Broad Agency Announcement

Reliable Central-Nervous-System Interfaces (RCI)

Microsystems Technology Office

DARPA-BAA-11-37

March 30, 2011

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PROPOSERS ARE CAUTIONED THAT EVALUATION RATINGS MAY BE LOWERED AND/OR PROPOSALS REJECTED IF PROPOSAL PREPARATION (PROPOSAL FORMAT, CONTENT, ETC.) AND/OR SUBMITTAL INSTRUCTIONS ARE NOT FOLLOWED.

THOSE INTENDING TO SUBMIT A PROPOSAL FOR AN ASSISTANCE INSTRUMENT (GRANT OR COOPERATIVE AGREEMENT) ARE STRONGLY ENCOURAGED TO READ THE INSTRUCTIONS PROVIDED AT SECTION IV(B)(4) REGARDING THE TIME REQUIRED TO RECEIVE VALIDATION OF SUBMISSIONS MADE THROUGH GRANTS.GOV. PROPOSALS THAT ARE VALIDATED AFTER THE PROPOSAL DUE DATE/TIME WILL BE CONSIDERED LATE AND, AS SUCH, WILL NOT BE REVIEWED.

Part I: Overview Information

- **Federal Agency Name** – Defense Advanced Research Projects Agency (DARPA), Microsystems Technology Office
- **Funding Opportunity Title –** Reliable Central-Nervous-System Interfaces (RCI)
- **Announcement Type –** Initial Announcement
- **Funding Opportunity Number –** DARPA-BAA-11-37
- **Catalog of Federal Domestic Assistance Numbers (CFDA)** – 12.910 Research and Technology Development
- **Dates**
  - Posting Date: March 30, 2011
  - Proposer's Day: April 8, 2011
  - Proposal Due Date: May 16, 2011 (11:59 a.m., Eastern Time)
- **Concise description of the funding opportunity --** DARPA seeks to develop reliable in-vivo CNS motor-signal recording and sensory-signal stimulating interfaces. Such efforts will involve design, fabrication, testing, and analysis of new materials and technologies to demonstrate substantial improvements in reliability and quantity of CNS motor-signal information. Ultimately DARPA desires to develop clinically viable technologies, enabling wounded service members to control state-of-the-art prosthetic limbs.
- **Anticipated amount of money to be awarded –** Up to $18M
- **Anticipated type of funding -** 6.2
- **Anticipated individual awards** – Multiple awards are anticipated.
- **Types of instruments that may be awarded -** Procurement contract, grant, cooperative agreement or other transaction.
- **Any cost sharing requirements** - None
- **Agency contact** - Jack Judy, Program Manager

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Part II: Full Text of Announcement

I. FUNDING OPPORTUNITY DESCRIPTION

The Defense Advanced Research Projects Agency often selects its research efforts through the Broad Agency Announcement (BAA) process. The BAA will appear first on the FedBizOpps website, http://www.fbo.gov/, and the Grants.gov website http://www.grants.gov/ . The following information is for those wishing to respond to the BAA.

DARPA is soliciting innovative research proposals in the area of reliable neural-interface systems, for recording motor-signal information from and stimulating sensory-feedback information into the central nervous system (CNS). For the purposes of this BAA, the CNS is defined to include the brain down to but not including the dorsal (sensory) and ventral (motor) roots. Advances in robotic technologies have enabled tremendous improvements in the field of upper-limb prostheses, which clearly exceed the ability of existing neural-interface recording technology to control them. The goal of this BAA is to develop and demonstrate all of the system components necessary to reliably convey enough motor-control intent from the CNS to adequately drive many-degree-of-freedom (DOF) prostheses for the durations of time needed by wounded warriors (i.e., the life of the patient).

Proposed research should investigate and develop innovative approaches that enable revolutionary advances in one or more of the following technical areas: (1) the long-term reliability and performance of CNS motor-control recording interfaces, (2) implanted electronic systems necessary to reliably acquire and transmit CNS motor-control information, (3) new decoding and encoding algorithms that greatly enhance the reliability of CNS-interface systems without compromising performance, (4) new behavioral testing methods for critical evaluation of CNS-interface reliability and performance in an amputee relevant manner, and (5) the long-term reliability and accuracy of CNS sensory-feedback stimulus interfaces.

Reliability must be the foundation of any proposed work. Rather than being a technology "push" or scientific study, proposed efforts should be a reliability "pull". Proposals lacking significant effort to improve at least one critical element that limits the overall reliability of existing technology or new approaches will not be considered selectable. What separates RCI from prior NIH and DARPA activities is the singular focus on engineering reliable neural-interface systems, not continued scientific studies or basic feasibility demonstrations.

Although acutely recording neural activity from the CNS is well established, there are a number of fundamental and practical challenges that must be addressed and overcome in order to reliably capture many-DOF motor-control intent for the life of the patient. Invasive interfaces must contend with problems related to the foreign-body tissue response, long-term motor-control-intent decoding under a wide range of motor tasks and activity levels, and the rate, scale, and precision of captured and decoded motor-control

information in order to adequately restore lost functionality. Furthermore, all proposed system-level approaches need to be designed to function continuously without the frequent intervention of a third party (e.g., turning system on and off, facilitating frequent calibration and algorithm re-training, etc.).

There are multiple CNS-based signals that could be recorded and used to interpret the motor intent of amputees. Proposals based on one or more of these signals will be given full consideration without prejudice or preference. Each signal source has its own unique set of challenges with regard to achieving long-term reliability goals (i.e., life of the patient) and high performance goals (i.e., controlling a 22-DOF prosthetic limb). Successful proposals will identify and address these challenges in a clear and convincing manner. All proposals must clearly define the performance and reliability of existing state-of-the-art (SOA) CNS-interface technology in order to adequately quantify the advantages of the proposed technology. Likewise, all proposals must identify the challenges and limitations of the proposed methods in order to adequately understand the risks involved.

Despite the above-mentioned challenges, recent technological advances in many areas (e.g., tissue-response-mitigating invasive cortical interfaces, high-density ECoG/epidural electrode arrays, non-contact EEG electrode arrays, multi-scale/multi-modal motor-control information acquisition, and robust motor-control intent-decoding algorithms) provide support to the following hypothesis: it is now possible to develop high-channel-count CNS interfaces that can reliably provide the amount of motor-control information needed for amputees to accurately and quickly control many-DOF prosthetic limbs for the remainder of their life at a performance level allowing them to perform activities of daily living both in military and civilian life.

The majority of demonstrations to-date have relied upon linear Kalman filters and linear principal component analysis. While these techniques are sufficient to demonstrate high accuracy in acute studies, chronic studies require frequent recalibration. However, the level of performance and reliability demanded by amputees is much higher than is widely appreciated. For example, many wounded warriors with upper-limb amputation would like to return to their units in the field. However, in order to do so they must at least demonstrate the ability to field strip and reassemble their weapons. Given that this ultimate goal represents a truly challenging set of reliability and performance capabilities, proposers should strive to extract the greatest rate of motor-control information while minimizing all errors (i.e., inaccuracies, false positives/negatives, etc.) over the longest experimental time period without intervention by experimenters or other third parties. Proposers are expected to use metrics that adequately reflect potential clinical use initially by young and highly active wounded warriors (i.e., athletic individuals that strive to regain a high level of limb functionality). One possible metric of overall performance is the ratio of the time between experimental interventions to the motor-control-information error rate.

Careful consideration must also be given to the differences in experimental design between amputees and non-amputees, as well as to the interpretation of experimental

results. Proposals planning to work with amputee-relevant models will be considered closer to achieving the overall goals of the BAA than those proposing equally innovative approaches that only work with normal and healthy test subjects.

Although researchers have demonstrated the ability to stimulate the sensory cortex, they have had difficulty targeting and providing sensory information on all of the modalities of interest (i.e., pressure, vibration, heat, cold, injury, etc.) with substantial scale and resolution. Proposed work to provide sensory feedback signals to the CNS must have a strategy for overcoming the challenges associated with targeting the stimulation very selectively, tailoring the signal to achieve the desired perception level, and providing feedback with a high dynamic range.

The outcome of RCI will include statistically validated demonstrations of high-performance and high-reliability CNS-interface technologies, which will result in systems with revolutionary motor-control data and error rates, dynamic range, and number of independent motor-control outputs (DOF). Selected performers may be required to demonstrate their capability with a highly dexterous prosthetic limb.

Proposed research should investigate innovative approaches that enable revolutionary advances in science, devices, or systems. Specifically excluded is research that primarily results in evolutionary improvements to the existing state of practice, lacks credible scalability, lacks a credible transition pathway to human use, and all approaches involving the peripheral nervous system (PNS). Investigators must have the ability to perform sophisticated biostatistics, use state-of-the-art engineering failure-analysis statistics and methods, and conduct well-designed experiments to build a solid foundation for the advancement of reliable CNS interfaces. Proposers are thus encouraged to incorporate innovation by building upon non-traditional partnerships (e.g., applied mathematicians, failure analysis statisticians, animal behaviorists, etc.).

Due to the large variation and overall complexity of biotic-abiotic interactions, there are significant factors that may hinder the achievement of all the programmatic milestones. As a result, investigators must present a thorough risk-assessment, a thoughtful explanation for any and all animal models selected, and quantitatively justify populations of test subjects. Since any proposed technology must have a clear pathway toward clinical use for human amputees, all applicable established testing standards should be identified and followed.

It is expected that all of the DARPA-funded RE-NET activities (i.e., HIST DARPA-BAA-10-32, RPI DARPA-BAA-11-08, and RCI DARPA-BAA-11-37 performers) will collaborate to advance the reliability of neural-interface technology. As a result, there will be certain elements of data sharing incorporated into all contracts.

Post-RCI: Achievement of the RCI program milestones and objectives may inform the launch of related DARPA programs. At this time, DARPA makes no guarantees of the structure, timing, or scope of any related programs.

