

COOPERATIVE AGREEMENT

BETWEEN

The Materials In Extreme Dynamic Environments Consortium *

AND

U.S. Army Research Laboratory (ARL)

CONCERNING

Materials In Extreme Dynamic Environments (MEDE) Collaborative Research Alliance (CRA)

Agreement No.: W911NF-12-2-00xx

Total Estimated Amount of the Basic Agreement: To be completed at award

Total Estimated Government Funding of the Basic Agreement: To be completed at award

Total Estimated Recipient Cost Share of the Basic Agreement: To be completed at award

Total Estimated Amount of the Option: \$**

Total Estimated Government Funding of the Option: \$50,000,000.00**

Total Estimated Recipient Cost Share of the Option: \$**

**While the Total Estimated Government Funding of the Option is listed above, the Recipient will be requested to provide a complete cost proposal for the optional five-year period of performance as part of the evaluation to be completed prior to making the decision concerning this optional period. (See also Article 5.1.2 and 5.1.3)

CLIN 0001 is hereby established in the amount of \$ _____. CLIN 0001 is funded as set forth below. Additional CLINs will be established, subject to the availability of funds, up to the Total Estimated Amount of the Agreement set forth above.

Government Funds Obligated: \$ _____

Authority: 10 U.S.C. 2358

Accounting and Appropriation Data:

ACRN AA:

- (1) Appropriation No.:
- (2) Requisition No.:
- (3) Amount: \$0.00
- (4) Applicable CLIN: 0001
- (5) Applicable SubCLIN: 000101

* Award is being made to the MEDE Consortium with the membership as set forth in Article 3.2 below. The SF 26 Award/Contract cover page specifies _____ in Block 7, as per Article 3.5 below _____ is identified as the Lead Research Organization (LRO) responsible for distribution of Government funds on behalf of the Consortium.

Table of Contents

ARTICLES

	Signature pages of Integration Lead Organization (LRO) and Consortium Members
Article 1	Scope of the Agreement
Article 2	General Definitions
Article 3	Program Management
Article 4	Staff Rotation and On-Site Collaboration
Article 5	Fiscal Management
Article 6	Agreement Administration
Article 7	Term of the Agreement
Article 8	Administrative Responsibility
Article 9	Public Release or Dissemination of Information
Article 10	Intellectual Property
Article 11	Entire Agreement
Article 12	Governing Law/Order of Precedence
Article 13	Waiver of Rights
Article 14	Use of Technical Facilities
Article 15	Metric System of Measurement
Article 16	Liability
Article 17	Non-Assignment
Article 18	Severability
Article 19	Force Majeure
Article 20	Notices
Article 21	Access Guidance
Article 22	Central Contractor Registration and Universal Identifier Requirements

ATTACHMENTS

Attachment 1	Standard Terms and Conditions for Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations
Attachment 2	Standard Terms and Conditions for For-Profit Entities
Attachment 3	National Policy Requirements
Attachment 4	Other Certifications
Attachment 5	Reporting Requirements
Attachment 6	Articles of Collaboration
Attachment 7	Initial Program Plan & Budget

Signatures of one person from each member of the Materials In Extreme Dynamic Environments Consortium, authorized to bind that organization under this Cooperative Agreement

LEAD RESEARCH ORGANIZATION, (LRO) OF CONSORTIUM

(Signature)

(Name)

(Title)

(Name of Organization)

(Date)

Signatures of one person from each member of the Materials In Extreme Dynamic Environments Consortium, authorized to bind that organization under this Cooperative Agreement

GENERAL MEMBER OF CONSORTIUM (one page for each member)

(Signature)

(Name)

(Title)

(Name of Organization)

(Date)

ARTICLE 1 Scope of the Agreement

1.1 Introduction

This Agreement is a “Cooperative Agreement” (31 U.S.C. 6305) and is awarded pursuant to 10 U.S.C. 2358 Research Projects. The Parties agree that the principal purpose of this Agreement is for _____, hereinafter referred to as the “Recipient,” to provide its best research efforts in the support and stimulation of fundamental research and not the acquisition of property or provision of services for the direct benefit or use of the Government. FAR and DFARS apply only as specifically referenced herein. This Agreement is not intended to be, nor shall it be construed as, by implication or otherwise, a partnership, a corporation, or other business organization.

1.2 Background and Vision Statement

The Army seeks a sustained research program, comprised jointly of extramural and intramural basic research efforts, which through collaborative research will methodically and systematically push towards this vision. To this end, the Army Research Laboratory will establish the Enterprise for Multiscale Research of Materials with three components: 1) a CRA for Materials in Extreme Dynamic Environments (MEDE), 2) CRA for MultiScale multidisciplinary Modeling of Electronic materials (MSME) and 3) an in-house Initiative for Multiscale Modeling of Materials (I3M).

As part of both CRAs, ARL Scientists will have substantial involvement in performance, with a cadre of ARL scientists engaged in deep and meaningful collaborative research with the other CRA team members. The MEDE CRA will develop the capability to design, create, synthesize, process and manufacture high strain rate tolerant materials and material systems. The MEDE CRA may consider a range of material classes such as metals, ceramics, polymers and composites. The MSME CRA will develop the capability, with modeling emphasis, to create electronic device applications to include sensors and electronics for enhanced battlespace effects and efficient power and energy devices. The MSME CRA will focus on advancing the fundamental science, understanding, and state-of-the-art (SoA) for Multiscale Multidisciplinary Models in each of the following Electronic Materials Research Areas: 1) Electrochemical Energy Devices, 2) Hybrid Photonic, Spintronic Devices, and 3) Heterogeneous Metamorphic Electronics.

As part of ARL’s vision for an Enterprise for Multiscale Research of Materials, the MSME and MEDE Alliances will work collaboratively with the I3M to identify areas for interdependent basic research projects that have definitive links to the current Army mission and long-term vision. Collaborations or transition links among the CRA’s and I3M will also be pursued and defined through continuous collaboration, technical exchanges, site visits, staff rotations, and mutual participation in technical reviews during the period of performance. This will strengthen Army/ARL mission-relevance in the CRA research and enable the transition of developments from the Enterprise to further strengthen ARL’s efforts in multiscale multidisciplinary computational science, polymer & soft matter science, and optoelectronic/electronic/power & energy science. Within these contexts, and through collaborations via the CRA, the outcomes will take the form of theoretical, modeling or experimental methods that improve mission flexibility and capabilities for ARL to pursue its core mission programs and business areas with the visionary arc towards materials by design.

The U.S. Army Research Laboratory (ARL) is seeking to develop the capability to design, optimize, and fabricate lightweight protection material systems exhibiting revolutionary performance. The approach is to realize a “Materials by Design” capability by establishing a new Collaborative Research Alliance (CRA) focused on Materials in Extreme Dynamic Environments (MEDE). The focus of the CRA will be to advance the fundamental understanding of materials in relevant high strain rate and high stress regimes. The CRA is intended to create a collaborative environment that enables an Alliance of participants from academia, government and potentially industry and/or non-profit organizations to advance the state of the art and assist with the transition of research to enhance the performance of materials of interest to the U.S. Army. The ARL believes that the establishment of this CRA, as part of an ARL “Enterprise for Multiscale Research of Materials” and in conjunction with a robust internal mission program, provides the optimum path to success. It is envisioned that the results of the MEDE CRA research will be efficiently and rapidly transitioned to ARL in-house research and development programs.

The foundational problem to be addressed by the MEDE CRA is the lack of understanding of the physical phenomena at multiple scales that govern high-stress and high strain-rate material performance resulting from the paucity of validated linkages between experimental and computational research tools at critical length and time scales. Recent significant advances in experimental and computational technology at disparate scales have provided the framework to couple phenomena at diverse length and time scales to address this challenge with an exceptional likelihood of success.

1.3 Research Strategy

The objective of the MEDE CRA is to develop (cooperatively and collaboratively with ARL) the capability to design, optimize, and fabricate novel material systems exhibiting revolutionary performance in extreme dynamic environments. To achieve the latter objective the long term goal of the Army is a robust “materials by design” capability for optimum high strain rate material response and electronic material and device performance. Significant advances in experimental and computational approaches at disparate scales have long provided motivation to address this challenge; recent and emerging approaches to coupling phenomena at diverse length and time scales provide a new opportunity to address this challenge with an exceptional likelihood of success.

