must be provided for that purpose upon request of the DARPA Program Manager.

The final report should present the performer's strategy for transitioning or otherwise commercializing this technology in DoD and/or private sector markets. Information should be given on the market need addressed by A-to-I receiver technology as well as on the anticipated size of the market. If possible, performers should indicate specific systems to which they intend to apply A-to-I technology.

A-to-I Receiver Development projects will provide key results (at least at a high level) at program meetings held at Kickoff, Principal Investigator (PI) Review, and Final Review Meetings, at which all Performer Teams will be represented. Meetings with individual performer teams may be held following each of these meetings at the discretion of the DARPA Program Manager.

Reports may take the form of a Power Point briefing. Additional materials, such as Quad Charts or brief interim reports, may be requested by the DARPA Program Manager on occasion.

## Proposal Technical Content

Proposals should provide a detailed description of a coherent research effort addressing the A-to-I receiver development program goals and vision described above. Proposers must describe their research programs in detail sufficient to enable an in-depth review of the key technical and management issues. Each proposal must include the following technical content:

1. A clear and technically sound strategy for extending and applying fundamental understanding of A-to-I in order to create AIC-based receiver designs.
2. Detailed description of and rationale for the particular choices of RF challenge problems used to determine and demonstrate particular A-to-I receiver designs. This should include details of representative RF environments and signal classes to be examined as well as the particular application-specific objectives and metrics for evaluating receiver performance. A detailed case for the realism and importance of the particular choices of DoD RF challenges should be made
3. A detailed description of proposed designs for one or more particular advanced A-to-I receivers addressing the selected DoD RF challenges. It may be useful to clearly indicate the signal bandwidth/rate at key stages of the receiver chain. Proposers should give detailed rationale for their design(s). Any technically challenging components, such as Nyquist-rate front end components, should be specified and risk reduction strategies identified. The anticipated performance of these designs should be comprehensively developed and justified in terms of its contribution to the overall receiver performance. The discussion should include performance robustness in the face of non-idealities and variation in the structure of the RF environment, signals of interest, and application. Proposers must clearly delineate anticipated specific advantages of their designs over traditional ADC-based approaches applicable to the RF challenge problems of interest. Only proposals presenting a technically convincing case for dramatic quantifiable advances over what is achievable using state-of-the-art conventional ADCs will be considered selectable.
4. A detailed presentation of the quantitative performance targets of the proposed A-to-I receiver designs, expressed in terms of standard metrics as described previously in the “Figures of Merit” section. These include metrics relevant to each identified challenge application area as well as the more generic metrics appropriate to all proposed designs: effective instantaneous bandwidth of regard, effective dynamic range achievable for digitizing meaningful signals of interest, and the dissipated power for operation in realistic and representative clutter and noise scenarios. Corresponding metrics should also be used to compare the performance of the proposed design to the performance of state-of-the-art approaches to the same challenge application. Where possible, proposers are encouraged to present the anticipated performance of their design and the comparison to state-of-the-art using tables like those described in the “Figures of Merit” section above. Demonstration of significant quantitative performance

- improvements over the state-of-the-art is a key objective of the program, so the proposer's ability to lay out a convincing research program likely to produce significant quantifiable advances is a key evaluation criterion for the proposals.
5. A comprehensive test and demonstration plan for the Phase I Go/No Go. This should include a detailed description of testing methods for quantitatively evaluating in detailed simulation (possibly supported by measurement) the performance goals of the A-to-I receiver in terms of effective bandwidth, dynamic range, estimated power, and application specific metrics. The evaluation plan should include "real world issues," such as the impact of thermal noise, the impact of departure from sparsity and the impacts of component non-idealities. It should also include details of the procedures for exercising the simulated receiver design against realistic and representative simulations of the RF environments for the purpose of evaluating the performance of the design with respect to application-specific figures of merit. For projects implementing hardware component prototypes in Phase I, proposers should clearly describe performance goals and test plan for quantitatively verifying that the projected performance has been attained by the end of the Phase. This performance should be quantified with respect to appropriate key attributes (e.g. jitter, noise figure, bandwidth, dissipated power, etc.) that drive the ultimate receiver-level performance. The relationship of the component performance to the ultimate system performance should be clearly explained. The performance of such prototypes relative to the projected requirements will be an important part of the Phase I Go/No-Go evaluation. If no hardware prototypes are to be developed in Phase I, proposers must carefully justify this decision in terms of the risk to the overall project.
  6. A plan for constructing brassboard prototypes in Phase II.
  7. A detailed plan and rationale for brassboard evaluation and demonstration of brassboard prototypes in Phase II with lab, chamber, and/or live collection via field testing in a realistic and challenging environment. Proposers should describe relevant experience and facilities for performing such evaluations and indicate how their proposed demonstration will support potential transitions to particular DoD applications.
  8. A detailed description of the proposed programmatic structure and management plan for accomplishing the proposed program tasks and meeting technical objectives.
  9. A transition/commercialization strategy, detailing plans for commercializing this technology in DoD and/or private-sector markets. Proposers should provide specific information on the market need addressed by their proposed technology developments and the size of the market, along with any specific current and/or anticipated RF systems to which this technology may be applied.