Technical Areas

DARPA seeks innovative proposals in one or more of the following areas of interest corresponding to five Technical Areas (TA):

1. Demonstrate Reliable CNS Motor-Control Recording Interfaces
2. Demonstrate Electronic Systems for Reliable CNS-Interface Systems
3. Demonstrate Reliable CNS-Interface Motor-Control Decoding Algorithms and System-Level Approaches
4. Demonstrate Amputee-Relevant Behavioral Testing Methods to Evaluate the Reliability of CNS-Interface Systems
5. Demonstrate Reliable CNS Sensory-Feedback Stimulation Systems

The work proposed in response to each TA should be as independent as allowed by the technical approach. Each TA is intended to spur innovation in a specific aspect of neural interfaces, leveraging existing technologies to allow focus on one hard problem at a time. For example, although TA1 proposals require *innovation* at the physical interface in order to be considered responsive, the proposed work must use the electronics, algorithms, and behavioral testing methods needed to statistically assess the positive impact of proposed improvements to interface reliability, even though the electronics, algorithms, and behavioral testing methods used need not themselves be innovative. Similarly, for TA3 the *innovative* proposed decoding subsystem must include the interfaces, electronics, and behavioral testing methods needed to statistically assess the reliability improvements achieved by the proposed algorithms, even though the interfaces, electronics, and behavioral testing methods used need not themselves be innovative. Some proposals may *require* simultaneous innovation in more than one Technical Area, such as co-development of novel physical interfaces or behavioral testing methods that require development of innovative wireless electronics, in order to be successful. In these cases, clearly state the dependency and divide the discussion of the reliability challenges, innovation, effort and expenses between the TAs in a manner that reflects the disciplinary boundaries of the TAs.

Proposers with ideas that can strongly contribute toward achieving only a portion of the final goals described in a given TA are encouraged to explore collaboration opportunities (please see Section III.C.1: Collaborative Efforts) or speak to the program manager directly about other possible funding sources.

All respondents to this BAA must include a description of a complete yet concise high-level block diagram of a proposed reliable CNS-interface system. Proposals must describe a clear vision for the *complete* system, even if the proposed work encompasses only one TA. This high-level block diagram should start with the assumed biological signal sources and end with the proposed input to an existing complex many-DOF prosthetic limb to be controlled. Each block in the system diagram must depict several key attributes, including: functional capabilities, physical properties, and a description of the information received and sent between adjacent blocks.

Since funding decisions for each TA will be *considered independently*, proposals must be clearly organized in a way that facilitates review and the possibility of receiving funding for only a subset of the TAs and/or a subset of the tasks within one or more TAs. Towards this goal, proposers should use identifiers for all tasks in all TAs that are consistent between the different sections of the technical and cost proposals (i.e., innovative claims, technical rationale, program plan, risk assessment, SOW, cost, schedule, and milestones). Furthermore, the relationship between all proposed tasks of all proposed TAs and the high-level block diagram mentioned above should be clear.

Since CNS-interface systems vary greatly in design, proposers must clearly define metrics and techniques to quantitatively assess the reliability and performance of each discrete portion of their proposed CNS-interface system or component. All technology developed as part of the RCI program must have the built-in ability to perform sub-system-level self-testing, error checking, and when possible error correction, in order to identify the location and cause of failures and to periodically monitor functionality in situ. In addition, proposers should use careful experimental design and well-chosen statistical methods to confidently identify the factors that influence operational lifetime, as well as variation between individual recording channels and between human and/or animal subjects.

Final System-Level Goals:

The final goals for the RCI BAA, based upon developments in all five TAs, are the following:

1. **Reliability and Reproducibility:**
   demonstrate the quantitative improvement of the proposed novel failure-mitigating CNS-interface design relative to 2011 SOA
   demonstrate target level performance for at least 12 months
   describe a credible trajectory towards a lifetime use of 70 years
   demonstrate target level of performance in at least 80% of human and/or animal subjects
2. **Error Rate:**
   demonstrate total motor-control decoding error rates below 1% over entire duration of implantation and use, not only during down-selected testing periods
   describe a credible trajectory towards a total motor-control decoding error rate below 0.1%
3. **Behavioral Test Methods:**
   demonstrate amputee-relevant test subjects performing unsynchronized and untrained tasks for extended experimental durations that are quantified with high spatial and temporal resolution
   describe a credible trajectory towards freely moving amputee-relevant test subjects performing unsynchronized and untrained tasks for extended experimental durations that are quantified with high spatial and temporal resolution

4. **Independent Prosthesis-Control Outputs (DOF):**
   demonstrate at least 8 simultaneous independent motor-control outputs (DOF)
   describe a credible trajectory to at least 22 simultaneous independent motor-control outputs (DOF)

5. **Decoded Output Signals**:
   demonstrate an update rate of at least 10 Hz, for each simultaneous independent motor-control output (DOF)
   describe a credible trajectory towards an update rate of at least 50 Hz, for each simultaneous independent motor-control output (DOF)
   demonstrate a motor-signal decoder that has a dynamic range equivalent to 12 bits for each simultaneous independent motor-control output (DOF)
   describe a credible trajectory towards a motor-signal decoder that has a dynamic range equivalent to 16 bits for each simultaneous independent motor-control output (DOF)

6. **Total System Latency:**
   demonstrate overall electronic plus decoding system latency below 50 ms
   describe a credible trajectory towards an overall latency below 10 ms

7. **Total System Power Consumption:**
   demonstrate total electronic plus decoding system power below 1 W
   describe a credible trajectory towards power consumption less than 100 mW

8. **Packaging Robustness:**
   demonstrate packaging that provides adequate hermeticity, EMI shielding, and thermal management for at least 1 year
   describe a credible durability trajectory towards a lifetime use of 70 years

9. **Self-Test and Performance Monitoring:**
   demonstrate ability to self-test each sub-system block to isolate and identify failures
   demonstrate ability to perform performance monitoring of each sub-system block to track signal degradation, short-term and long-term drift, and noise levels

10. **Error Detection and Correction:**
    demonstrate robust methods to detect and correct errors in each sub-system block

11. **Regulatory Approval**
    describe a credible trajectory towards rapid IDE approval of your technology

Technical Area 1:

Demonstrate clinically viable high-performance CNS interfaces that robustly achieve the ability to reliably record motor-control information.

Without the ability to record enough independent motor-control information, the most advanced electronics, algorithms, behavioral testing methods, and overall system design will not help amputees to use many-DOF prosthetic limbs to their fullest extent in order to recover much of their lost motor function.

The physical scale and spatial resolution of high-performance CNS interfaces greatly depends on the targeted anatomy, the algorithms employed, and the system design. Any effort to develop neural interfaces must be clearly proposed within the context of the final system-level goals stated on pages 8 to 9. This is true even if proposers are only responding to only this single TA. As a result, proposers must indicate how the proposed reliable CNS-interface technology relates to the block diagram for the full system and provide a detailed rationale for the specific scale and spatial resolution of the proposed physical CNS interface.

The expected data rate of motor-signal information to be detected by the physical interface should be quantitatively related to the number of independent physical channels, their spatial arrangement, the nature of the signals to be recorded, and the variability of the targeted tissues. Demonstrating the long-term reliability and robustness of the proposed physical interface is necessary to prove the feasibility of its eventual chronic use in humans at a scale up to and including that required to control a 22-DOF prosthetic limbs.

Careful consideration must be paid to the differences between amputee and non-amputee experimental designs and subsequent interpretation of results. For example, the deafferanted cortex in amputees has been shown to undergo cortical re-organization, bi-lateral activation during imagined movements, spontaneous activation, and activation associated with phantom limb pain. Therefore, these motor and sensory spiking activity changes may differ greatly across amputee and non-amputee experimental models over time and must be accounted for in the proposed experimental design. Additionally, given the life-long scope of this BAA, neural plasticity and atrophy associated with aging are also factors that should be considered when developing RCI technologies appropriate for the entire life of the patient.

Final Goals for Technical Area 1:

The final goal for Technical Area 1 is to demonstrate physical interfaces that can reliably obtain enough CNS motor-control information to facilitate the control of complex many-DOF systems, such as high-performance prosthetic limbs. The following specific goals are expected to drive developments in this Technical Area:

1. Justify and quantify all relevant performance and reliability metrics, assessment parameters, and established test standards for each functional block of this Technical Area. These results will be used to evaluate progress over the course of the program.
2. Develop physical-interface technologies that are designed to overcome specific hypothesized failure mechanisms and have built-in self-test and error-checking capability.
3. Using novel experimental design and/or accelerated-testing strategies, statistically demonstrate the ability of the proposed approaches to reduce the failure rate and performance loss to the point where the system is able to maintain the flow of motor-control information necessary to provide at least 8 simultaneous

independent motor-control outputs (DOF) for up to the lifetime of the patient. Provide raw data and plots of all relevant performance and reliability metrics and assessment parameters over this experimental time period. Proposers must also at least describe a credible transition pathway toward a 22-DOF system for eventual use by humans.

All proposed efforts should identify measurable quantitative milestones at appropriate time-points throughout the duration of the effort. These milestones must define a credible trajectory towards achieving the final system-level goals outlined on pages 8 to 9. It is expected that the proposed efforts will be structured to achieve substantial progress early in the program, such as in the first year.

Technical Area 2:

Demonstrate clinically viable electronic systems for reliable CNS-interface systems.

In order to control many-DOF high-performance prosthetic limbs to their fullest extent, it is of prime importance to reliably manage the flow of motor-control information. Although it may be sufficient to use conventional electrophysiological interconnect technology and bench-top electronics, there may be situations and approaches that require new CNS-interface electronics to reliably convey detected motor-control signals from the physical tissue interface (TA1) to the decoding subsystem (TA3) as well as to convey sensory-feedback signals (TA5) to the CNS. Proposals responding to this TA must make a very compelling argument justifying why conventional CNS-interface electronics and approaches are insufficient to achieve the final system-level goals, and how the proposed innovative technology will achieve these goals.

Although highly capable implantable electronic technologies have been demonstrated, the long-term in-vivo reliability of these technologies has been cast into doubt due to mechanical interconnect and packaging failures, challenges with transferring information through the skull and scalp (such as infection or wireless signal degradation), power budgets, and wireless link budgets.

Any electronics-development effort must be proposed within the context of the final system-level goals stated on pages 8 to 9. This is true even if proposers are only responding to this single TA. As a result, proposers must indicate how the proposed reliable CNS-interface electronics relates to the block diagram for the full system and provide a detailed rationale for the capabilities of the proposed electronics functional blocks of the CNS-interface system. Furthermore, since there is not one standard CNS motor-signal-recording interface, respondents must clearly define the properties of the assumed input signal from the physical tissue interface. Similarly, since there is also not one standard decoding algorithm, respondents must clearly define the assumed input requirements for the motor-signal decoding subsystem.