The CRA in Materials in Extreme Dynamic Environments (MEDE) will develop the capability to design, optimize and fabricate novel materials and material systems for high stress and high strain-rate environments. The MEDE CRA will examine the following material classes: metals, ceramics, polymers and composites.

To create this collaborative synergy the CRA will develop a comprehensive and focused basic research program that enables a systematic and synergistic approach with a materials by design strategy to perform the following:

- **Advanced Experimental Techniques:** Develop experimental methodologies to interrogate and characterize the in-situ materials response to extreme dynamic environments at critical length and time scales
- **Modeling and Simulation:** Develop computational approaches to predict the materials response to extreme dynamic environments at critical length and time scales
- **Bridging the Scales:** Develop physical and mathematical constructs necessary to bridge critical length and time scales
- **Material Characteristics and Properties at Multiple Scales:** Utilize existing and novel experimental methodologies to validate computational approaches in order to bridge the characteristic length and time scales, and to identify the comprehensive set of material characteristics, microstructural features and dynamic properties that govern high rate deformation and failure phenomena
- **Synthesis and Processing:** Incorporate research discoveries to enable the synthesis of novel materials and the processing of final products with critical material characteristics and resulting properties.

The basic structure of the CRA is specifically designed to accomplish the goals set forth above. Further, by specifically funding a parallel but complementary ARL in-house mission program and fostering leveraged industry partnerships, the results of the CRA research can be efficiently and rapidly transitioned to the ARL in-house research and development programs.

It is critical that the five core elements described above of a “Materials-by-Design” strategy are included and that the contribution of each is of fundamental and equal importance to the final goal of a material design capability for materials with revolutionary performance in extreme dynamic environments. This capability should be developed for one polymer, one metal, one ceramic, and one composite material system. It is also stressed that within each core element a cohesive research strategy to advance the state of the art is evident with the commensurate validation and verification plan. The research gaps to be addressed by the offeror in each of the five specific core elements are discussed in sections 1.3.1 through 1.3.5 below.

1.3.1 Advanced Experimental Techniques: Develop experimental methodologies to interrogate and characterize the in-situ materials response to extreme dynamic environments at critical length and time scales.

The grand challenge is to develop the “*the ability to perform quantitative concurrent spatial and temporal measurements and characterization of materials at multiple scales.*” The realization of this in concert with concurrent advances in modeling and simulation would revolutionize “Materials-by-Design” capabilities for

designing and fabricating materials with optimized performance in dynamic environments. The offeror may consider some or all of the suggestions below and propose any and all advanced experimental technique research and development deemed necessary to successfully achieve the 2, 5 and 10 year program goals and address the grand challenge.

- The development of advanced experimental technique/probes/sensors to:
 - capture complex high rate material response concurrently in space and time
 - measure properties of a material at multiple locations over a range of spatial and temporal scales
 - increase the penetration depth of probing excitations to make relevant 3-dimensional measurements of the physical processes operating during high strain rate experiments
- Develop experimental methods and protocols to probe wholly new material systems/microstructures guided by physical insights learned from parallel modeling / experiments
- Measurement of material elastic, and inelastic deformation, bulk plasticity, progressive / catastrophic failure, and phase response at microstructural length scales and below
- New experimental techniques to probe materials microstructure and response under extreme conditions (rates, pressure, etc) including *in situ* observations of relevant mechanisms such as
 - Bond stretching, transformation, and breakage, phase transformation, dislocation nucleation, twinning, strain hardening, void and crack formation and growth, adiabatic shear localization, fracture and vibration spectra
- Experimentally quantify deterministic and stochastic parameters for physical models at critical length scales; includes relevant microstructure and interface features and properties
- The multidisciplinary (chemistry, electrodynamics, magnetics, and mechanics) experimental analysis of a material in an extreme dynamic environment

1.3.2 Modeling and Simulation: Develop computational approaches to predict the materials response to extreme dynamic environments at critical length and time scales.

The U.S. Army has the long-term strategy to advance the state of the art in computational materials modeling of material response during dynamic events. The strategy is to develop the science and computational capability to exploit critical information obtained at relevant length scales. The result of the research should include a robust suite of recommended and validated models and codes at the length and time scales appropriate for predicting material response in extreme dynamic environments. The offeror may consider some or all of the suggestions below and propose any and all modeling and simulation research deemed necessary to successfully achieve the program goals.

- Novel computational approaches and algorithms
- Modeling and simulation codes and algorithms at critical length scales
- Multiphysics, i.e. combined mechanics (solid and/or fluid) with electro-magnetic effects
- Calculating the same properties using multiple codes in regions of overlapping scale
- Development of physics-based models and algorithms for embedding into meso-scale and continuum codes.
- Models and algorithms for incorporating discrete failure /damage and interfaces into codes.
- New model formulations and approaches for continuum models that are robust with respect to advection.

1.3.3 Bridging the Scales: Develop physical and mathematical constructs necessary to bridge critical length and time scales.

The U.S. Army believes that a successful comprehensive program to advance the physics of materials in extreme environments requires a parallel and concurrent effort in analysis, theoretical mathematics and algorithms. This aspect of the program should aim to (1) enhance the ability to do modeling and simulation, (2) extract, evaluate and correlate experimental results, (3) theoretically link material micro, meso and macrostructure structure-property relationships across scales and disciplines, (4) provide the foundation for new numerical modeling algorithms, and (5) provide physical insight into equations of state and constitutive equations. The offeror may consider some or all of the suggestions below and propose any and all theoretical and mathematical research deemed necessary to successfully achieve the program goals.

- Novel mathematical theories/algorithms that link the fundamental governing equations across scales with the long term goal to have a unified set of governing equations which are asymptotically valid between and across scales.
- Novel mathematical theories/techniques linking the fundamental governing equations, equations of state and constitutive equations across scales and disciplines that can be used to optimize information transfer due to disparate length and time scales
- Novel methods to manipulate and correlate deterministic and stochastic data from models, simulations and experiments for use in code validation
- New and novel mathematical techniques that would be the basis for optimum numerical algorithms in a multiscale environment
- New theory and mathematics that would bring a higher level of fundamental physics to equations of state and constitutive models (provide predictive capability)
- New mathematical techniques for manipulation and analysis of experimental data for validation and verification needed to understand the capabilities of modeling and simulation in a multiscale environment

1.3.4 Material Characteristics and Properties at Multiple Scales: Utilize existing and novel experimental methodologies to validate computational approaches in order to bridge the characteristic length and time scales, and to identify the comprehensive set of material characteristics, microstructural features, and dynamic properties that govern high rate deformation and failure phenomena.

It is important to be able to describe in detail, both deterministically and stochastically, the characteristics of a material so it can be processed and/or synthesized. This aspect of material science is well founded for materials subjected to static or slowly varying loads. However, for materials in extreme dynamic environments there are serious gaps in the ability to predict non-linear material response during dynamic events. The offeror is to consider developing advanced deterministic and stochastic descriptions of governing material characteristics and resulting properties. This will define the desired properties, microstructure and characteristics of materials with revolutionary response under extreme dynamic environments. The offeror may consider some or all of the suggested areas of study below.

- Material characteristics, defects, mechanisms, failure modes statically and in time and space
 - Non-linear material characteristics in time and space
 - Definition of the macro, micro structure, crystal and atomic structure
- Deterministic and stochastic metrics describing
 - Bond stretching, transformation, and breakage; phase transformation; dislocation nucleation, twinning, adiabatic shear localization, and strain hardening; void and crack formation and growth, fracture and vibration spectra
- Consider metrics for multidisciplinary description of materials
 - Spatial and temporal changes in chemical composition, phase reactivity
 - Spatial and temporal changes in electrostatics and magnetic response
- Ensure the metrics can be extracted from modeling, experiments and theory as described in paragraphs 1.3.1, 1.3.2 and 1.3.3 above

1.3.5 Synthesis and Processing: Incorporate research discoveries to enable the synthesis of novel materials and the processing of final products with critical material characteristics and resulting properties.