10. An elaboration of the capabilities and role of each of the (institutional) members of the investigator team, including:
  - a. a description of the overall experience of each of the team members.
  - b. a demonstration that the team has the breadth and depth of expertise required to realize the required technical innovations, implementation, and validation as well as systems expertise sufficient to identify areas of significant impact in DoD applications.
  - c. a detailed discussion of the specific role/contributions of each of the proposed team members.
  - d. a detailed discussion of the plans for integrating the individual contributions of each of the proposed team members and working across traditional discipline and subsystem boundaries.

Details of proposal format are given in section IV of this BAA.

## **SECTION 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 offerors. 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 offeror. If the proposed effort is inherently divisible and nothing is gained from the aggregation, offerors 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 offerors 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.

### **SECTION III: ELIGIBILITY INFORMATION**

#### **A. Eligible Applicants**

All responsible sources capable of satisfying the Government's needs may submit a proposal that shall be considered by DARPA. Historically Black Colleges and Universities (HBCUs), Small Businesses, Small Disadvantaged Businesses and Minority Institutions (MIs) are encouraged to submit proposals and join others in submitting proposals; however, no portion of this announcement will be set aside for these organizations' participation due to the impracticality of reserving discrete or severable areas of this research for exclusive competition among these entities. Independent proposals from Government/National laboratories may be subject to applicable direct competition limitations, though certain Federally Funded Research and Development Centers are excepted per P.L. 103-337§ 217 and P.L 105-261 § 3136. Proposers from Government/ National Laboratories must provide documentation to DARPA to establish that they are eligible to propose and have unique capabilities not otherwise available in private industry.

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

##### **1. Procurement Integrity, Standards of Conduct, Ethical Considerations, and Organizational Conflicts of Interest**

Certain post-employment restrictions on former federal officers and employees may exist, including special Government employees (including, but not limited to, Title 18, Section 207, United States Code, the Procurement Integrity Act, 41 U.S.C. 423, and FAR 3.104.) Current federal employees are prohibited from participating in particular matters involving conflicting financial, employment, and representational interests (18 USC 203, 205, and 208.) 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 is a detailee to DARPA under the Intergovernmental Personnel Act (IPA) from the University of Maryland at College Park 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 include an effective mitigation plan, or that do not include a mitigation plan at all, 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 contact information and a summary of the potential conflict by email to the mailbox address for this BAA at [BAA08-03@darpa.mil](mailto:BAA08-03@darpa.mil), before time and effort are expended in preparing a proposal and mitigation plan. If, in the sole opinion of the Government after full consideration of the circumstances, any conflict situation cannot be effectively mitigated, the proposal may be returned without technical evaluation and withdrawn from further consideration for award under this BAA.

## **B. Cost Sharing/Matching**

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

## **C. Other Eligibility Criteria**

### **1. Collaborative Efforts**

Collaborative efforts and meaningful teaming arrangements 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.

## **SECTION IV: APPLICATION AND SUBMISSION INFORMATION**

### **A. Address to Request Application Package**

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

### **B. Content and Form of Application Submission**

#### **1. Proposal Information**

The time and date for submission of proposals 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.

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

The typical proposal should express a consolidated effort in support of one or more related technical concepts or ideas. Disjointed efforts should not be included into a single proposal.

Restrictive notices notwithstanding, proposals may be handled, for administrative purposes only, by a support contractor. This support contractor is prohibited from competition in DARPA technical research and is bound by appropriate nondisclosure requirements. Proposals 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.