Proposals should consider how to design the system to deal with an adverse mechanical environment (e.g., repetitive motion, metal fatigue, physical impact, etc.), biochemical

environment (e.g., active immune system, corrosive fluids, limiting temperature rise, etc.), and electrical environment (e.g., electromagnetic interference, shielding, cross-talk, signal strength, confounding biological signals, movement artifacts, stimulation artifacts, etc.).

Final Goals of Technical Area 2:

The final goal for Technical Area 2 is to demonstrate back-end hardware that can reliably convey a sufficient amount of information from the front-end interface to the motor-signal decoding subsystem. The following specific goals are expected to drive innovation in this TA:

1. Quantify and justify all relevant performance and reliability metrics, assessment parameters, and established test standards for each functional block of this TA that will be used to evaluate progress over the course of the program.
2. Develop an electronic system that is designed to capture and transmit neural information while overcoming all hypothesized performance degradation and failure mechanisms and has built-in self-test and error-detection/correcting capability.
3. Using accelerated-testing strategies, statistically demonstrate the ability to reduce the failure rate to the point where the system is able to maintain the flow of information for at least 8 simultaneous independent motor-control outputs (DOF) for up to the lifetime of the patient. Provide raw data and plots of all relevant performance and reliability metrics and assessment parameters over this experimental time period. Proposers must also describe a credible transition pathway toward a 22-DOF system for eventual use by humans.

All proposed efforts should identify measurable quantitative milestones at appropriate time points throughout the duration of the effort. These milestones must define a credible trajectory towards achieving the final system-level goals outlined on pages 8 to 9. As this TA relies primarily upon well-established engineering technologies, it is expected that all proposals will clearly and quantitatively state the expected values of the following relevant properties of the proposed technology:

- Range of input/output signal amplitude at the neural interfaces (V)
- Input/output signal dynamic range (min and max V)
- Input/output signal bandwidth (Hz)
- Input noise (V/sqrt(Hz))
- Gain (dB)
- Input/output CMRR between channels (dB, best case and worst case)
- PSRR
- Filter properties (design, cutoff frequencies)
- Sampling rate (samples per second, Sps)
- Sample bit depth (bits)

- Manufacturer and part numbers for key commercial-off-the-shelf (COTS) components: LNA, ADC, DSP, etc.
- Wireless communication (if proposed): modulation scheme, data rate, BER, frequency, bandwidth, energy per bit,
- Wireless communication (if proposed): link budget (transmitter output power (dBm), transmitter antenna gain (dBi), transmitter losses (coax, connectors...) (dB), free space loss or path loss (dB), miscellaneous losses (fading margin, body loss, polarization mismatch, other losses...) (dB), receiver antenna gain (dBi), receiver losses (coax, connectors...) (dB), PRX = received power (dBm)
- Power budget (per channel, per component, and for the entire system)
- Wireless power-transfer scheme (if proposed): modulation scheme, frequency, SAR, transfer efficiency, and expected range through tissue
- Error-detection and error-correction capabilities
- Packaging type, materials, supplier, and dimensions (in mm)
- Interconnect mechanical stiffness, impedance, shielding, and channel count
- Interconnect socket/connector supplier, dimensions, impedance, and encapsulation
- Other relevant capabilities
- Expected cost for the system if it were mass-produced ($/1000 units)
- Test protocols

It is expected that the proposed efforts will be structured to achieve substantial progress early in the program, such as in the first year.

Technical Area 3:

Demonstrate clinically viable algorithms and a system-level approach for reliably decoding motor-control signals from detected CNS signals.

In order to control many-DOF systems, such as high-performance prosthetic limbs, to their fullest extent, it is of prime importance to accurately and reliably interpret motor-signal activity detected by physical front-end interfaces. Without the ability to accurately interpret enough motor-control signal activity, the most advanced CNS interfaces and electronics will not help amputees recover their lost motor function in a satisfactory manner.

Clinical adoption of neural-interface technologies for motor-control applications is hampered by the limitations of existing approaches to reliably decode sufficient amounts of motor-control information. Many existing approaches use algorithms that yield high confidence only under limited circumstances. Although synchronous experiments, highly trained tasks, and limited experimental duration may yield relatively high correlation coefficients, they do not demonstrate fundamentally reliable techniques that would be effective when performing any given set of untrained motor tasks that a freely moving and behaving prosthesis user may desire. It is expected that proposed decoding

subsystems will be robust (i.e., be effective with a high percentage of test subjects), reliable (i.e., effective over long experimental time periods), and accurate (i.e., produce few false positive/negative errors, rapidly achieve success with motor-control tasks, etc.).

Approaches seeking to use intelligent robotic systems to predict motor-task goals in order to speed-up task completion are not of interest. It is essential that all motor tasks and observations quantify with high precision all DOF of interest in time and space. Real-time motor-control error must be quantified using at least root mean square error (RMSE).

Proposers must clearly illustrate how the proposed decoding subsystem will interpret motor-control signals detected by the physical interfaces to the CNS. Proposed approaches should take into account input signals that vary tremendously in terms of amplitude, frequency, and noise level. Proposed performance metrics should relate to the dynamic range and information content of the decoding subsystem output and the uncertainty of the decoded output at any given time. Successful proposals must demonstrate the long-term accuracy, reliability, and robustness of the proposed decoding subsystem in order to prove the feasibility of its eventual chronic use in humans.

Careful consideration must be given to the overall system architecture within the context of the final system-level goals. Specifically, proposals should consider how to design the decoding subsystem to deal with biological variability, to circumvent or exploit neural plasticity, to accommodate both short-term and long-term drift and imperfect reliability of the front-end hardware, and to function on mobile platform with severe size, weight, and power constraints.

Proposed techniques should be able to operate upon recorded neural information containing a very high dimensionality, and at the same time be able to learn model parameters from very few examples. These algorithms must also deal with highly variable recordings (e.g. due to movements artifacts, electrode degradation, etc.). Therefore, the proposed approaches should be able to self-adjust and self-calibrate in real-time without the need for retraining. Proposers should consider various statistical and machine-learning techniques including, but not limited to, latent variable models and parametric or nonparametric Bayesian approaches. Proposers are encouraged to explore the advantages of techniques that can deal with non-stationary, non-linear, and non-Gaussian signals.

Neural recording devices generally produce high volumes of data. In order to perform real-time analysis, preprocessing and dimensionality reduction techniques are typically applied. However, it is likely that the data obtained from these interfaces, such as multi-channel recordings, have a much richer structure than what is revealed by analysis techniques currently in use. Therefore, proposers are encouraged to propose new techniques that can capture high-order statistics and apply them to raw data (before any filtering or preprocessing is done).

Any decoding subsystem development effort must be clearly proposed within the context of the final system-level goals given on pages 8 to 9. This is true even if proposers are only responding to this single TA. As a result, proposers must indicate how the proposed reliable CNS motor-signal decoding subsystem relates to the block diagram for the full system and provide a detailed rationale for the specific proposed CNS motor-signal decoding subsystem design. All assumptions must be clearly identified, especially if the proposed decoding subsystem is limited in scope to a particular front-end technology or anatomical target.

Proposed decoding subsystem technologies, which have broad applicability to more than one anatomical target, interface technology, animal model, behavioral testing method, and require no assistance or user intervention, are highly desired. In addition, proposed technologies that justify and effectively incorporate heterogeneous information from multiple anatomical regions or detection techniques are also encouraged. This TA also seeks to encourage the development of decoding techniques for CNS-interface technologies and approaches that have received less attention than more widely used methods.

Final Goals of Technical Area 3:

The final goal of this TA is to demonstrate clinically viable decoding subsystems that can reliably interpret CNS-interface signals and extract motor-control information at the data rate, dynamic range, and system latency necessary to provide enough simultaneous independent motor-control outputs (DOF) to fully control SOA prosthetic limbs. The following specific goals are expected to drive developments in this TA:

1. Quantify and justify all relevant performance and reliability metrics, assessment parameters, and established test standards for each functional block of this TA that will be used to evaluate progress over the course of the program.
2. Develop motor-control decoding subsystems to reliably interpret CNS-interface signals under conditions representative of free-moving test subjects performing untrained tasks for extended measurement durations. Furthermore, the decoding subsystems must be able to provide the amount of motor-control information needed to restore lost functionality equivalent to at least 8 simultaneous independent motor-control outputs (DOF).
3. Statistically demonstrate the improvements of the proposed decoding subsystem relative to SOA techniques under stress-testing conditions. Metrics of interest are accuracy, precision, and control latency. Provide raw data and plots of all relevant performance and reliability metrics and assessment parameters over this experimental time period. Proposers must also describe a credible transition pathway toward a 22-DOF system for eventual use by humans.

The proposed effort should identify measurable quantitative milestones at appropriate time-points throughout the duration of the effort. These milestones must define a credible trajectory towards achieving the final system-level goals outlined on pages 8 to 9. It is

expected that the proposed efforts will be structured to achieve substantial progress early in the program, such as in the first year.

Technical Area 4:

Develop novel behavioral testing methods to demonstrate the amputee-relevant functionality of neural interfaces.

In order to help amputees recover their lost motor function in a satisfactory manner, CNS-interface systems capable of detecting, conveying, and decoding motor-control information, must be demonstrated in a manner that translates directly to post-amputation intervention. Existing behavioral testing methods typically rely upon implantation and training of healthy unamputated test subjects, in order to calibrate the system prior to demonstration of motor control. Demonstrations of CNS-interface systems in this manner leave questions regarding the transferability of functionality when implanted in subjects with pre-existing amputations. Technical Area 4 requires the development of novel behavioral testing methods that do not rely on pre-amputation training. By avoiding pre-training and pre-amputation implantation, these behavioral testing methods will more accurately demonstrate the ability to overcome plasticity effects and alterations to neural network activity due to amputation. Furthermore, experimental designs that accomplish these tasks are likely to reduce the total time and cost by minimizing the number of trials necessary to build statistical models, potentially improving the estimates of model parameters and model accuracy. In order to successfully accomplish this task, a close collaboration between experimentalists and theoreticians is strongly encouraged.