At the heart of this CRA is a approach described in “Materials Science and Engineering for the 1990’s”, National Academy Press, Washington, DC, 1989, as follows: “... that the properties and phenomena associated with a material are intimately related to its composition and structure at all levels (scales), including what atoms are present and how the atoms are arranged in the material, and that this structure is the result of synthesis and processing. It is these elements – properties, structure and composition, synthesis and processing, and performance and their strong interrelationship among them – that define the field of materials science and engineering”. It is understood that during the start up of the CRA, the research will rely on available materials, but it is very important that as the other

parts of the program evolve, the ability to design and fabricate, with technical rationale, new materials be developed. This will include the synthesis of designed starting materials (e.g. powders, fibers, interface chemistry or structure, monomers, etc.) with controlled composition and atomic structure and further processing of these starting materials into bulk materials with controllable nano-, micro- and meso-structures. The offeror should strategically address these aspects by considering any and all approaches and techniques, which may include:

- Model synthesis and processing
 - Use of high performance computing modeling and simulation to optimize processing
 - Modeling and simulation strategies such as genetic algorithms, artificial intelligence algorithms to drive optimization techniques
 - Strategies for relating the processing to new metrics developed under the CRA
- New synthesis and processing techniques
- In-situ processing techniques that can be non-destructively monitored concurrently in time and space
- New methods to synthesize starting materials with controlled composition and atomic structure and possible functionalization with minimum defects and unwanted phases.
- Process starting materials into bulk materials with controlled nano-, micro- and meso-structure
 - Minimize unwanted phases and defects
 - Control interfaces between similar and dissimilar materials
 - Novel nano-, micro- and macrostructures for energy dispersion, redirection and transformation.

The Recipient shall participate in a program of coordinated research, development, and education with ARL in accordance with the Annual Program Plan, which sets forth the specific goals and objectives for the program for each program period. The Annual Program Plans will be provided as attachments to this Agreement. The Recipient shall also comply with the reporting requirements set forth in Attachment 6.

The Government will have continuous involvement with the Recipient. The Government will also obtain access to the research results and certain rights in data, computer codes developed, and patents pursuant to Article 10 and Attachment 1 to this agreement. The Government and the Recipient are bound to each other by a duty of good faith and best research effort in achieving the goals of the Program.

As a condition of this Agreement, it is herein understood and agreed that Federal funds are to be used only for costs that: (1) a reasonable and prudent person would incur, in carrying out the research project herein; and (2) are consistent with the purposes stated in governing Congressional authorizations and appropriations.

1.4 Research Goals The Army requires the capability to design, optimize, and fabricate lightweight protection material systems exhibiting revolutionary performance. A “Materials by Design” capability will be established through a Collaborative Research Alliance (CRA) focused on *Materials in Extreme Dynamic Environments* (MEDE) to advance the fundamental understanding of materials in relevant high strain rate and high stress regimes. A successful program should address the following related periodic goals, with tangible benefits to the soldier at each stage:

2-Year Goals: Advance the experimental and computational state-of-the-art for characterizing the in-situ materials response to extreme dynamic environments at critical length and time scales in metallic, polymeric, ceramic and composite material systems. Two-year outcomes that demonstrate progress toward the goals should include:

- Demonstration of real-time microstructural interrogation during high-rate experiments
- Preliminary identification of key microstructural phenomena related to high-rate deformation, fracture, and failure at critical length and time scales
- Accurately predict one or more bulk dynamic properties based upon models built up from smaller size scales in each of the four selected systems.

Benefit to the Soldier: Improved protection systems through incorporation of enhanced discrete deformation and failure algorithms in current continuum simulations and design codes.

5-Year Goals: Integration of novel experimental methodologies and multiscale computational approaches to enable unprecedented microstructural control and predictive capabilities. Five-year outcomes that demonstrate progress toward the goals should include:

- Validation of the comprehensive set of material characteristics and properties at length scales that govern high rate deformation, fracture and failure phenomena in metallic, polymeric, ceramic and composite material systems through both computational and experimental techniques.
- Demonstration of a 30% improvement in multiple concurrent key properties in newly designed and processed materials from each of the four selected systems.

Benefit to the Soldier: The CRA will transition to ARL and the industrial base the key materials characteristics and properties to achieve a 15%-30% weight reduction for selected protection systems.

10-Year Goals: Demonstrate a comprehensive “materials-by-design” capability to include both designing materials and predicting key properties for materials in extreme dynamic environments. Ten-year outcomes that demonstrate progress toward the goals should include:

- Demonstrate computational capability at critical length scales (bridged and optimized as required) for one polymer, one metal, one ceramic, and one composite material system for the relevant spectrum of stresses and strain rates.
- Deliver the fabrication technology for optimized polymeric, metallic, ceramic and composite systems.

Benefit to the Soldier: The CRA, ARL and industrial partners will utilize the “materials-by-design” capability to design and produce protection materials with 1/3 the weight of the current systems.

1.5 Programmatic Strategy The CRA is intended to foster collaborative basic research (Budget Activity 1 – see definition below) involving government, industry, and academia. This programmatic strategy provides the structure for the desired comprehensive and cohesive outcome of the basic research performed under the CRA. However, the CRA will also allow participation from other government agencies (see discussion of Enhanced Program below) which may result in additional Budget Activity 1 (basic research) funding as well as Budget Activity 2 (applied research) funding. Therefore, the research proposed and performed must comply with the definition for Budget Activity 1 or Budget Activity 2 funding (as appropriate) as outlined in the DoD Financial Management Regulation (FMR), Volume 2B, Chapter 5 (July 2008) as follows:

Budget Activity 1: Basic Research. Basic research is systematic study directed toward greater knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications towards processes or products in mind. It includes all scientific study and experimentation directed toward increasing fundamental knowledge and understanding in those fields of the physical, engineering, environmental, and life sciences related to long-term national security needs. It is farsighted high payoff research that provides the basis for technological progress. Basic research may lead to: (a) subsequent applied research and advanced technology developments in Defense-related technologies, and (b) new and improved military functional capabilities in areas such as communications, detection, tracking, surveillance, propulsion, mobility, guidance and control, navigation, energy conversion, materials and structures, and personnel support. Program elements in this category involve pre-Milestone A efforts.

Budget Activity 2: Applied Research. Applied research is systematic study to understand the means to meet a recognized and specific need. It is a systematic expansion and application of knowledge to develop useful materials, devices, and systems or methods. It may be oriented, ultimately, toward the design, development, and improvement of prototypes and new processes to meet general mission area requirements. Applied research may translate promising basic research into solutions for broadly defined military needs, short of system development. This type of effort may vary from systematic mission-directed research beyond that in Budget Activity 1 to sophisticated breadboard hardware, study, programming and planning efforts that establish the initial feasibility and practicality of proposed solutions to technological challenges. It includes studies, investigations, and non-system specific technology efforts. The dominant characteristic is that applied research is directed toward general military needs with a view toward developing and evaluating the feasibility and practicality of proposed solutions and determining their parameters. Applied Research precedes system specific technology investigations or development. Program

control of the Applied Research program element is normally exercised by general level of effort. Program elements in this category involve pre-Milestone B efforts, also known as Concept and Technology Development phase tasks, such as concept exploration efforts and paper studies of alternative concepts for meeting a mission need.

ARTICLE 2 GENERAL DEFINITIONS

2.1 Recipient – An organization or other entity receiving a grant or cooperative agreement from a DoD Component. For purposes of this Agreement, the Recipient is _____.

2.2 Party – For purposes of this Agreement, the parties are ARL and the Recipient.

2.3 Collaborative Alliance Manager (CAM) – The research executed under the CRA will be considered an extension and integral part of the US Army Research Laboratory (ARL) research program. As such, the program established under this PA will be planned, defended, executed, and reviewed as part of ARL's mission program. Overall scientific management and fiscal responsibility for the CRA will reside with a senior ARL scientific manager, who will be designated the CAM for the CRA under the cooperative agreement. The ARL Grants Officer/Contracting Officer will receive recommendations from the CAM/COR and will be the ultimate legal authority empowered to make formal adjustments to the Cooperative Agreement. The CAM is identified at Article 3.1.