Proposals should be submitted electronically using one of the two submission methods. Note that neither dual submissions nor a paper copy are required. Please note that proposers will receive a confirmation email generated from the T-FIMS electronic system (described below) as receipt that their proposal has been received.

1. DARPA/MTO will employ an electronic upload process, the Technical Financial Information Management System (T-FIMS) Proposal Submission System, for proposal submissions to this BAA. Proposals should be in Microsoft Word format or PDF and submitted via a web site interface:

<https://www.tfims.darpa.mil/baa>. \*Please note that T-FIMS will acknowledge receipt of the submission via e-mail. This e-mail will assign a control number that should be used in all correspondence regarding the proposal.\*

2. Offerors may elect to use the Grants.gov APPLY (<http://www.grants.gov/>) function if the applicant is seeking a grant or cooperative agreement. The APPLY function replaces the proposal submission process that other offerors follow. The APPLY function does not affect the proposal content or format. The APPLY function is electronic; offerors do not submit paper proposals in addition to the Grants.gov APPLY electronic submission.

DARPA will attempt to review proposal within thirty (30) calendar days after receipt. Full proposals will be reviewed as they are received. Early submissions of full proposals are strongly encouraged because selections may be made at any time during the evaluation process. Proposers submitting full proposals are required to do so no later than **4:00 p.m. Eastern Time on Friday, December 21, 2007** in order to be considered during the initial round of selections; however, proposals received after this deadline may be evaluated up to one year from date of posting on FedBizOpps (<http://www.fedbizopps.gov/>) and Grants.gov (<http://www.grants.gov/>). Full proposals submitted after the due date stated in the BAA may be selected contingent on the availability of funds.

**Proposer Registration:** Organizations planning to submit proposals via T-FIMS must register at: <http://www.tfims.darpa.mil/baa>. Only the lead or prime organization should register. One registration per proposal should be submitted. This means that an organization wishing to submit to multiple technical topic areas should complete a single registration for each proposal. The proposer makes no commitment to submit by registering. Please note that it is recommended that proposers register on T-FIMS at least a week prior to the submission deadline to allow sufficient time for completing the registration process and uploading the submission. Please also note that proposers will receive a confirmation e-mail generated from the T-FIMS electronic system as receipt that their proposal has been received.

The T-FIMS Proposal Submission System supports the following file formats: Portable Document Format (PDF), Word Document (doc), Plain Text (txt), Comma-separated I-7 Values (CSV), PowerPoint Presentation (ppt), Excel Worksheet (xls), and Excel Workspace (xlw). Proposal submissions made through the T-FIMS Proposal Submission System must be no larger than 50 megabytes per file.

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 [baa08-03@darpa.mil](mailto:baa08-03@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/>.

All material submitted electronically must be UNCLASSIFIED. Please DO NOT attempt to submit a CLASSIFIED material proposal through an electronic upload process as this is PROHIBITED. Offerors intending to include classified, or potentially classified, information or data as part of their proposals shall submit an UNCLASSIFIED PROPOSAL referring to a classified annex. The offeror should contact the Technical POC for this BAA, or the Security POC cited below, for guidance on submitting the classified annex.

All administrative correspondence and questions on this solicitation, including requests for information on how to submit a proposal to this BAA, should be directed to the administrative addresses below; e-mail or fax is preferred. A “Proposer’s Questions,” website will be posted for BAA 08-03 on the DARPA, Microsystems Technology Office solicitations page ([www.darpa.mil/mto/solicitations/index.html](http://www.darpa.mil/mto/solicitations/index.html)). If you would like to have a question answered and posted on this site, please send your question to the following address: [BAA08-03@darpa.mil](mailto:BAA08-03@darpa.mil). DARPA intends to use electronic mail and fax for correspondence regarding BAA 08-03. Proposals may not be submitted by fax or e-mail; any so sent will be disregarded. DARPA encourages use of the World Wide Web for retrieving the Broad Agency Announcement and any other related information that may subsequently be provided.

The administrative addresses for this BAA are:  
Fax: (703) 741-0079 (Addressed to: DARPA/MTO, BAA 08-03),  
Electronic Mail: [BAA08-03@darpa.mil](mailto:BAA08-03@darpa.mil)

Full Proposal Format: All proposals must be in the format given below. Nonconforming proposals may be rejected without review. Proposals shall consist of two volumes: Volume 1, Technical and Management Proposal; Volume 2, Cost Proposal. All pages shall be printable on 8-1/2 by 11 inch paper with type not smaller than 12 point. The proposal page limitations given below include all figures, tables, and charts.