Proposers will design, develop, and demonstrate novel designs of behavioral testing methods that quantitatively assess the ability of the CNS interface system to correctly interpret motor intent in an amputee. The proposed behavioral testing methods must demonstrate the ability to accurately assess the ability of CNS-interface systems to predict limb movement while performing various untrained motor tasks. The behavioral testing methods developed in this TA may use previously developed physical interfaces, electronics, packaging, and algorithms, or the advancements developed in TAs 1, 2, and 3 in the out years. Proposers must provide a block diagram of the full system in order to show how the components fit together (i.e., from the biological signal sources to the outputs provided to the proposed prosthetic limbs). Although this TA does not explicitly require the use of an advanced prosthetic limb, the demonstrations must show that the CNS-interface systems can be easily scaled and capable of controlling SOA motor prostheses.

Proposers must carefully consider the differences between non-amputee, recent amputee, and long-term amputee subjects in order to develop valid interpretations of results. Proposals should also describe how their proposed behavioral testing methods deal with biological variability, circumvents or exploits neural plasticity, and potentially imperfect reliability of the front-end hardware.

Even through qualitative (ordinal or nominal data) performance measures may be common in human therapeutic testing, quantitative motor-control performance data must also be recorded during testing to interpret performance. Successful proposals will use this quantitative data to present a precise and statistically validated demonstration of interface reliability and stability over time. Proposals that do not include a very substantial use of quantitative measures will be considered unresponsive.

Final Goals of Technical Area 4:

The final goal of this TA is to demonstrate new amputee-relevant behavioral testing methods that quantitative assess the reliability and performance of CNS-based neural interface systems in acquiring and correctly interpreting motor intent. The following specific goals are expected to drive developments in this TA:

1. Quantify and justify all amputee-relevant performance testing and reliability metrics, assessment parameters, and the ability of the behavioral testing method to be valid across a wide variety of CNS interface systems.
2. Experimental design will unambiguously demonstrate system effectiveness in an amputee-relevant scenario while taking into account various potential confounds due to plasticity and the lack of prior training. This demonstration will provide a platform to transition technology in a clinically relevant scenario.
3. Extensive performance measures will be used during analysis in order to demonstrate long-term system effectiveness during unconstrained activity.
4. Proposed behavioral testing methods must unequivocally demonstrate the ability of the CNS-interface system to ultimately scale to the degree of dexterity required in this BAA.
5. Testing protocols must demonstrate the ability to effectively measure CNS-interface system reliability during short-term and long-term experimental timeframes.
6. Demonstrate the ability of the proposed behavioral testing methods to assess a complete CNS-interface system appropriate for use by human test subjects. The methods should be capable of determining the equivalent number of simultaneous independent motor-control outputs (DOF). Although systems designed for use with lower amputations and in lower animals species may provide fewer simultaneous independent motor-control outputs (DOF), the proposed behavioral testing methods must be scalable in order to achieve up to a 22-DOF system for eventual use by humans.

All proposed efforts should identify measurable quantitative milestones at appropriate time-points throughout the duration of the effort. These milestones must define a credible trajectory towards achieving the final system-level goals outlined on pages 8 to 9. It is expected that the proposed efforts will be structured to achieve substantial progress early in the program, such as in the first year.

Technical Area 5:

Demonstrate clinically viable systems that provide tactile sensory and/or proprioceptive limb feedback via stimulation of the CNS.

Whereas the other TA in this BAA have focused on demonstrating advanced capability to reliably record and decode CNS motor-control signals, the goal of this TA is to demonstrate effective CNS sensory stimulation in an amputee model. Demonstrating the long-term accuracy, reliability, and robustness of the proposed sensory feedback subsystem is necessary to prove the feasibility of its eventual chronic use in humans.

In order to control many-DOF systems, such as high-performance prosthetic limbs, to their fullest extent, providing reliable sensory stimulation directly to the CNS would be of tremendous value. Without the ability to convey information to the nervous system from the prosthetic limb, the most advanced CNS-interface technology will greatly reduce the ability of the amputee to recover their lost limb-control function.

Amputees often express a profound desire to "feel" with their prosthetic limb. Psychologists claim that sufficient sensory feedback would allow the incorporation of the limb into the sense-of-self, thereby increasing the use and overall capability of the amputee with the prosthesis. However, the selectively stimulation of specific regions of the CNS with the intent to provide targeted sensory feedback in humans has yet to be demonstrated.

The physical scale and spatial resolution of high-performance CNS interfaces greatly depends on the targeted anatomy, the algorithms employed, and the system design. Any effort to develop CNS sensory-feedback technology must be clearly proposed within the context of the final system-level goals stated on pages 8 to 9. This is true even if proposers are only responding to only this single TA. As a result, proposers must indicate how the proposed reliable CNS sensory-feedback technology relates to the block diagram for the full motor-control system and provide a detailed rationale for the specific proposed sensory-feedback subsystem design.

Careful thought must be given to experimental design in order to fully demonstrate that the neural stimulation patterns will be specific to, or allow discernment between, sensory modalities, such as pressure, temperature and proprioception. In addition, the differences between amputee and non-amputee experimental design and interpretation of results must also be appreciated and taken into account.

Final Goals of Technical Area 5:

The final goal of this TA is to demonstrate clinically viable sensory-feedback subsystems that can reliably supply information to the CNS, with the data rate, dynamic range, and system latency necessary to improve the lives of amputees. The following specific goals are expected to drive developments in this TA:

1. Quantify and justify all relevant performance and reliability metrics, assessment parameters, and established test standards for each functional block of this Technical Area that will be used to evaluate progress over the course of the program.
2. Identify all leading mechanisms of failure and performance degradation for the proposed CNS-stimulation technology.
3. Develop CNS-stimulation technology that is designed to overcome all known failure mechanisms so that it can reliably provide sensory-feedback information and has built-in self-test and error-detection/correction capability.
4. Demonstrate the ability to selectively stimulate different sensory modalities in amputee models.
5. Demonstrate sensory-feedback subsystems that are designed for use by human test subjects and are capable of providing at least 8 simultaneous independent sensory-feedback inputs (DOF).
6. Demonstrate the reliability of the sensory-feedback subsystem to maintain performance for a period of at least 1 year. Provide plots of all relevant performance and reliability metrics and assessment parameters over this experimental time period.
7. Demonstrate the robustness of the sensory-feedback subsystem by maintaining reliability and performance during test-subject movement and activity in at least 80% of human and/or animal subjects.

All proposed efforts should identify measurable quantitative milestones at appropriate time-points throughout the duration of the effort. These milestones must define a credible trajectory towards achieving the final system-level goals outlined on pages 8 to 9. It is expected that the proposed efforts will be structured to achieve substantial progress early in the program, such as in the first year.

Guidelines for Program Phases and Milestones

The RCI Program will have a duration of three years. Proposed efforts may define as many as three distinct maturation phases. The proposed effort should identify measurable quantitative milestones throughout the full duration. These milestones must define a credible trajectory towards achieving the final goals outlined above. Proposers are encouraged to submit thoughtful transition plans should their RCI developments succeed. The proposal should include, for each Technical Area being addressed, (1) a detailed experimental plan for completion of all milestone-oriented tests within any proposed phases, (2) a detailed budget for each individually priced Technical Area and proposed phase by Federal Government Fiscal Year, and (3) proposed internal milestones for measuring progress.

A successful proposal will thoroughly discuss all details for meeting the RCI program milestones set forth for all proposed phases, for each of the Technical Areas included in the proposal (i.e., one or more of the Technical Areas listed in this BAA).

Post Award Note: Performance will be continually evaluated based on the likelihood that progress will lead to achievement of the final goals of each Technical Area. Should it be determined that substantial progress is unlikely, DARPA does not guarantee continued funding.

II. AWARD INFORMATION

Multiple awards are anticipated. Depending on the quality of proposals received, total funding for all awards made under this BAA is limited to no more than $18,000,000 for multi-disciplinary research teams in each of the five technical areas of interest: (1) Demonstrate reliable CNS motor-control recording interfaces; (2) Demonstrate electronic systems for reliable CNS-interface systems; (3) Demonstrate reliable CNS-interface motor-control decoding algorithms and system-level approaches; (4) Demonstrate amputee-relevant behavioral testing methods to evaluate the reliability of CNS-interface systems; and (5) Demonstrate reliable CNS sensory-feedback stimulation systems. No funding targets/thresholds are available for specific technical areas.

The Government reserves the right to select for negotiation all, some, one, or none of the proposals received in response to this solicitation, and to make awards without discussions with proposers. The Government also reserves the right to conduct discussions if it is later determined to be necessary. If warranted, portions of resulting awards may be segregated into pre-priced options. Additionally, DARPA reserves the right to accept proposals in their entirety or to select only portions of proposals for award. In the event that DARPA desires to award only portions of a proposal, negotiations may be opened with that proposer. To facilitate negotiations, the proposers are advised to price each Technical Area individually by project year and by phase. Any cost redundancies between the individually priced Technical Areas must be identified. The Government reserves the right to fund proposals in phases with options for continued work at the end of one or more of the phases.

Awards under this BAA will be made to proposers on the basis of the evaluation criteria listed below (see section labeled "Application Review Information", Sec. V.), and program balance to provide overall value to the Government. Proposals identified for negotiation may result in a procurement contract, grant, cooperative agreement, or other transaction depending upon the nature of the work proposed, the required degree of interaction between parties, and other factors. The Government reserves the right to request any additional, necessary documentation once it makes the award instrument determination. Such additional information may include but is not limited to Representations and Certifications. The Government reserves the right to remove proposers from award consideration should the parties fail to reach agreement on award terms, conditions and cost/price within a reasonable time or the proposer fails to timely provide requested additional information.

As of the date of publication of this BAA, DARPA expects that program goals for this BAA may be met by proposers intending to perform 'fundamental research,' i.e., basic or applied research performed on campus in science and engineering, the results of which

ordinarily are published and shared broadly within the scientific community, as distinguished from proprietary research and from industrial development, design, production, and product utilization the results of which ordinarily are restricted for proprietary or national security reasons. Notwithstanding this statement of expectation, DARPA is not prohibited from considering and selecting research proposals that, while perhaps not qualifying as 'fundamental research' under the foregoing definition, still meet the BAA criteria for submissions. If proposals are selected for award that offer other than a fundamental research solution, then DARPA will either work with the proposer to modify the proposed statement of work to bring the research back into line with fundamental research or else the proposer will agree to restrictions in order to receive an award. See Section VI.B.4 for further information on fundamental, non-fundamental and restricted research. In all cases, the DARPA contracting officer shall have sole discretion to select award instrument type and to negotiate all instrument provisions with selectees.