2.4 Program Manager – The CRA Program Manager (PM) is the Consortium's scientific representative charged with the Consortium's overall responsibility for management and guidance of the Cooperative Agreement. The PM will be designated by the LRO and be a member of that organization. The CRA is expected to be the primary responsibility of the individual assigned as PM, and a commitment of time commensurate with this responsibility is also expected. The PM is required to be an eminent scholar in the field of material science and have the stature, experience and leadership skills to successfully execute the CRA program. The Program Manager is identified at Article 3.3

2.5 Research Management Board (RMB) – The RMB will be established to identify and develop collaborative opportunities, advise and assist the CAM in setting research goals, and facilitate transition to ARL basic and applied research programs. The RMB will be chaired by the CAM and will include representatives from Army, other service organizations and other government agencies with interest, expertise in the technologies related to the CRA. The RMB will be invited to the APP Meeting and Review, and be informed about the Annual Program Plan approval process.

2.6 Consortium Management Committee (CMC) – The CRA will have a Consortium Management Committee (CMC) that consists of one representative from each member of the Consortium. The CAM participates as ex officio member in all discussions except those that deal with purely internal Consortium matters. The CMC will be chaired by the PM. Each Member will have one vote on the CMC to support programmatic and management-related activities and decisions. In the event of a tie, the LRO will cast the deciding vote. The CMC will be responsible for the management and integration of the Consortium's efforts under the CRA including programmatic, technical, reporting, financial, and administrative matters. The CMC makes recommendations that concern the membership of the Consortium, the definition of the tasks and goals of the participants, and the distribution of funding to the participants. Quarterly meetings will be conducted by the CMC.

2.7 Grants Officer – The Grants Officer is the Government's principal point of contact for all administrative, financial or other non-technical issues arising under the Agreement. The Grants Officer is identified at Article 8.1.

2.8 Agreements Administrator – The Agreements Administrator has authority to administer Cooperative Agreements and, in coordination with the Grants Officer, make determination and findings related to delegated administration functions. The Agreements Administrator is identified at Article 8.2.

ARTICLE 3 PROGRAM MANAGEMENT

3.1 The ARL Collaborative Alliance Manager (CAM) is:

 To be completed at award

3.2 The Members of the Consortium include:

_____ (LRO)

 To be completed at award

3.3 The Program Manager is:

 To be completed at award

3.4 Management

ARL and the winning Consortium will establish a CRA. Additionally, other Government agencies may be invited to join the Alliance to contribute, as appropriate, their technical expertise, personnel, access to research facilities and funding. The consortium will be led by an academic institution that will be charged with creating and fostering an open, collaborative research environment in which each member of the Consortium is an equal partner. This organization will be designated as the Lead Research Organization (LRO). The framework is sparse and flexible to minimize overhead, yet insure research relevance and proper oversight. There will be no limitation to the place of performance for other organizations participating in the Consortium.

During performance it is envisioned that there will be Consortium Members as well as Subawardees performing under the CA. The LRO has specific leadership and management responsibilities and roles as outlined below. Consortium Members are expected to have significant involvement and input on a long-term basis as outlined below. While Subawardees are expected to fulfill short-term needs as outlined below, they are particularly expected to execute new and innovative research covered by the 10% of overall funding that the Government reserves the right to withhold for this purpose. In addition, covered educational institutions must receive 5-10% of the CRA annual funding.

To be qualified to be a Consortium Member, an organization must:

- Have the management capability and adequate financial and technical resources, given those that would be made available through the cooperative agreement, to execute the program of activities envisioned under the cooperative agreement.
- Have a satisfactory record of executing such programs or activities (if a prior recipient of an award).
- Have a satisfactory record of integrity and business ethics.
- Be otherwise qualified and eligible to receive a cooperative agreement under applicable laws and regulation.

In deciding whether a recipient is otherwise qualified, the Grants Officer shall ensure that the potential recipient: is not identified in the Government-wide Excluded Parties List System (EPLS) as being debarred, suspended, or otherwise ineligible to receive the award; has provided all certifications and assurances required by Federal statute, Executive order, or codified regulation, unless they are to be addressed in award terms and conditions at the time of award; and meets any eligibility criteria that may be specified in the statute authorizing the specific program under which the award is being made.

3.5 Role of the Lead Research Organization (LRO)

The LRO is required to be an academic institution. The academic institution is expected to be an advanced degree-granting educational institution under the Higher Education Act of 1965 as amended. This institution is also expected to have doctoral level courses of study in scientific and research areas related to this CRA that can result in the granting of a doctoral degree. The LRO has primary responsibility for articulating and executing the vision for

the basic research and maintaining cross-Consortium collaboration and integration. This Member is expected to articulate a vision for the CRA, promote collaboration among Consortium Members, and members of the Alliance, and coordinate crosscutting themes with Alliance Members. This Member is required to administer, integrate, and manage the Consortium, participate in the research, and promote the transition of research and technologies resulting from the research program within the CRA. This includes distribution of Government funding to Consortium Members in accordance with the approved IPP/APP under the agreement. The LRO is also responsible for timely billing (invoicing) of executed research for itself and the other Consortium Members to ensure proper disbursement of government funds.

3.6 Consortium Members

Each Consortium Member may be an industrial, non-profit or academic institution but must possess substantial experience and expertise in the research areas contained within the scope of the CRA. Under special considerations outlined below Federally Funded Research and Development Centers (FFRDCs) and National Laboratories may participate in the Consortium as a Member. Academic members are expected to be advanced degree-granting educational institutions under the Higher Education Act of 1965 as amended. Those institutions are also expected to have doctoral level courses of study in scientific and research areas related to this CRA that can result in the granting of a doctoral degree. Industrial members are expected to have the ability to conduct appropriate research activities utilizing in-house engineers, scientists and facilities. All Members are expected to demonstrate opportunities for substantive collaboration with ARL, including appropriate opportunities for staff rotations and research collaboration.

3.7 Subawardees

Consortium Members will be augmented with Subawardees to conduct specific research projects as necessary and appropriate to meet the goals of the CRA, especially for the conduct of new and innovative research for which they are particularly qualified. Subawardees are organizations that (1) are not expected to provide strategic input concerning the goals and direction of the CRA and (2) may possibly have only a short term relationship with the Consortium.

3.8 Federally Funded Research and Development Centers (FFRDCs) and National Laboratories

FFRDC's, and National Laboratories, may participate as Consortium Members or Subawardees, but may not be the LRO, and their participation must be within the scope of their charter or sponsorship agreements. Further, FFRDC's and National Laboratories must cost-share an amount at least equal to the funding to be provided to them under the CRA.

3.9 Covered Educational Institutions:

The FY10 Department of Defense (DoD) Authorization Act, Public Law 111-84, provides authority for the Secretary of each military department to carry out a program to provide assistance to "covered educational institutions" to assist DoD in defense-related research, development, testing, and evaluation activities. The term "covered educational institution" is defined to mean an (1) an institution of higher education eligible for assistance under title III or IV of the Higher Education Act of 1965 (20 U.S.C. 1051 et seq.); or (2) an accredited postsecondary minority institution. As defined under title III or IV of the Higher Education Act, "covered educational institution" includes Historically Black Colleges and Universities/Minority-Serving Institutions (HBCU/MSIs).¹

Accordingly, it is required that covered educational institutions receive 5-10% of the annual funding under the CA. This may be accomplished through one of the following: (a) a covered educational institution submitting the proposal as the LRO; (b) a covered educational institution being included as a Member or Subawardee in a proposal; or (c) the proposal including a plan for how the LRO will work collaboratively with the Government to identify a covered educational institution for participation in the program.

3.10 Place of Performance for all Consortium Participants

There is no limitation on the place of performance for any organization participating under the CRA.

¹ See the definition of an "eligible institution" at 20 U.S.C. 1067q which includes historically Black colleges and universities and other minority-serving institutions.