The required sections of Volume I, Sections I, II, and III (described in more detail below) shall not exceed seventy-two (77) pages total. The mandatory maximum page lengths for each section are shown in parenthesis ( ) below. For purposes of guidance, the recommended maximum page lengths for each subsection are shown in braces { } below. Section IV of Volume I is an optional appendix of background material comprising bibliography, papers, presentation slides, and resumes and does not have a page limit. The submission of other supporting materials along with the proposal is strongly discouraged and will not be considered for review.

## Volume I, Technical and Management Proposal

### Section I. Administrative (2 pages total)

- A. {1} **Cover sheet.** This should 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); (10) date proposal was prepared; and (11) proposal expiration date.
- B. {1} **Official transmittal letter.**

### Section II. Summary of Proposal (Not more than 15 pages total)

This section provides an overview of the proposed work as well as a succinct introduction to the associated technical and management approaches. Further elaboration will be provided in Section III of the proposal.

- A. {4 pages recommended maximum} Innovative claims for the proposed research. This section is the centerpiece of the proposal and should succinctly indicate the uniqueness and benefits of the proposed approach relative to the current state-of-art and alternate approaches. This section should also succinctly explain how and to what extent (being as quantitative as possible) the proposed work will benefit the Department of Defense.
- B. {2} Summary of deliverables associated with the proposed research and the prospects and paths to practical technological implementation. Summarize in this section all proprietary claims to results, prototypes, intellectual property, or systems supporting and/or necessary for the use of the research, results, and/or prototype. If there are no proprietary claims, this should be stated.
- C. {1} Summary description of cost, schedule and milestones for the proposed research, including estimates of cost for each task delineated by the prime and major subcontractors, total cost, and any company cost share. For this program, the major milestone will include evaluation in simulation of A-to-I receiver designs, evaluation of brassboard realizations of these receivers in lab, chamber or live environment.

- D. {5} Summary of technical rationale, technical approach, and constructive plan for accomplishment of technical goals with regard to design, construction, and evaluation.
- E. {2} General discussion of related 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 members; (2) the unique capabilities of team members; (3) the task responsibilities of team members; (4) the teaming strategy among the team members; (5) the key personnel along with the amount of effort to be expended by each person during each year.

Section III. Detailed Proposal Information (Not more than 60 pages total)

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

- A. {8} Statement of Work (SOW) written in plain English, outlining the scope of the effort (by Phase) and citing specific tasks to be performed, contractor requirements, and data and/or material deliverables.
- B. {8} Description of the anticipated results that elaborates and enhances the summary presented in Section II. A and B. Detailed figures of merit should be included for the proposed A-to-I receiver at the subsystem and system levels described earlier. This section should also discuss how the technology to be developed in this program will be commercialized and made available to DoD contractors. See also “Intellectual Property.”
- C. {25} Detailed technical approach, rationale, and plan for design, construction and evaluation enhancing and elaborating the summary of Section II. This should include 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.
- D. {6} Comparison with other ongoing research in ADC and A-to-I converters, indicating advantages and disadvantages of the proposed effort relative to the state of the practice as well as other potential A-to-I approaches.
- E. {4} Discussion of proposer’s previous accomplishments and relevant prior work, the background, qualifications and relevant experience of key individuals to be assigned to the program and the facilities and equipment to be utilized. Please do

not attach supporting material (CDs, movies, etc.) to the proposal, except as noted in Section IV below.

- F. {4} Detail of the team structure and plans for its management, enhancing that of Section II, including details of proposed teaming agreements which are required to execute this program
- G. {5} Summary cost schedule and milestones for the proposed research, including estimates of cost for each task, total cost, and any company cost share. Where the proposed 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. Detail the 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, particularly the Go/No-Go metrics, will be measured. The proposed period of performance of the overall program and specifically of each program phase and demonstration should be clearly stated. Milestones must be associated with demonstrable, quantitative measures of performance, and should be summarized in a single table. For this program, the major milestones are simulations and then hardware evaluations establishing the capabilities of proposed A-to-I receivers. Measurable milestones should occur every six months after start of effort.