III. ELIGIBILITY INFORMATION

A. Eligible Applicants

All responsible sources capable of satisfying the Government's needs may submit a proposal that shall be considered by DARPA. Historically Black Colleges and Universities (HBCUs), Small Businesses, Small Disadvantaged Businesses and Minority Institutions (MIs) are encouraged to submit proposals and join others in submitting proposals; however, no portion of this announcement will be set aside for these organizations' participation due to the impracticality of reserving discrete or severable areas of this research for exclusive competition among these entities.

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

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

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

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

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

C. Cost Sharing/Matching

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

D. Other Eligibility Criteria (optional)

1. Collaborative Efforts

Collaborative efforts/teaming are encouraged. A teaming website http://teaming.sysplan.com/BAA-11-37/ has been established to facilitate the formation of teaming arrangements between interested parties. Specific content, communications, networking, and team formation are the sole responsibility of the participants. Neither DARPA nor the Department of Defense (DOD) endorses the destination web site or the information and organizations contained therein, nor does DARPA or the DOD exercise any responsibility at the destination. This website is provided consistent with the stated purpose of this BAA.

IV. APPLICATION AND SUBMISSION INFORMATION

A. Address to Request Application Package

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

B. Content and Form of Application Submission

1. Security and Proprietary Issues

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

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

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

Proposers choosing to submit a classified proposal from other classified sources must first receive permission from the respective Original Classification Authority in order to use their information in replying to this BAA. Applicable classification guide(s) should

also be submitted to ensure the proposal is protected at the appropriate classification level.

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

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

Classified submissions shall be in accordance with the following guidance:

Confidential and Secret Collateral Information: Use classification and marking guidance provided by previously issued security classification guides, the Information Security Regulation (DoD 5200.1-R), and the National Industrial Security Program Operating Manual (DoD 5220.22-M) when marking and transmitting information previously classified by another Original Classification Authority. Classified information at the Confidential and Secret level may be submitted via ONE of the two following methods:

1. Hand-carried by an appropriately cleared and authorized courier to the DARPA CDR. Prior to traveling, the courier shall contact the DARPA CDR at 571-218-4842 to coordinate arrival and delivery.

OR

2. Mailed via appropriate U.S. Postal Service methods (e.g., (USPS) Registered Mail or USPS Express Mail). All classified information will be enclosed in opaque inner and outer covers and double wrapped. The inner envelope shall be sealed and plainly marked with the assigned classification and addresses of both sender and addressee.

The inner envelope shall be addressed to:

Defense Advanced Research Projects Agency
ATTN: Microsystems Technology Office (MTO)
Reference: DARPA-BAA-11-37
3701 North Fairfax Drive
Arlington, VA 22203-1714

The outer envelope shall be sealed with no identification as to the classification of its contents and addressed to:

Defense Advanced Research Projects Agency
Security & Intelligence Directorate, Attn: CDR
3701 North Fairfax Drive
Arlington, VA 22203-1714

All Top Secret materials: Top Secret information should be hand carried by an appropriately cleared and authorized courier to the DARPA CDR. Prior to traveling, the courier shall contact the DARPA CDR at 571 218-4842 to coordinate arrival and delivery.

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

Sensitive Compartmented Information (SCI): SCI must be transmitted via approved methods. Prior to transmitting SCI, contact the DARPA Special Security Office (SSO) at 703-248-7213 for instructions.

Proprietary Data: All proposals containing proprietary data should have the cover page and each page containing proprietary data clearly marked as containing proprietary data. It is the Proposer's responsibility to clearly define to the Government what is considered proprietary data.

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

2. Abstract Information

There will be no abstract submissions for this BAA.

3. Full Proposal Information

Proposers are required to submit full proposals by the time and date specified in the BAA in order to be considered during the single round of selections. Proposals received after the date and time specified in the BAA will be considered late and, as such, will not be evaluated.

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

Restrictive notices notwithstanding, proposals may be handled, for administrative purposes only, by a support contractor. This support contractor is prohibited from

competition in DARPA technical research and is bound by appropriate nondisclosure requirements. Proposals may **NOT** be submitted by fax or e-mail; any so sent will be disregarded.

For Proposers Requesting an Assistance Instrument:

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

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

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

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

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

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

If submitting hard-copy, an original and four (4) copies of the proposal and (4) electronic copies of the proposal on a CD-ROM must be submitted to DARPA/MTO, 3701 North Fairfax Drive, Arlington, VA 22203-1714 (Attn: DARPA-BAA-11-37) no later than the time and date specified in Section IV.

For Proposers Requesting a Contract or Other Transaction Agreement:

Unclassified proposals sent in response to DARPA-BAA-11-37, unless seeking a grant or cooperative agreement, must be submitted through T-FIMS (no email, fax, or hardcopy submissions are permitted). See https://www.tfims.darpa.mil/baa/ for more information on how to request an account, upload proposals, and use the T-FIMS tool. Because proposers using T-FIMS may encounter heavy traffic on the web server, and T-FIMS requires a registration and certificate installation for all proposers, proposers should not wait until the day the proposal is due to create an account in T-FIMS and submit the proposal. All proposers using T-FIMS must also encrypt the proposal, as per the instructions below.

All proposals submitted electronically by means of an Electronic Business Application Tool or proposal submission web site (not including Grants.gov) must be encrypted using Winzip or PKZip with 256-bit AES encryption. Only one zipped/encrypted file will be accepted per proposal and proposals not zipped/encrypted will be rejected by DARPA. An encryption password form must be completed and emailed to DARPA-BAA-11-37@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/.

For All Proposers:

All administrative correspondence and questions on this solicitation should be directed to DARPA-BAA-11-37@darpa.mil. DARPA intends to use electronic mail for correspondence regarding DARPA-BAA-11-37. **Proposals may not be submitted by fax or e-mail; any so sent will be disregarded**. DARPA encourages use of the Internet for retrieving the BAA and any other related information that may subsequently be provided.

4. Proposal Abstract Format

There will be no proposal abstract submissions for this BAA.

5. Full Proposal Format

All full proposals must be in the format given below. Nonconforming proposals may be rejected without review. Proposals shall consist of two volumes. All pages shall be printed on 8-1/2 by 11 inch paper with type not smaller than 12 point. Smaller font may be used for figures, tables and charts. The page limitation for full proposals includes all figures, tables, and charts. Volume I, Technical and Management Proposal, may include an attached bibliography of relevant technical papers or research notes (published and unpublished) which document the technical ideas and approach upon which the proposal is based. Copies of not more than three (3) relevant papers can be included with the submission. The bibliography and attached papers are not included in the page counts given below. The submission of other supporting materials along with the proposals is strongly discouraged and will not be considered for review. Section II Volume I, Technical and Management Proposal, shall not exceed 7.5 pages. Section III Volume I, Technical and Management Proposal, shall not exceed 15 pages per Technical Area proposed. Maximum page lengths for each section are shown in braces { } below. All full proposals must be written in English. All full proposals must have page numbers on **all page**s.

a. Volume I, Technical and Management Proposal

Section I. Administrative

A. Cover sheet to include:

(1) BAA number;
(2) Technical area(s) proposing to;
(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 submitted; and
(11) Total funds requested, broken down by Technical Area, phase, and phase duration (list number of months, not periods of time). Please make sure that these amounts match the funds in Volume II, the cost proposal.

B. Official transmittal letter.

Section II. Summary of Proposal

This summary section is a single overview of the proposed work incorporating all proposed technical areas. Further elaboration will be provided in Section III.

A. {max: 0.5 pages + (0.5 pages per Technical Area)} For each Technical Area being proposed, provide an executive summary of innovative claims that briefly outlines the overall scientific and engineering merit of the technical approaches in comparison with existing technology and related on-going research.

B. {max: 0.5 pages + (0.5 pages per Technical Area)} For each Technical Area being proposed, present a summary of the program schedule, milestones, and costs for each task and each year of the effort. (Note: Measurable milestones should capture key development points in tasks and should be clearly articulated and defined in time relative to start of effort). As applicable, the presented information must be delineated by the prime and major subcontractors, total costs, and company share.

C. {max: 0.5 pages} For the overall proposal, present a single executive summary that conveys the relevance of the work being proposed to the DARPA mission and its efforts to serve the needs of the DOD.

D. {max: 1 page per Technical Area } **Block Diagram:** Provide a detailed block diagram of the envisioned neural-interface system that will meet the final system-level goals of the BAA. This block diagram is an opportunity to place the proposed innovations, even for the case of a single Technical Area, into the complete context of a full and realizable neural-interface system. The block diagram should start with a descriptive block for the assumed biological signal sources and end with a descriptive block for the input to an existing prosthetic limb. The diagram should include descriptive blocks for each important system component in between. Each block in the system diagram must depict at least the following key attributes:
    - Name of the block
    - Name of the Co-I responsible for the block
    - Relevant subtask identifiers from the SOW
    - Properties of the input and output signals
    - Functional capabilities / properties
    - Approximate cost to purchase or develop the entire block
    - Key physical properties
    - Other important properties or attributes

Section III. Detailed Proposal Information

The remainder of Volume I (Technical and Management Proposal) should be separated into a number of sections corresponding to the number of proposed Technical Areas. In each individual section, include the detailed proposal information described below (III.A to III.I) in order.

A. {max: 2 pages per Technical Area} **Statement of Work (SOW):** In this section of the proposal, the respondents must clearly define, in plain English and without proprietary information, all technical tasks and subtasks to be performed. Within each phase, the SOW must be structured so that each parallel task, subtask, and associated completion criteria and are defined separately. Each subtask should have a unique identifier that will be used to refer to individual subtasks in the following sections of the proposal: SOW, Program Plan, Risk Assessment, Schedule and Milestones, and Costs. The following must be provided for each subtask defined in the SOW:

- General description of the objective for all defined subtasks;
- Identification by name of the organizations and individuals contributing to and responsible for subtask execution, including subtask lead investigator, team members, subcontractors, and consultants;
- Duration and start date relative to program kick-off;
- Completion criteria, such as a milestone, event, or product that defines its completion;
- Clearly defined deliverables (i.e., experimental results, analyses, reports, software, etc.) to be provided to the Government.