3.11 Initial Program Plan (IPP)

Within 90 days after award, the Consortium (through the CMC) and the Government will jointly prepare an Initial Program Plan (IPP) to cover the first 9 months of performance. The IPP will be based substantially on the final proposals received from the Consortium. The IPP will be accompanied by a five-year roadmap that describes the overall plan to be accomplished by the Consortium within the Alliance structure. This roadmap should provide the vision for grand challenges and crosscutting themes to be addressed during the first five years of the Alliance. The roadmap should provide a detailed description of a well-coordinated preliminary APP for execution of the basic research, balancing theoretical and experimental elements of the program in each of the five core elements. It should provide a clear plan for data collection, technology integration, and technology assessment activities to facilitate planning by all Alliance partners. It should provide approximate timelines for research activities to facilitate potential future basic research transitions.

3.12 Annual Program Plan (APP)

Eight months after award, the Consortium (through the CMC) and the Government will jointly prepare a proposed Annual Program Plan (APP) for the next fiscal year. Through discussion among the consortium members, an APP will result that enables integration and execution of crosscutting themes that strive to achieve CRA objectives. The CAM will approve the APP and formally submit the approved APP to the Grants Officer for incorporation into the collaborative agreement. This process will continue through the life of the collaborative agreement.

Each APP will cover a one-year timeframe, but may be altered, with the approval of the CAM and the Grants Officer, if research work requirements change. The APP will provide a detailed plan of research activities (including research goals, key personnel, educational opportunities, staff rotation, facilities, demonstrations and budget) that commits the Consortium to use their best efforts to meet specific research objectives. The APP will also describe the collaborative efforts with the Government. The APP will include, as a separate volume, a detailed description of the projects proposed to be undertaken by subawardees, including new subawardees that may be included at the discretion of the Government, and funded by up to a 10% withhold on the Consortium annual budget. In addition to the items normally outlined for each Consortium task in the APP, this appendix will demonstrate the novel nature of the research, the manner in which it complements the research being undertaken by the consortium, and how it is being integrated into the overall research program.

ARTICLE 4 STAFF ROTATION AND ON-SITE COLLABORATION

4.1 Collaboration

The CRA continues the ARL concept of the creation of an Alliance to facilitate a close relationship between ARL and its partners so that collaborative research with the government across the academic and industrial community enhances innovation and has a high return on investment. It is ARL's strong belief that collaboration between the members of the Consortium and the Government is integral to the execution and success of the CRA. Creation of an environment that is conducive to collaboration is therefore a critical element in establishing the CRA.

4.1.1 ARL/WMRD/CISD Mission Program

ARL will specifically fund a parallel complementary in-house mission program to foster direct partnerships between CRA members and government researchers. The in house parallel effort will cover the five critical core technical elements of the MEDE CRA as well as the materials by design strategy. ARL will develop that mission program for optimal synergies with the CRA strategy, the CRA Initial Program Plan (IPP) and the subsequent Annual Program Plans (APPs), thus insuring a direct and continuing correspondence within the Alliance. The APP will be the basis for the Alliance to optimize the collaboration, information, research and technology transfer between the CRA and ARL subject matter experts.

4.1.2 ARL Enterprise for Multiscale Materials

This CRA is part of the ARL Enterprise for Multiscale Research of Materials. The Enterprise will include an in-house ARL Initiative for Multiscale Modeling of Materials (I3M) that will be established prior to the CRA awards. The long-term goal of the I3M is to develop new physics-based scientific multidisciplinary multiscale modeling methodologies and software that can interrogate design space in which material imperfections, surface and interfaces

(ISI's) are prominent enablers or detractors for performance. The I3M will be a partner in collaboration with the CRAs. It is envisioned that this Enterprise effort will provide the Army and DoD fundamentally new cross-cutting capabilities (high level physics-based computational tools) that will help overcome obstacles for materials development relevant to energetics, sensors, electronics, power, modeling and simulation applications. This I3M will also provide access to advanced high performance computing capability, computing environments, validated codes and software, visualization suites, and data management techniques that can be leveraged by the CRAs.

4.1.3 Staff Rotation

An important element of CRA collaboration is the advancement, education and rotation of technical staff through short- and long-term temporary assignments. The scope of this collaboration may range from regular, periodic short term visits to sabbaticals lasting as long as a year. Staff rotations will be undertaken to foster and facilitate collaborative research where face-to-face interaction is advantageous, to enable a researcher to utilize unique facilities, to enable Alliance personnel to obtain specialized training or experience and to facilitate the exchange of research results. In addition, this exchange, or cross fertilization, of personnel will provide Consortium personnel with insight into Army unique requirements and will provide Government personnel with insight into state of the art research and commercial practices and/or the opportunity to pursue fundamental research with noted researchers. The success of these interactive and collaborative exchanges will be assessed by the quality of the collaboration as demonstrated by joint efforts such as basic research transitions to applied research programs, archival journal papers, patents, and refereed presentations.

4.1.4 Lectures, Workshops, and Research Reviews

The Alliance (i.e., the Consortium and ARL) will be encouraged to hold, from time to time throughout the period of performance of the MEDE CRA, scientific lectures, short courses and workshops on mutually agreed upon topics. These lectures and workshops will serve as both educational and research outreach opportunities and should involve participants outside the Alliance when appropriate. Additionally, the Alliance is expected to hold regular, periodic research reviews that will permit the free exchange of ideas and research results, especially those impacting any cross-cutting research themes, among the entire ARL Enterprise for Multiscale Research of Materials. The costs associated with the Consortium's efforts for these lectures, short courses, workshops and reviews will be funded under the Cooperative Agreement.

4.1.5 Education

As a means to foster the professional growth, technical strength and to provide a venue for training personnel in the scientific disciplines underlying the Alliance, the Consortium will identify educational opportunities for Government scientists and engineers. These opportunities may include fellowship programs that lead to masters and doctoral degrees, and short courses (e.g., summer and intensive special topic courses in critical technology areas) that lead to the award of appropriate academic credit. The Consortium will further consider means to foster collaboration with the ARL technical staff through programs such as internships at ARL for graduate and undergraduate students, faculty sabbaticals and summer research. The costs associated with the Consortium's efforts to identify, prepare for and execute such educational opportunities will be funded under the Cooperative Agreement. The cost associated with salaries, travel, etc. for Government personnel will be the responsibility of the Government, and will not be funded under the Cooperative Agreement.

4.1.6 Industry

To foster industrial participation, the Consortium is required to provide a plan for engagement of Industry. As an example, such a plan may include the establishment of a separate, self-funded Industry/University consortium that will parallel the government funded CRA. Such an Industry consortium, for example, may offer: funding of industry driven R&D projects, interaction with key players in industry, peers and customers, access to intellectual property, access to pre-publication research papers, access to world class facilities and researchers, access to students and transfer of research results to serve industry projects and products. Other industrial participation mechanisms may also be proposed. Examples of Industry/University Collaborative Research Centers that may be used to model a proposed plan for engagement of industry may be found at:

<http://flexdisplay.asu.edu/partners/industry>
<http://www.ccmd.psu.edu/>
<http://ccmc.rutgers.edu/>

4.1.7 Other Collaboration Opportunities

4.1.7.1 High Performance Computing DoD Supercomputing Resource Center (HPC-DSRC)

The CRA partners can request access to the DSRC under the CRA umbrella to utilize the computational, and visualization resources. ARL is a partner with the DoD High Performance Computing Modernization Program Office (HPCMPO) to manage and operate one of its four DoD Supercomputing Resource Centers (DSRCs). The ARL DSRC also delivers the latest in computational tools and innovative technology. Our computer simulations and models help technologists develop, test, and field weapon systems faster and more efficiently-shortening the entire acquisition process from research to production. ARL DSRC Team members are helping scientists develop more effective techniques for simulating combat environments, detecting munitions, and creating new armaments-to save lives on future battlefields. The Center offers a full spectrum of computational capabilities for the Department of Defense (DoD) Science and Technology and Test and Evaluation communities, including:

- Powerful parallel processors
- Reliable high-speed networks
- A wide range of software
- Comprehensive storage
- Scientific visualization
- Novel storage platforms
- Close ties with academic partners
- Advanced training
- Outstanding end-user care

4.1.7.2 HPC (High Performance Computing) Software and Application

Institute (HSAI) for Multi-Scale Reactive Modeling and Simulation of Insensitive Munitions (MSRMS-IM).