Section IV. Appendix for Additional Information (Optional-No page limit)

- A. Presentation slides {not more than 20} presenting the following information about the proposed program:
- Basic graphics and/or descriptions depicting the potential implementation(s) of proposed design.
  - Basic graphics and/or descriptions depicting the potential advantages of the proposed design over competing strategies for the proposed RF challenge application, including state of the art ADC based approaches.
  - Predicted receiver performance with respect to appropriate figures of merit for the proposed application.
  - Basic graphics and/or descriptions depicting the proposed strategy for evaluating the design both in simulation and in brassboard form.
  - Unique features of the proposed approach.
  - Primary challenges to be overcome.
  - Preliminary results supporting the claims for the proposed design.
  - Team members and responsibilities.
  - A “Penta Chart” (as shown in the following template) detailing the goals, approaches, challenges, cost and schedule of the proposed effort in a single slide.

|   |   |  |
|---|---|--|
| <b>Performer/Principal Investigator Effort Title</b>  |   | Cost Info:   |
| <p style="text-align: center;"><b>[ PROJECT-NAME ] ACHIEVEMENT</b></p> <p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>STATUS QUO</b></p> <div style="border: 1px dashed black; padding: 5px; margin-bottom: 10px;"> <p><i>What is the state of the art and what are its limitations?</i></p> <p>(DELETE THIS BOX OF TEXT AND INSERT DIAGRAM(S))</p> </div> <p>Primary answer here. Add more text as necessary.</p> <ul style="list-style-type: none"> <li>• First bullet point</li> <li>• Additional as necessary</li> </ul> | <div style="border: 1px solid black; padding: 10px; margin-bottom: 10px;"> <p><b>MAIN ACHIEVEMENT:</b></p> <p>Placeholder explanatory text. Replace with text and diagrams as necessary.</p> </div> <p><b>HOW IT WORKS:</b></p> <p>Placeholder explanatory text paragraph. Replace with text and diagrams as necessary.</p> | <p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>QUANTITATIVE IMPACT</b></p> <div style="border: 1px dashed black; padding: 5px; margin-bottom: 10px;"> <p><i>CHARACTERIZE THE QUANTITATIVE IMPACT</i></p> <p>(DELETE THIS BOX OF TEXT AND INSERT TABLE, GRAPH, OR OTHER SUITABLE VISUALIZATION)</p> </div> <p>First item planned. Add more text as necessary.</p> <p>Second item planned. Add more text as necessary.</p> <p>• Add other points as necessary</p> |
| <p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>NEW INSIGHTS</b></p> <div style="border: 1px dashed black; padding: 5px; margin-bottom: 10px;"> <p><i>What are the key new insights?</i></p> <p>(REPLACE THIS BOX AND INSERT DIAGRAM(S))</p> </div> <p>First key insight. Add more text as necessary.</p> <p>Second key insight. Add more text as necessary.</p> <p>• Add other points as necessary</p>   | <div style="border: 1px solid black; padding: 10px; margin-bottom: 10px;"> <p><b>ASSUMPTIONS AND LIMITATIONS:</b></p> <ul style="list-style-type: none"> <li>• Limitation or assumption</li> <li>• Another limitation or assumption</li> </ul> </div>   | <p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>END-OF-PHASE GOAL</b></p> <div style="border: 1px dashed black; padding: 5px; margin-bottom: 10px;"> <p><i>What are the end-of-phase goals?</i></p> <p>(REPLACE WITH DIAGRAM/TEXT/THRESHOLD CRITERIA)</p> </div> <p>Primary answer here. Add more text as necessary.</p> <ul style="list-style-type: none"> <li>• First key point</li> <li>• Additional as necessary</li> </ul>                                  |
| <p><b>A sentence why it is important/useful</b></p>   |   |  |

- B. Resumes of up to five (5) key personnel (no longer than two pages for each resume).
- C. A brief bibliography of relevant technical papers and research notes (published and unpublished) which document the technical ideas upon which the proposal is based may be provided.
- D. Copies of not more than five (5) relevant papers can be included in the submission.

**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-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 offeror's cognizant Defense Contract Management Agency (DCMA) administration office (if known); (14) Name, address, and telephone number of the offeror's cognizant Defense Contract Audit Agency (DCAA) audit office (if known); (15) Date proposal was prepared; and (16) Dun and Bradstreet (DUN) Number; (17) Tax Identification Number (TIN); (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, subcontracts, materials, other direct costs, overhead charges, etc.) and further broken down by year; (2) major program tasks by year; (3) an itemization of major subcontracts<sup>6</sup> and equipment purchases; (4) an itemization of any information technology (IT)<sup>7</sup> purchases; (5) a summary of projected funding requirements by month; and (6) the source, nature, and amount of any industry cost-sharing. 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.