B. {max: 3 pages per Technical Area} **Innovative Claims, Technical Rationale and Approach:** This section is the centerpiece of the proposal. For each Technical Area, proposers should succinctly respond to the following: (1) state clearly what you propose to do without using any jargon; (2) thoroughly and quantitatively describe, compare, and contrast all prior work (i.e., proposers must demonstrate a clear understanding of the present state-of-the-art); (3) identify what is new about your proposed approach along with the quantitative improvements expected over the existing state-of-the-art approaches (e.g., within the context of all prior work, indicate all advantages and disadvantages); (4) assuming program success, describe specific and significant DOD-related impacts or benefits. Sufficient technical detail must be provided in order to permit complete evaluation of the proposed technology and to assess its feasibility. The proposal must enumerate a clear set of metrics and assessment parameters associated with demonstrable quantitative measures of performance. The ultimate quantitative goals of the proposed work, which are achievable during the funded period, must also be identified. ***In this section, the proposers should also address mitigation of life-cycle and sustainment risks associated with transitioning***

intellectual property for the U.S. military applications, if applicable. See also Section VIII "Intellectual Property".

C. **{**max: 1 page per Technical Area} **Program Plan:** In this section of the proposal, the respondents must clearly describe a detailed plan for accomplishing the goals of the BAA using the innovative approach(es) described in Section III-A. Ample justification of the feasibility of these approaches must be included. The program plan must, for each subtask: (1) provide a specific test plan which includes a through description of performance metrics and assessment parameters and how each will be accurately demonstrated and measured, (2) identify expected values for all quantitative performance metrics and assessment parameters at intermediate and final time points. For proposals that involve human subject research during the first year or phase, this section must include a plan for Institutional Review Board (IRB) evaluation upon final proposal submission to DARPA (see Section VI.B.2 below). For proposals that involve research with animals, this section must also include Institutional Animal Care and Use Committee (IACUC) review and approval (see Section VI.B.3 below).

D. {max: 1 page per Technical Area} **Schedule and Milestones:** In this section of the proposal, the respondents must provide a comprehensive Gantt chart of the work schedule and milestones of the proposed work. This information must be consistent with, and directly correspond to, that provided in the SOW, the organization chart, the summary slides, and the full cost proposal. The dependences and relationship between scheduled tasks and subtasks must also be made clear. The measurable milestones used to capture key development points for the proposed work, must clearly articulate and define interim quantitative targets at time points relative to start of the effort and not use proprietary information.

E. {max: 1 page per Technical Area} **Costs:** In this section of the proposal, the respondents must provide a thorough description of the cost of the proposed work. This information must be organized in a manner consistent with the subtasks identified in the SOW (Section III.A). For each subtask, the cost of the following must be summarized separately by both project year and by project phase: (1) personnel, (2) supplies, (3) test subjects, (4) equipment, (5) travel, (6) other direct costs, (7) indirect costs, and (8) total.

F. **{**max: 1 page per Technical Area} **Risk Assessment:** In this section of the proposal, the respondents must include a thoughtful and thorough risk-assessment. All risk assessments must, for each subtask: (1) identify all major technical risks specific to the proposed approaches, (2) estimate the relative magnitude of the risks, (3) identify which milestones are subject to each risk, and (4) describe specific plans to mitigate each risk.

G. {max: 1 page per Technical Area} **Teaming and Management Plan:** In this section of the proposal, the respondents must present a comprehensive

organization chart for each Technical Area. Each chart must clearly convey the following information for every person: (1) name, (2) affiliation, (3) abbreviated listing of all subtasks they will work on with roles, responsibilities, and percent time indicated, (4) keywords indentifying relevant expertise and/or unique capabilities. In addition, include a narrative describing the programmatic relationship between investigators and the rationale for choosing this teaming strategy.

H. {max: 1 page per Technical Area} **Capabilities:** In this section of the proposal, the respondents must identify the equipment and facilities required to achieve the final system-level goals described on pages 8 and 9. The respondents must also clearly identify which of the equipment and facilities are presently available to the team and which are not. If the equipment and facilities are presently available to the team, the respondents must identify: (1) their location, (2) identify which investigator or facility is providing them, and (3) describe their specifications and/or qualifications. If the equipment and facilities are not presently available to the team, the respondents must justify why this is the case and the expected cost to acquire them.

I. {4 slides per Technical Area} **Summary Slides:** In this section of the proposal, the respondents must provide a carefully crafted set of four PowerPoint-type slides (i.e., landscape formatted for presentation) for each Technical Area. The slides should convey all information in a manner suitable for presentation to the senior management of DARPA. These slides should contain:

Slide 1: Executive summary chart depicting: (1) main goal(s) of the effort, (2) proposed approach, (3) expected outcome.

Slide 2: Quantitatively assess the state-of-the-art (i.e., what are the present methods and approaches to address the identified problems) and identify specific limitations and inadequacies. White-space charts that use two well-chosen axes to plot quantitative data from the literature are particularly powerful at identifying technical barriers, opportunities, and goals.

Slide 3: Describe what is new and innovative about the proposed approach(es) and why they are likely to be successful. Identify program metrics and assessment parameters that will be used to measure progress.

Slide 4: Identify specific risks and technical challenges that must be overcome in order to solve the problems being addressed using your approach(es).

Section IV. Additional Information

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

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

Please refer to Attachment 1 for a Cost Proposal Summary Checklist.

A. Cover sheet to include:

(1) BAA number;
(2) Technical area(s) proposing to;
(3) Lead organization submitting proposal;
(4) Type of business, selected among the following categories: "LARGE BUSINESS", "SMALL DISADVANTAGED BUSINESS", "OTHER SMALL BUSINESS", "HBCU", "MI", "OTHER EDUCATIONAL", OR "OTHER NONPROFIT";
(5) Contractor's reference number (if any);
(6) Other team members (if applicable) and type of business for each;
(7) Proposal title;
(8) Technical point of contact to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), electronic mail (if available);
(9) Administrative point of contact to include: salutation, last name, first name, street address, city, state, zip code, telephone, fax (if available), and electronic mail (if available);
(10) Award instrument requested: cost-plus-fixed-free (CPFF), cost-contract—no fee, cost sharing contract – no fee, or other type of procurement contract (specify), grant, cooperative agreement, or other transaction;
(11) Place(s) and period(s) of performance;
(12) Total proposed cost separated by basic award and option(s) (if any);
(13) Name, address, and telephone number of the proposer's cognizant Defense Contract Management Agency (DCMA) administration office (if known);
(14) Name, address, and telephone number of the proposer's cognizant Defense Contract Audit Agency (DCAA) audit office (if known);
(15) Date proposal was prepared;
(16) DUNS number;
(17) TIN number;
(18) Cage Code;
(19) Subcontractor Information;
(20) Proposal validity period; and
(21) Any Forward Pricing Rate Agreement, other such approved rate information, or such documentation that may assist in expediting negotiations (if available).

The proposers, to include eligible FFRDCs, cost volume shall provide cost and pricing information (See Note 1), or other than cost or pricing information if the total price is under $700,000, in sufficient detail to substantiate the program price proposed (e.g., realism and reasonableness). In doing so, the proposer shall provide a summary cost breakdown by Technical Area and a detailed cost breakdown by phase (if multiple phases are proposed), by technical task/subtask, and by month for each technical area proposed.

The breakdown, for each proposed Technical Area, shall include, at a minimum, the following major cost item along with associated backup documentation:

B. Total program cost broken down by major cost items:

a. **Direct Labor** – a breakout clearly identifying the individual labor categories with associated labor hours and direct labor rates, as well as a detailed Basis-of-Estimate (BOE) narrative description of the methods used to estimate labor costs;
b. **Indirect Costs** – Including Fringe Benefits, Overhead, General and Administrative Expense, Cost of Money, Fee, etc. (must show base amount and rate);
c. **Travel** – Provide the purpose of the trip, number of trips, number of days per trip, departure and arrival destinations, number of people, etc.;
d. **Other Direct Costs** – Itemized with costs; Back-up documentation is to be submitted to support proposed costs;
e. **Material/Equipment** – A priced Bill-of-Material (BOM) clearly identifying, for each item proposed, the quantity, unit price, the source of the unit price (i.e., vendor quote, engineering estimate, etc.), the type of property (i.e., material, equipment, special test equipment, information technology, etc.), and a cross-reference to the Statement of Work (SOW) task/s that require the item/s. At time of proposal submission, any item that exceeds $5,000 must be supported with basis-of-estimate (BOE) documentation such as a copy of catalog price lists, vendor quotes or a written engineering estimate (additional documentation may be required during negotiations, if selected). If seeking a procurement contract and items of Contractor Acquired Property are proposed, exclusive of material, the proposer shall clearly demonstrate that the inclusion of such items as Government Property is in keeping with the requirements of FAR Part 45.102.
f. **Information Technology –** An itemization of any information technology (IT) purchase, as defined in FAR Part 2.101.
g. **Consultants** – If consultants are to be used, proposer must provide a copy of the consultant's proposed SOW as well as a signed consultant agreement or other document which verifies the proposed loaded daily / hourly rate and any other proposed consultant costs (e.g. travel);
h. **Subcontracts** – Itemization of all subcontracts. Additionally, the prime contractor is responsible for compiling and providing, as part of its proposal submission to the Government, subcontractor proposals prepared at the same level of detail as that required by the prime. Subcontractor proposals include Interdivisional Work Transfer Agreements (ITWA) or similar arrangements. If seeking a procurement contract, the prime contractor shall provide a cost reasonableness analysis of proposed subcontractor cost/prices. Such analysis shall indicate the extent to which the prime contractor has negotiated subcontract cost/prices and whether any such subcontracts are to be placed on a sole-source basis. All proprietary subcontractor proposal documentation which cannot be uploaded to TFIMS or Grants.gov as part of the proposer's

submission, shall be made immediately available to the Government, upon request, under separate cover (i.e., mail, electronic/email, etc.), either by the proposer or by the subcontractor organization – this does not relieve the proposer from the requirement to include , as part of their TFIMS submission, subcontract proposals that do not include proprietary pricing information (rates, factors, etc.);

i. **Cost-Sharing** – The source, nature, and amount of any industry cost-sharing; and
j. Written justification required per Section VI(B)(4) pertaining to subcontracted effort being considered Contracted Fundamental Research.