The HSAI for MSRMS-IM has the mission, vision, and goals to develop a science-based capability to simulate munition response to insults through adequately capturing the effects that micro, meso and macrostructural heterogeneities, inherent in composite Energetic Materials (EM), impose on macroscopic events. This effort will transform the current Modeling and Simulation (M&S) process that DoD presently utilizes in the design of IM compliant weapons by incorporating essential but currently, lacking micro-and meso-level modeling capabilities needed to capture key physiochemical properties in continuum codes. This will provide a change in paradigm by eliminating current system-specific M&S tools that have high levels of empiricism and inaccuracies and introducing an agile and robust set of M&S tools applicable for a wide range of IM development that are amenable for future growth and expansion. Further, this multi-scale approach provides true predictive capability of system-level munitions response based on fundamental physics and chemistry parameters linked to engineering/continuum models, resulting in 1) faster design and implementation of IM technology solutions 2) reduced risk with IM technology integration and 3) a reduction of the development and acquisition cycle to introduce IM compliant mission-capable munitions into service. This multiscale design and analysis tool suite will allow for extrapolation beyond current IM threats and will be transitioned and disseminated to DoD, industry and university researchers, developers and the acquisition community. The output of the HSAI will be validated and vetted computational codes, equations of state and constitutive models for Multiscale modeling of IM compliant energetic materials which may be leveraged by the CRA

4.1.7.3 Other Government Agencies (OGA's)

The government will work with the LRO to leverage and/or integrate other interested OGA's (and funding where appropriate) into the CRA umbrella. This may become part of the Core Research Program, or maybe enabled directly through the enhanced CRA program. These efforts and thrusts may be lead by the LRO, consortium partners or coordinated jointly. Other service elements such as the U.S. Air Force, the U.S. Navy and the U.S. Army Research and Development Centers (RDECs) such as the U.S. Army Tank-Automotive Research Development and Engineering Center (TARDEC), the U.S. Army Armaments Research Development and Engineering Center, (ARDEC), the U.S. Army Aviation and Missile Research and Development Center (AMRDEC), the Natick Soldier Research Development and Engineering Center (NSRDEC) and the U.S. Army Engineer Research Development Center (ERDEC) have requirements for Materials in Extreme Environments and will be able to leverage the CRA work and/or provide funding in areas of interest. The U.S. Army RDEC's will be a part of the CRA Research

Management Board.

4.2 Salary and Travel Costs

All salary and travel costs associated with the rotation of government personnel will be borne by the Government. All salary and travel costs associated with staff rotations of Consortium members will be funded under the Cooperative Agreement or may be provided by the Consortium member as cost-share. There should be a balance of staff rotations across all the partners in the Consortium and across all the research areas. It is anticipated that some portion of the Consortium's scientific labor-years will be in staff rotations.

4.3 Host Facility Regulations

All personnel in rotational assignments or on-site collaboration are required to comply with the safety, environmental, security, and operational regulations or requirements of the host facility.

4.4 Administrative Support

The host facility will provide adequate office space, communications connections, administrative support, and office supplies, if available, for researchers in long-term rotational assignments. Should it become necessary to procure equipment to facilitate a rotational assignment, the APP should reflect the need for said equipment, and the costs will be borne under the Cooperative Agreement.

ARTICLE 5 FISCAL MANAGEMENT

5.1 Allocation of Recipient Funds

5.1.1 Restrictions on the Use of Government Funds

Government funds provided under this Agreement must be allocated by the Recipient exclusively for the execution and operation of the IPP/APP or Agreement Scope. Government funds shall not be utilized to support the Recipient's operations or administration unrelated to this Agreement.

5.1.2. Cost Share *(will be included in the Cooperative Agreement only if there is Cost Share by the Recipient)*

The Government and Recipient estimate that the Scope of this agreement can only be accomplished with a total aggregate resource contribution of \$_____ for the Basic Agreement, and a total resource contribution of \$_____* for the Option. For the purposes of this Agreement, the cost share ratio for the Basic Agreement shall be \$_____ for the Government and \$_____ for the Recipient, and \$_____* for the Government and \$_____* for the Recipient for the Option. The Recipient intends, and by entering into this Agreement, undertakes the cause for which these funds are being provided. The Recipients contributions will be provided as detailed in the IPP and subsequent APPs under this Agreement. Failure of either Party to provide its contribution may result in termination of this agreement, or a proportional reduction in funding.

(* While the Total Estimated Government Funding of the Option is listed above, the Recipient will be requested to provide a complete cost proposal for the optional five-year period of performance as part of the evaluation to be completed prior to making the decision concerning this optional period.)

5.1.3 Obligation

In no case shall the Government's financial obligation exceed the amount obligated on this Agreement or by amendment to the Agreement. The total Government funding amount estimated for performance of the Basic Agreement is \$_____, subject to the availability of funds. Of this amount, the Government share is \$_____ and the Recipient share is \$_____. The total amount estimated for performance of the Option is \$____*. Of this amount, the Government share is \$____* and the Recipient share is \$____*. The amount of Government funds currently obligated and available for payment is \$_____. It is estimated that such funds shall be sufficient to cover performance from date of award through _____ (____) months. The Government is not obligated to reimburse the Recipient for expenditures in excess of the amount of obligated funds allotted by the Government.

(* While the Total Estimated Government Funding of the Option is listed above, the Recipient will be requested to provide a complete cost proposal for the optional five-year period of performance as part of the evaluation to be completed prior to making the decision concerning this optional period.)

5.1.4 Incremental Funding

The Government may obligate funds to this Agreement incrementally. In the event that this Agreement is funded incrementally, the Government anticipates that from time to time additional amounts will be allotted to this agreement by unilateral modification, until the total amount for performance of this Agreement has been funded. To minimize interruption of effort due to lack of funds, the Recipient shall notify the Grants Officer in writing whenever the amount of funds obligated under this agreement when added to anticipated costs in the next 60 days will exceed 75% of the amount allotted. Obligated funds provided to the Consortium for any Governmental Fiscal Year (GFY), which are not expended in the same GFY, may be carried forward and expended in the next succeeding GFY until they are completely expended within the performance period of the IPP or APP.

5.1.5 Payments

a. The Recipient shall submit to the Agreement Administrator an original and two (2) copies of all vouchers, SF 270 "Request for Advance or Reimbursement" or other form or format prescribed by the DoD component when it (component) determines that adequate information has been provided to meet Federal needs. One copy shall also be provided to the CAM for payment approval. The Recipient shall attach additional information as reasonably requested by the Agreement Administrator. After written verification of progress towards or achievement of the research milestones by the CAM and approval by the Agreement Administrator, the vouchers will be forwarded to the payment office within ten (10) calendars of receipt of the voucher. The Payment Office will make payments via EFT within 20 calendar days of receipt of transmittal.

b. Payments will be made no more frequently than monthly and will be based on reimbursement of actual expenditures as monitored against the Budget Plan contained in the IPP/APP. Once the CAM has verified that the Recipient has expended best efforts towards the successful achievement of the research goals, payment will be authorized.

5.1.6 Financial Reporting

The Recipient shall submit Annual and Final Financial (SF425) reports as specified in Attachment 4.

ARTICLE 6 AGREEMENT ADMINISTRATION

6.1 Modifications to this Agreement

Any Party who wishes to modify this Agreement will, upon reasonable notice of the proposed modification to the other Party, confer in good faith with the other Party to determine the desirability of the proposed modification. Modifications will not be effective until a written modification is signed by the Agreement signatories or their successors. Administrative modifications may be unilaterally executed by the Grants Officer or by the Agreements Administrator.