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 offeror is seeking a procurement contract award of \$650,000 or greater unless the offeror requests an exception from the requirement to submit cost or pricing data. "Cost or pricing data" are not required if the offeror proposes an award instrument other than a procurement contract (e.g., a grant, cooperative agreement, or other transaction). Please also provide any Forward Pricing Rate Agreement, other such Approved Rate Information (e.g., Rate Memo's, etc.), or such other documentation that may assist in expediting negotiations (if not

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<sup>6</sup> To include similar cost breakdown as required by the offeror (prime).

<sup>7</sup> IT is defined as "any equipment, or interconnected system(s) or subsystem(s) of equipment, that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information by the agency. (a) For purposes of this definition, equipment is used by an agency if the equipment is used by the agency directly or is used by a contractor under a contract with the agency which – (1) Requires the use of such equipment; or (2) Requires the use, to a significant extent, of such equipment in the performance of a service or the furnishing of a product. (b) The term "information technology" includes computers, ancillary, software, firmware and similar procedures, services (including support services), and related resources. (c) The term "information technology" does not include – (1) Any equipment that is acquired by a contractor incidental to a contract; or (2) Any equipment that contains imbedded information technology that is used as an integral part of the product, but the principal function of which is not the acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information. For example, HVAC (heating, ventilation, and air conditioning) equipment such as thermostats or temperature control devices, and medical equipment where information technology is integral to its operation, are not information technology."

available, state so). All proprietary subcontractor proposal documentation of which cannot be uploaded to TFIMS shall be made immediately available to the Government, upon request, under separate cover (i.e., mail, electronic/email, etc.), either by the proposer or by the subcontractor organization.

## **C. Submission Dates and Times**

### **1. Period of Solicitation**

This BAA will remain open from 7 November 2007 through 7 November 2008.

### **2. Full Proposal Date**

The full proposal must be submitted to T-FIMS or Grants.gov no later than 4:00 p.m., Eastern Time, Friday, December 21, 2007, 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 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.

## **SECTION 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, listed in descending order of relative importance: (1) Overall Scientific and Technical Merit; (2) Potential Contribution and Relevance to the DARPA Mission; (3) Proposer's Capabilities and/or Related Experience; (4) Realism of Proposed Schedule; (5) Plans and Capability to Accomplish Technology Transition; and (6) Cost Realism. Detailed descriptions follow.

#### **1. Overall Scientific and Technical Merit**

The proposed technical approach must be feasible, achievable, complete, and supported by a technical team with the expertise and experience to accomplish the proposed tasks. Task descriptions and associated technical elements must be complete and presented in a logical sequence with all proposed deliverables

clearly defined. The proposal must present a sound case that, in the event of an award, the execution of the technical plan will obtain the targeted research objectives. The proposal must identify major technical risks and present planned mitigation efforts which are clearly defined and feasible.

**2. Potential Contribution and Relevance to the DARPA Mission**

The potential contributions of the proposed effort to the national technology base will be evaluated and its relevance to DARPA's particular mission and methods assessed. DARPA seeks to maintain the technological superiority of the U.S. military and prevent technological surprise from harming our national security. DARPA aims to accomplish this by sponsoring revolutionary, high-payoff research that bridges the gap between fundamental discoveries and their ultimate military use.

**3. Proposer's Capabilities and/or Related Experience**

The proposer's prior experience in similar efforts must clearly demonstrate an ability to deliver, within the proposed budget and schedule, products and results that meet the proposed technical performance goals. The proposed team must possess sufficient experience and expertise to manage the cost and schedule of the effort throughout its execution. Related ongoing or recently completed efforts by the proposer in this research area must be fully described, including identification of other Government sponsors.

**4. Realism of Proposed Schedule**

The proposer's plans and capabilities to attain the proposed objectives in the shortest possible time will be evaluated. Successful proposals must present a clear and convincing rationale for the estimated time required for key schedule elements of the proposed project. The proposer's ability to understand, identify, and mitigate any potential risk in the schedule will also be evaluated.

**5. 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 will be evaluated. Of particular concern will be the extent to which intellectual property rights may create impediments to technology transition.