Proposers are encouraged to provide the aforementioned cost breakdown as an editable MS Excel spreadsheet, inclusive of calculations formulae, with tabs (material, travel, ODC's) provided as necessary. The Government also requests and recommends that the Cost Proposal include MS Excel file(s) that provide traceability between the Bases of Estimate (BOEs) and the proposed costs across all elements and phases. This includes the calculations and adjustments that are utilized to generate the Summary Costs from the source labor hours, labor costs, material costs, etc. input data. It is requested that the costs and Subcontractor proposals be readily traceable to the Prime Cost Proposal in the provided MS Excel file(s); however, this is not a requirement.

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

The cost proposal should include identification of pricing assumptions of which may require incorporation into the resulting award instrument (i.e., use of Government Furnished Property/Facilities/Information, access to Government Subject Matter Experts, etc.).

Note 1: "cost or pricing data" as defined in FAR Subpart 15.4 shall be required if the proposer is seeking a procurement contract award of $700,000 or greater unless the proposer requests an exception from the requirement to submit cost or pricing data. "Cost or pricing data" are not required if the proposer proposes an award instrument other than a procurement contract (e.g., a grant, cooperative agreement, or other transaction.) Those proposing a grant or cooperative agreement may follow/use the application instructions/form templates (i.e., DARPA BAA Form Package) provided as part of the BAA posting to grants.gov; however, the costing details requested above should be provided to the maximum extent possible, as this will reduce the time needed to negotiate any resulting award instrument.

PLEASE NOTE, PROPOSERS ARE CAUTIONED THAT EVALUATION RATINGS MAY BE LOWERED AND/OR PROPOSALS REJECTED IF PROPOSAL PREPARATION (PROPOSAL FORMAT, CONTENT, ETC.) AND/OR SUBMITTAL INSTRUCTIONS ARE NOT FOLLOWED.

6. Submission Dates and Times

1. Proposal Abstract Date

There will be no abstract submissions for this BAA.

2. Full Proposal Date

The full proposal must be submitted to DARPA on or before **11:59 a.m. (morning), Eastern Time, May 16, 2011,** in order to be considered during the single round of selections. Proposals received after the deadline will not be reviewed.

DARPA will post a consolidated Question and Answer document (FAQ) to the MTO solicitations webpage http://www.darpa.mil/Opportunities/Solicitations/MTO_Solicitations.aspx. In order to allow the Government adequate time and to provide a response to questions prior to the proposal due date, proposers are encouraged to submit questions by no later than May 6, 2011 to DARPA-BAA-11-37@darpa.mil.

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

7. Intergovernmental Review

Not applicable.

8. Funding Restrictions

Not applicable.

9. Other Submission Requirements

Cost proposal summary checklist (Attachment 1) for full proposal submission.

V. APPLICATION REVIEW INFORMATION

A. Evaluation Criteria

Evaluation of proposals will be accomplished through a scientific/technical review of each proposal. Proposals will not be evaluated against each other since they are not submitted in accordance with a common work statement.

Proposals will be evaluated using the following criteria in descending order of importance: Overall Scientific and Technical Merit; Potential Contribution and Relevance to the DARPA Mission; Cost Realism; Realism of Proposed Schedule; and Proposer's Capabilities and/or Related Experience.

The following are descriptions of the evaluation criteria:

Overall Scientific and Technical Merit:

The proposed technical approach must be feasible, achievable, complete, and supported by a proposed technical team that has the expertise and experience to accomplish the proposed tasks. The technical merit of the research and the soundness of the plan to perform it will be evaluated. The proposed research must be highly innovative and show promise of meeting the program performance goals. The research must have the potential to make a radical impact on future technology and enable cost-effective design and fabrication at future technology nodes. Task descriptions and associated technical elements must be complete and presented in a logical sequence with all proposed milestones and deliverables clearly defined. The proposal must present a sound case that, in the event of an award, the execution of the technical plan will meet the targeted research objectives. In particular, there must be convincing evidence of the ability of the proposer to meet the program milestones. The proposal must identify major technical risks and present mitigation plans which are clearly defined and feasible.

Potential Contribution and Relevance to the DARPA Mission:

The potential contributions of the proposed effort with relevance to the national technology base will be evaluated. Specifically, DARPA's mission to maintain the technological superiority of the U.S. military and prevent technological surprise from harming our national security by sponsoring revolutionary, high-payoff research that bridges the gap between fundamental discoveries and their application. Specifically, the proposal will be evaluated for the extent that the proposed research will advance the design and fabrication capabilities for future electronics technology nodes, and enable the DOD to have access to these capabilities to develop cost effective digital and/or analog circuits for advanced DOD applications.

Cost Realism:

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

Realism of Proposed Schedule:

The proposer's abilities to aggressively pursue performance milestone in the timeframe set forth in the BAA and to accurately account for that timeframe will be evaluated, as

well as proposer's ability to understand, identify, and mitigate any potential risk in schedule.

Proposer's Capabilities and/or Related Experience:

The proposer's prior experience in similar efforts must clearly demonstrate an ability to deliver products that meet the proposed technical performance within the proposed budget and schedule. The proposed team must possess sufficient experience and expertise to manage the cost and schedule of the effort throughout its execution. The proposer must possess all the facilities and leading-edge technology capabilities required to meet the proposed technical performance goals for the respective digital and/or analog thrusts related ongoing or recently completed efforts by the proposer in this research area must be fully described, including identification of other Government sponsors.

B. Review and Selection Process

Evaluation of proposals will be accomplished through a scientific/technical review of each proposal. Proposals will not be evaluated against each other since they are not submitted in accordance with a common work statement. DARPA's intent is to review proposals as soon as possible after they arrive; however, proposals may be reviewed periodically for administrative reasons.

Award(s) will be made to proposers whose proposals are determined to be the most advantageous to the Government, all factors considered, including the potential contributions of the proposed work to the overall research program and the availability of funding for the effort. DARPA's intent is to review proposals as soon as possible after they arrive; however, proposals may be reviewed periodically for administrative reasons.

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

For evaluation purposes, a proposal is the document described in Section IV.B. Abstract and Proposal Information. Other supporting or background materials submitted with the proposal will be considered for the reviewer's convenience only and not considered as part of the proposal.

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

Subject to the restrictions set forth in FAR 37.203(d), input on technical aspects of the proposals may be solicited by DARPA from non-Government consultants /experts who are strictly bound by the appropriate non-disclosure requirements.

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

VI. AWARD ADMINISTRATION INFORMATION

A. Selection Notices

As soon as the evaluation of a proposal is complete, the proposer will be notified that 1) the proposal has been selected for funding pending contract negotiations, or 2) the proposal has not been selected. These official notifications will be sent via email to the Technical POC identified on the proposal coversheet.

B. Administrative and National Policy Requirements

1. Meeting and Travel Requirements

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

2. Human Use

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

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

For all proposed research that will involve human subjects in the first year or phase of the project, the institution must provide evidence of or a plan for review by an Institutional Review Board (IRB) upon final proposal submission to DARPA. The IRB conducting the review must be the IRB identified on the institution's Assurance. The protocol, separate from the proposal, must include a detailed description of the research plan, study population, risks and benefits of study participation, recruitment and consent process, data collection, and data analysis. Consult the designated IRB for guidance on writing the protocol. The informed consent document must comply with federal regulations (32 CFR 219.116). A valid Assurance along with evidence of appropriate training all investigators should all accompany the protocol for review by the IRB.

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

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

3. Animal Use

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

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

All Recipients must receive approval by a DOD certified veterinarian, in addition to an IACUC approval. No animal studies may be conducted using DOD/DARPA funding until the USAMRMC Animal Care and Use Review Office (ACURO) or other appropriate DOD veterinary office(s) grant approval. As a part of this secondary review process, the Recipient will be required to complete and submit an ACURO Animal Use

Appendix, which may be found at https://mrmc-www.army.mil/index.cfm?pageid=Research_Protections.acuro&rn=1.

4. Publication Approval

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

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

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

Since the research to be performed as a result of this BAA is expected to be Applied Research (6.2), DARPA does not anticipate applying publication restrictions of any kind to research performed on-campus at a university. However, publication restrictions will be placed on research NOT performed on-campus at a university.

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

Proposers are advised if they propose grants or cooperative agreements, DARPA may elect to award other award instruments due to the need to apply publication or other restrictions. DARPA will make this election if it determines that the research resulting from the proposed program will present a high likelihood of disclosing performance characteristics of military systems or manufacturing technologies that are unique and critical to defense. Any award resulting from such a determination will include a requirement for DARPA permission before publishing any information or results on the program and will be considered Restricted Research.

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

> *There shall be no dissemination or publication, except within and between the Contractor and any subcontractors, of information developed under this contract or contained in the reports to be furnished pursuant to this contract without prior written approval of DARPA's Public Release Center (DARPA/PRC). All technical reports will be given proper review by appropriate authority to determine which Distribution Statement is to be applied prior to the initial distribution of these reports by the Contractor. With regard to subcontractor proposals for Contracted Fundamental Research, papers resulting from unclassified contracted fundamental research are exempt from prepublication controls and this review requirement, pursuant to DOD Instruction 5230.27 dated October 6, 1987.*
>
> *When submitting material for written approval for open publication, the Contractor/Awardee must submit a request for public release to the PRC and include the following information: 1) Document Information: document title, document author, short plain-language description of technology discussed in the material (approx. 30 words), number of pages (or minutes of video) and document type (briefing, report, abstract, article, or paper); 2) Event Information: event type (conference, principle investigator meeting, article or paper), event date, desired date for DARPA's approval; 3) DARPA Sponsor: DARPA Program Manager, DARPA office, and contract number; and 4) Contractor/Awardee's Information: POC name, e-mail and phone. Allow four weeks for processing; due dates under four weeks require a justification. Unusual electronic file formats may require additional processing time. Requests can be sent either via e-mail to prc@darpa.mil or via 3701 North Fairfax Drive, Arlington VA 22203-1714, telephone (571) 218-4235. Refer to* http://www.darpa.mil/NewsEvents/Public_Release_Center/Public_Release_Center.aspx *for information about DARPA's public release process.*

5. Export Control

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

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

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

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

(b) The Contractor shall comply with all applicable laws and regulations regarding export-controlled items, including, but not limited to, the requirement for contractors to register with the Department of State in accordance with the ITAR. The Contractor shall consult with the Department of State regarding any questions relating to compliance with the ITAR and shall consult with the Department of Commerce regarding any questions relating to compliance with the EAR.