6.2 Requirements for Approval for Changes to the Program Budget and Program Plan

During the course of performance, if it appears that research goals will not be met, the CMC will provide a proposed adjustment to the APP for approval by the CAM. In addition, the CAM may from time to time request that additional research be added to the APP within the scope of the collaborative agreement. The Consortium, as an entity, will not solicit or accept funding from outside sources other than the US ARL without the approval of the CAM and the Grants Officer.

This provision highlights Agency decisions on the terms and conditions of 32 CFR 32.25 and 32 CFR 34.15 as applicable. During the course of performance, the Grants Officer, in coordination with the CAM, will have approval authority for certain specific changes to the APP when such changes are requested by the Recipient, including but not limited to:

- 6.2.1** Changes in the scope or the objective of the program, IPP/APP, or research milestones;
- 6.2.2** Change in the key personnel specified in IPP/APP;

- 6.2.3** The absence for more than three months, or a 25% reduction in time devoted to the project, by the PM;
- 6.2.4** The need for additional Federal funding;
- 6.2.5** Any subaward, transfer, or contracting out of substantive program performance under an award, unless described in the IPP/APP.

The CAM, in coordination with the CMC and ARL management, will be responsible for integrating the IPP/APP into the overall respective research and technology programs.

During the course of performance, the Grants Officer, in coordination with the CAM, will have approval authority for certain specific changes to the cooperative agreement including, but not limited to:

- Changes to the Articles of Collaboration if such changes substantially alter the relationship of the parties as originally agreed upon;
- Solicitation or acceptance of funding under the agreement from sources other than ARL; and
- Changes in Consortium membership.

6.3 No-Cost Period of Performance Extension

In accordance with the DoD Grant and Agreement Regulations (DoD 3210.6-R), the Recipient may initiate a request for a one-time, no-cost extension to the period of performance. The request may not include additional Federal funds, nor change the approved objectives or scope of the program.

ARTICLE 7 TERMS OF THE AGREEMENT

7.1 Term of the Agreement

The basic term of this Agreement will commence upon the effective date and continue through five (5) years, subject to the availability of funds. There will be an option to extend the CRA for an additional five (5) years. At the end of the fourth year, a program review will be conducted as directed by ARL. The progress towards the 5 year goal will be evaluated, and an assessment will be made of the ultimate ability of the Consortium to achieve the 10 year goal. This review will consider cumulative performance metrics, the Consortium's vision for the additional five-year period of performance (to be submitted by the Consortium at the end of the fourth year), funding availability and the current fundamental research needs and goals of the US Army. Performance metrics are expected to include items that provide an indication of the CRA's accomplishments, such as research transitions from the CRA, the number of refereed journal articles, invited presentations, relevance of the work to ARL, collaboration, staff rotation, education, management, etc. The decision as to whether to exercise the option is expected to be based on the results of the review and evaluation described above. The Option may be exercised at any time prior to completion of the Basic Agreement. Performance on the Option period will be subject to the availability of funds.

ARTICLE 8 ADMINISTRATIVE RESPONSIBILITY

8.1 THE AGREEMENTS OFFICE

U.S. Army Contracting Command – Aberdeen Proving Ground (Soldier, Chemical, Research & Test)
Research Triangle Park Contracting Division
ATTN: CCRD-RT

For FedEx etc. use: 4300 S. Miami Blvd., Durham, NC 27703
For USPS use: P.O. Box 12211, Research Triangle Park, NC 27709

Grants Officer: Patricia J. Fox
Phone: (919) 549-4272
Fax: (919) 549-4373
Email: patricia.fox@us.army.mil

Grant Specialist: Joseph Morse
Phone: (919) 549-4311
Fax: (919) 549-4388
Email: joseph.morse@us.army.mil

8.2 AGREEMENT ADMINISTRATOR

To be completed at award

8.3 THE RECIPIENT ADDRESS AND POINT OF CONTACT

To be completed at award

8.4 THE PAYMENT OFFICE

To be completed at award

8.5 ADDRESS OF PAYEE – SEE ARTICLE 8.3

ARTICLE 9 PUBLIC RELEASE OR DISSEMINATION OF INFORMATION

9.1 Open Publication Policy

Notwithstanding the reporting requirements of this Agreement, parties to this Agreement favor an open-publication policy to promote the commercial acceptance of the technology developed under this Agreement, but simultaneously recognize the necessity to protect proprietary information.

9.2 Prior Review of Public Releases

The Parties agree to confer and consult with each other prior to publication or other disclosure of the results of work under this Agreement to ensure that no classified or proprietary information is released. Prior to submitting a manuscript for publication or before any other public disclosure, each Party will offer the other Party ample opportunity (not to exceed 60 calendar days) to review such proposed publication or disclosure, to submit objections, and to file application letters for patents in a timely manner.

9.3 Publication Legend

It is herein agreed that except for the disclosure of basic information regarding this Agreement such as membership, purpose and a general description of the technical work, the Consortium Members will submit all proposed public releases to the ARL Cooperative Agreement Manager for comment prior to release. Public releases include press releases, specific publicity or advertisement, and articles for proposed publication or presentation. In addition, articles for publication or presentation will contain an acknowledgement of support and a disclaimer. This should be included to read as follows. These statements may be placed either at the bottom of the first page or at the end of the paper. "Research was sponsored by the Army Research Laboratory and was accomplished under Cooperative Agreement Number **W911NF-12-2-00XX**. The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the official policies, either expressed or implied, of the Army Research Laboratory or the U.S. Government. The U.S. Government is authorized to reproduce and distribute reprints for Government purposes notwithstanding any copyright notation herein."

ARTICLE 10 INTELLECTUAL PROPERTY

In addition to the Intellectual Property Rights contained in 32 CFR 32.36 or 32 CFR 34.25 as applicable, incorporated by reference into this Agreement, the participants recognize that this program may result in intellectual property that is generated by the Recipient or Sub-Recipient personnel and Government personnel. Should this occur, the Parties agree to use their best efforts to mutually agree to an equitable distribution of property rights and distribution of filing fees or other administrative costs. Should the Parties reach an impasse in determining the

distribution of property rights, the Parties shall resort to the Disputes, Claims, and Appeals Process as set forth at 32 CFR 22.815.

ARTICLE 11 ENTIRE AGREEMENT

This Agreement along with all Attachments constitutes the entire agreement between the parties concerning the subject matter hereof and supersedes any prior understandings or written or oral agreement relative to said matter. In the event of a conflict between the terms of the Agreement and its attachments, the terms of the Agreement shall govern.

ARTICLE 12 GOVERNING LAW/ORDER OF PRECEDENCE

The Agreement shall be enforced in accordance with applicable federal law and regulations, directives, circulars or other guidance as specified in this Agreement. When signed, this Agreement shall become binding on the Recipient and the Government to be administered in accordance with the DoD Grant and Agreement Regulations as they apply to the particular Recipient or sub-recipient concerned. In the event a conflict exists between the provisions of this Agreement and the applicable law, regulations, directives, circulars or other guidance, the Agreement provisions are subordinate.

ARTICLE 13 WAIVER OF RIGHTS

Any waiver of any requirement contained in this Agreement shall be by mutual agreement of the Parties hereto. Any waiver shall be reduced to writing and a copy of the waiver shall be provided to each Party. Failure to insist upon strict performance of any of the terms and conditions hereof, or failure or delay to exercise any rights provided herein or by law, shall not be deemed a waiver of any rights of any Party hereto.

ARTICLE 14 USE OF TECHNICAL FACILITIES

To the maximum extent practical, the Recipient agrees to use the technical reference facilities of the Defense Technical Information Center, 8725 John J. Kingman Road, Suite 0944, Ft. Belvoir, VA 22060-6218 (Internet address: <http://www.dtic.mil>) and all other sources, whether United States Government or private, for purpose of surveying existing knowledge and avoiding needless duplication of scientific and engineering effort.

ARTICLE 15 METRIC SYSTEM OF MEASUREMENT

The Metric Conversion Act of 1975 as amended by the Omnibus Trade and Competitiveness Act of 1988 and implemented by Executive Order 12770 gives preference to the metric system. The Recipient shall ensure that the metric system is used to the maximum extent practicable in performance of this Agreement.