**6. Cost Realism**

Proposed costs must be realistic for the technical and management approach offered, and this approach must reflect a sound practical understanding of the effort and the resources required to actually obtain the program objectives. Cost realism will be principally measured by cost per labor-hour and number of labor-hours proposed. DARPA recognizes that an undue emphasis on cost may motivate proposers to offer low-risk ideas and to staff their effort with junior personnel in an effort to appear more competitive; DARPA strongly discourages such practices. On the other hand, DARPA favors meaningful cost control approaches which do not sacrifice quality; for example, 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 availability of funds. 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.

## **SECTION VI: AWARD ADMINISTRATION INFORMATION**

### **A. Award Notices**

As soon as the evaluation of a proposal is complete, the offeror 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 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:

**A-to-I Receiver Development Program**

Defense Advanced Research Projects Agency  
ATTN: (Name of the Technical Office)  
Reference: (BAA08-03)  
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 offeror's responsibility to clearly define to the Government what is considered proprietary data.

Offerors 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**

*Procurement Contract Proposers*

**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<br>Computer Software<br>To be Furnished<br>With Restrictions | Basis for Assertion | Asserted Rights<br>Category | Name of Person<br>Asserting Restrictions |
| (LIST)  | (LIST)              | (LIST)                      | (LIST)                                   |

**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<br>Computer Software<br>To be Furnished<br>With Restrictions | Basis for Assertion | Asserted Rights<br>Category | Name of Person<br>Asserting<br>Restrictions |
| (LIST)  | (LIST)              | (LIST)                      | (LIST)                                      |

*NonProcurement 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.”

**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.

### **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, offerors 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 annual PI meetings and all key participants are required to attend. Performers should also anticipate periodic site visits at the Program Manager's discretion.

### **4. Human use**

Proposals selected for contract award are required to comply with provisions of the Common Rule (32 CFR 219) on the protection of human subjects in research (<http://www.dtic.mil/biosys/downloads/32cfr219.pdf>) and the Department of Defense Directive 3216.2 (<http://www.dtic.mil/whs/directives/corres/html2/d32162x.htm>). All proposals that involve the use of human subjects are required to include documentation of their ability to follow Federal guidelines for the protection of human subjects. This includes, but is not limited to, protocol approval mechanisms, approved Institutional Review Boards, and Federal Wide Assurances. These requirements are based on expected human use issues sometime during the entire length of the proposed effort.

For proposals involving "greater than minimal risk" to human subjects within the first year of the project, performers must provide evidence of protocol submission to a federally approved IRB at the time of final proposal submission to DARPA. For proposals that are forecasted to involve "greater than minimal risk" after the first year, a discussion on how and when the offeror will comply with submission to a federally approved IRB needs to be provided in the submission. More information on applicable federal regulations can be found at the Department of Health and Human Services – Office of Human Research Protections website (<http://www.dhhs.gov/ohrp/>).

Any aspects of a proposal involving human use should be specifically called out as a separate element of the statement of work and cost proposal to allow for independent review and approval of those elements.

### **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); and (ii) the guidelines described in National Institutes of Health Publication No. 86-23, "Guide for the Care and Use of Laboratory Animals."

## **6. Publication approval**

Offerors 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 resulting award 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:

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 Contracting Officer Representative (COR). 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 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](mailto:tio@darpa.mil) or via 3701 North Fairfax Drive, Arlington VA 22203-1714, telephone (571) 218-4235. Refer to [www.darpa.mil/tio](http://www.darpa.mil/tio) for information about DARPA's public release process.

## **7. Export Control**

The following provision will be incorporated into any resultant contract:

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, 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 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.

## **9. Reporting**

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

## **10. Award Administration Information**

**Central Contractor Registration:** 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>.

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

**Wide Area WorkFlow (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.

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

## **11. Confidentiality**

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. The original of each proposal received will be retained at DARPA and all other copies of non-selected proposals destroyed. Documentation related to the source selection process will be marked SOURCE SELECTION INFORMATION – SEE FAR 2.101 AND 3.104

## **SECTION VII: AGENCY CONTACTS**

DARPA will use electronic mail for all technical and administrative correspondence regarding this BAA, with the exception of selected/not-selected notifications.

Administrative, technical or contractual questions should be sent via e-mail to [BAA08-03@darpa.mil](mailto:BAA08-03@darpa.mil). If e-mail is not available, fax questions to (703) 741-0079, Attention: BAA 08-03. 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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