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

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

including but not limited to—

(1) The Export Administration Act of 1979, as amended (50 U.S.C. App. 2401, *et seq.*);
(2) The Arms Export Control Act (22 U.S.C. 2751, *et seq*.);
(3) The International Emergency Economic Powers Act (50 U.S.C. 1701, et seq.);
(4) The Export Administration Regulations (15 CFR Parts 730-774);
(5) The International Traffic in Arms Regulations (22 CFR Parts 120-130); and
(6) Executive Order 13222, as extended;

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

6. Subcontracting

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

7. Electronic and Information Technology

All electronic and information technology acquired through this solicitation must satisfy the accessibility requirements of Section 508 of the Rehabilitation Act (29 U.S.C. 794d)

and FAR Subpart 39.2. Each proposer who submits a proposal involving the creation or inclusion of electronic and information technology must ensure that Federal employees with disabilities will have access to and use of information that is comparable to the access and use by Federal employees who are not individuals with disabilities and members of the public with disabilities seeking information or services from DARPA will have access to and use of information and data that is comparable to the access and use of information and data by members of the public who are not individuals with disabilities.

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

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

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

Unless the proposer is exempt from this requirement, as per FAR 4.1403-a or DoDGARs Part25.110, as applicable, all proposers must be registered in the Central Contractor Registration (CCR) and have a valid Data Universal Numbering System (DUNS) number prior to submitting a proposal. Information on CCR registration is available at http://www.ccr.gov. All proposers must maintain an active CCR registration with current information at all times during which they have an active Federal award or proposal under consideration by DARPA. All proposers must provide the DUNS number in each proposal they submit.

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

10. Reporting Executive Compensation and First-Tier Subcontract Awards

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

11. Updates of Information Regarding Responsibility Matters

The following clause must be included in all contracts over $500,000 where the proposer has current active Federal contracts and grants with total value greater than $10,000,000.

Updates of Information Regarding Responsibility Matters (DEVIATION) (OCT 2010)

(a)(1) The Contractor shall update the information in the Federal Awardee Performance and Integrity Information System (FAPIIS) on a semi-annual basis, throughout the life of the contract, by posting the required information in the Central Contractor Registration database at http://www.ccr.gov (see 52.204-7).

(2) At the first semi-annual update on or after April 15, 2011, the Contractor shall post again any required information that the Contractor posted prior to April 15, 2011.

(b) (1) The Contractor will receive notification when the Government posts new information to the Contractor's record.

(2) The Contractor will have an opportunity to post commends regarding information that has been posted by the Government. The comments will be retained as long as the associated information is retained, i.e. for a total period of 6 years. Contractor comments will remain a part of the record unless the Contractor revises them.

(3) **Public access to information in FAPIIS.**

(i) Public requests for system information that was posted prior to April 15, 2011, will be handled under Freedom of Information Act procedures, including, where appropriate, procedures promulgated under E.O. 12600.

(ii) As required by section 3010 of Public law 111-212, all information posted in FAPIIS on or after April 15, 2011, except past performance reviews, will be publicly available.

C. Reporting

The number and types of reports will be specified in the award document, but will include as a minimum quarterly financial and technical status reports. The reports shall be prepared and submitted in accordance with the procedures contained in the award document and mutually agreed on before award. Reports and briefing material will also be required as appropriate to document progress in accomplishing program metrics. A Final Report that summarizes the project and tasks will be required at the conclusion of the performance period for the award, notwithstanding the fact that the research may be continued under a follow-on vehicle.

D. Electronic Systems

1. Representations and Certifications

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

2. Wide Area Work Flow (WAWF)

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

3. i-Edison

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

VII. AGENCY CONTACTS

Email is the preferred method of communication.

Administrative, technical or contractual questions should be sent via e-mail to DARPA-BAA-11-37@darpa.mil. All requests must include the name, email address, and phone number of a point of contact.

The technical POC for this effort is Dr. Jack W. Judy, electronic mail: DARPA-BAA-11-37@darpa.mil.
DARPA/MTO
ATTN: DARPA-BAA-11-37
3701 North Fairfax Drive
Arlington, VA 22203-1714

VIII. OTHER INFORMATION

A. Intellectual Property

1. Procurement Contract Proposers

a. Noncommercial Items (Technical Data and Computer Software)

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

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

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

NONCOMMERCIAL				
Technical Data Computer Software To be Furnished With Restrictions	Summary of Intended Use in the Conduct of the Research	Basis for Assertion	Asserted Rights Category	Name of Person Asserting Restrictions
(LIST)	(NARRATIVE)	(LIST)	(LIST)	(LIST)

b. Commercial Items (Technical Data and Computer Software)

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

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

COMMERCIAL				
Technical Data Computer Software To be Furnished With Restrictions	Summary of Intended Use in the Conduct of the Research	Basis for Assertion	Asserted Rights Category	Name of Person Asserting Restrictions
(LIST)	(NARRATIVE)	(LIST)	(LIST)	(LIST)

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

Proposers responding to this BAA requesting a Grant, Cooperative Agreement, Technology Investment Agreement, or Other Transaction for Prototype shall follow the applicable rules and regulations governing these various award instruments, but in all cases should appropriately identify any potential restrictions on the Government's use of any Intellectual Property contemplated under those award instruments in question. This includes both Noncommercial Items and Commercial Items. Although not required, proposers may use a format similar to that described in Paragraphs 1.a and 1.b above. The Government may use the list during the evaluation process to evaluate the impact of any identified restrictions, and may request additional information from the proposer, as may be necessary, to evaluate the proposer's assertions. If no restrictions are intended, then the proposer should state "NONE." Failure to provide full information may result in a determination that the proposal is not compliant with the BAA – resulting in nonselectability of the proposal.

C. All Proposers – Patents

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

D. All Proposers – Intellectual Property Representations

Provide a good faith representation that you either own or possess appropriate licensing rights to all other intellectual property that will be utilized under your proposal for the DARPA program. Additionally, proposers shall provide a short summary for each item asserted with less than unlimited rights that describes the nature of the restriction and the intended use of the intellectual property in the conduct of the proposed research

E. Other Transactions (OTs)

DARPA is able to obtain its research support through a variety of legal instruments and flexible arrangements, to include use of Other Transaction Agreements (OTAs). OTAs are potentially applicable to a wide variety of DARPA programs. They are likely to be particularly applicable to support dual-use technologies (those with commercial nonmilitary potential as well as potential military applications), consortia or multi-party agreements, and work supported by multiple funding sources. Because OTAs are not traditional procurement contracts, DARPA is not required to include the traditional FAR and DFARS clauses in these agreements, but is free to negotiate provisions that are mutually agreeable to both the Government and the consortium of companies entering into the agreement. Proposals may, but need not, state that an OTA rather than a contract or grant is desired. Furthermore, DARPA does not enter into OTAs when a contract or grant is feasible or appropriate. See FAR 35.003 for Government-wide policy on use of contracts for research and development.

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

For information on 845 Other Transaction Authority for Prototypes (OTA) agreements, refer to:
http://www.darpa.mil/Opportunities/Contract_Management/Other_Transactions_and_Technology_Investment_Agreements.aspx.
All proposers requesting an 845 Other Transaction Authority for Prototypes (OTA) agreement must include a detailed list of milestones. Each such milestone must include the following: milestone description, completion criteria, due date, payment/funding

schedule (to include, if cost share is proposed, contractor and Government share amounts). It is noted that, at a minimum, such milestones should relate directly to accomplishment of program technical metrics as defined in the BAA and/or the proposer's proposal. Agreement type, fixed price or expenditure based, will be subject to negotiation by the Agreements Officer; however, it is noted that the Government prefers use of fixed price milestones with a payment/funding schedule to the maximum extent possible. Do not include proprietary data. If the proposer requests award of an 845 OTA agreement as a nontraditional defense contractor, as so defined in the OSD guide entitled "Other Transactions (OT) Guide For Prototype Projects" dated January 2001 (as amended) (http://www.acq.osd.mil/dpap/Docs/otguide.doc), information must be included in the cost proposal to support the claim. Additionally, if the proposer plans requests award of an 845 OTA agreement, without the required one-third (1/3) cost share, information must be included in the cost proposal supporting that there is at least one non-traditional defense contractor participating to a significant extent in the proposed prototype project.

F. Proposer's Day

DARPA will host a Proposer's Day in support of the Reliable Central-Nervous-System Interfaces (RCI) program on April 8, 2011 in the Arlington, VA area. The purpose of the Proposer's Day is to provide potential proposers information on the RCI program, promote additional discussion on this topic, address questions, provide a forum to present their capabilities, and to encourage team formation. Interested proposers are not required to attend the Proposer's Day in order to respond to the Reliable Central-Nervous-System Interfaces (RCI) BAA. Material presented at the meeting including answers to selected questions, will be posted on Dr. Jack Judy's RE-NET website http://www.reliableneuraltech.info/ . DARPA will not provide cost reimbursement for interested proposers in attendance at the Proposer's Day.

Proposer's Day participants are required to register no later than April 4, 2011 and will be accepted on first come first serve basis, due to room restrictions. To receive registration materials, attendees must send an email with complete contact information to DARPA-BAA-11-37@darpa.mil, subject line "RCI Proposer's Day". The Proposer's Day will be open to members of the public who have registered in advance for the workshop; there will be no onsite registration. Members of the press MAY NOT attend. All foreign nationals, including permanent residents, must complete and submit a DARPA Form 60 "Foreign National Visit Request" which will be included in the registration materials.

Proposer's Day Point of Contact: DARPA-BAA-11-37@darpa.mil