ARTICLE 16 LIABILITY

No Party to this Agreement shall be liable to any other Party for any property that the other Party consumed, damaged, or destroyed in the performance of this Agreement, unless it is due to the negligence or misconduct of the Party or an employee or agent of the Party.

ARTICLE 17 NON-ASSIGNMENT

This Agreement may not be assigned by any Party except by operation of law resulting from the merger of a party into or with another corporate entity.

ARTICLE 18 SEVERABILITY

If any clause, provision or section of this Agreement shall be held illegal or invalid by any court, the invalidity of such clause, provision or section shall not affect any of the remaining clauses, provisions or sections herein and this Agreement shall be construed and enforced as if such illegal or invalid clause, provision or section had not been contained herein.

ARTICLE 19 FORCE MAJEURE

Neither Party shall be in breach of this Agreement for any failure of performance caused by any event beyond its reasonable control and not caused by the fault or negligence of that Party. In the event such a force majeure event occurs, the Party unable to perform shall promptly notify the other Party and shall in good faith maintain such partial performance as is reasonably possible and shall resume full performance as soon as is reasonably possible.

ARTICLE 20 NOTICES

All notices and prior approvals required hereunder shall be in writing and shall be addressed to the parties identified on the Agreement cover page and Article 8. Notices shall be effective upon signature of the Grants Officer.

ARTICLE 21 ACCESS GUIDANCE

Should a Recipient's performance require access to DoD facilities, the Recipient shall coordinate with their CAM or designated point of contact providing access in order to obtain the most current access guidance. Commencement of access coordination should occur at least 10 calendar days prior to the date of required access.

ARTICLE 22 CENTRAL CONTRACTOR REGISTRATION AND UNIVERSAL IDENTIFIER REQUIREMENTS

I. Central Contractor Registration and Universal Identifier Requirements

A. Requirement for Central Contractor Registration (CCR)

Unless you are excepted from this requirement under 2 CFR 25.110, you as the recipient must maintain the currency of your information in the CCR until you submit the final financial report required under this award or receive the final payment, whichever is later. This requires that you review and update the information at least annually after the initial registration, and more frequently if required by changes in your information or another award term.

B. Requirement for Data Universal Numbering System (DUNS) Numbers

If you are authorized to make subawards under this award, you:

1. Must notify potential subrecipients that no entity (see definition in paragraph C of this award term) may receive a subaward from you unless the entity has provided its DUNS number to you.
2. May not make a subaward to an entity unless the entity has provided its DUNS number to you.

C. Definitions

For purposes of this award term:

1. Central Contractor Registration (CCR) means the Federal repository into which an entity must provide information required for the conduct of business as a recipient. Additional information about registration procedures may be found at the CCR Internet site (currently at <http://www.ccr.gov>).

2. Data Universal Numbering System (DUNS) number means the nine-digit number established and assigned by Dun and Bradstreet, Inc. (D&B) to uniquely identify business entities. A DUNS number may be obtained from D&B by telephone (currently 866-705-5711) or the Internet (currently at <http://fedgov.dnb.com/webform>).

3. Entity, as it is used in this award term, means all of the following, as defined at 2 CFR part 25, subpart C:

- a. A Governmental organization, which is a State, local government, or Indian tribe;
- b. A foreign public entity;
- c. A domestic or foreign nonprofit organization;
- d. A domestic or foreign for-profit organization; and
- e. A Federal agency, but only as a subrecipient under an award or subaward to a non-Federal entity.

4. Subaward:

- a. This term means a legal instrument to provide support for the performance of any portion of the substantive project or program for which you received this award and that you as the recipient award to an eligible subrecipient.
- b. The term does not include your procurement of property and services needed to carry out the project or program (for further explanation, see Sec. __.210 of the attachment to OMB Circular A-133, "Audits of States, Local Governments, and Non-Profit Organizations").
- c. A subaward may be provided through any legal agreement, including an agreement that you consider a contract.

5. Subrecipient means an entity that:

- a. Receives a subaward from you under this award; and
- b. Is accountable to you for the use of the Federal funds provided by the subaward.

ATTACHMENT 1

Standard Terms and Conditions for Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations, Department of Defense Grant and Agreement Regulations (DoDGARS) (DoD 3210.6-R and 32 CFR Parts 21-37)

Award, administration and performance under this agreement is subject to the requirements of the DoD Grant and Agreement Regulations (32CFR Parts 21-37). Narratives following a reference indicate the Agency's decision on specific issues.

- **32 CFR 22.815 Claims, Disputes and Appeal**
The Agency and Recipient will employ Alternative Dispute Resolution to resolve issues which arise during the performance of the agreement. The procedures to be used will be mutually agreed to when and if issues arise (see section 815(c)(2)). The Grant Appeal Authority is the Director of ARL (see section 815(e)(i)).
- **32 CFR 32.21 Standards for Financial Management Systems**
ARL does not guarantee or insure the repayment of money borrowed by the Recipient. Further, ARL does not require the Recipient to secure fidelity bond coverage to protect the Government's interests.
- **32 CFR 32.22 Payment**
All payments made under this agreement will be of the reimbursement type. Recipients should refer to Article 5 Fiscal Management of this agreement for further information.
- **32 CFR 32.27 and 32.28 Allowable Costs**
The Recipient shall comply with the appropriate cost principles.
- **32 CFR 32.23 Cost Share or Match**
This provision is applicable only if cost share or match is included in the Recipient's proposal and the subsequent award document. Should cost share or match be included, the parties to this agreement will mutually agree to its allowability, valuation and necessary documentation.
- **32 CFR 32.24 Program Income**
Should this agreement result in generating program income, the Recipient shall account for said funds, add them to the funds committed to the project, and they shall be used to further the program objectives. The Recipient shall have no obligation to the Government for program income earned after the expiration of the program. Costs incident to the generation of program income may be deducted from gross income to determine program income, provided these costs have not been charged to the award document. The Patent and Trademark Amendments (35 U.S.C. Chapter 18) apply to inventions made under this award.
- **32 CFR 32.25 Revision of Budget/Program Plans**
See Article 6 of this agreement.
- **32 CFR 32.26 Audit**
Non-Profit entities shall submit a copy of the OMB Circular A-133 audit reports to the DoD Inspector General and to the Grants Officer.
- **32 CFR 32.40 through 32.49 Procurement**
ARL reserves the right to review prior to award procurement documents such as request for proposals, or invitations for bids, independent cost estimates etc., during performance under this award.
- **32 CFR 32.5 Subawards**
This subpart sets forth the requirement for flow down provisions or subsequent sub-agreements or subawards.
- **32 CFR 32.30 through 32.37 Property**

ARL waives the requirement for recordation of liens or other appropriate notices set forth at 32 CFR 32.37.

Recipients are subject to applicable regulations governing patents and inventions, including Government-wide regulations issued by the Department of Commerce at 37 CFR part 401 "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements."

ARL does not waive the right to obtain, reproduce, publish or otherwise use the data first produced under this award or to authorize others to receive, reproduce, publish, or otherwise use such data for government purposes.

- 32 CFR 32.51 and 32.52 Reports
See Attachment 4 of this agreement.

- 32 CFR 32.53 Records

- 32 CFR 32.60 through 32.62 Termination and Enforcement

In addition to the termination processes set forth in 32 CFR 32.61, this Agreement may also be terminated by the Grants Officer should available funds be insufficient to accomplish the goals or intent of the Agreement, or convenience of the Government.

- 32 CFR 32.71 through 32.73 After-the-Award Requirements

ATTACHMENT 2

Standard Terms and Conditions Applicable to For-Profit Entities Department of Defense Grant and Agreement Regulations (DoDGARS) DoD 3210.6-R and 32 CFR Parts 21-37

Award, administration, and performance under this agreement is subject to the requirements of the DoD Grant and Agreement Regulations (32 CFR Parts 21 – 37). The following references indicate the awarding agency's decision on specific issues.

32 CFR 34.1(b)(2)(ii) Subawards

For-profit organizations that receive prime awards covered by this part shall apply to each subaward the administrative requirements that are applicable to the particular type of sub-recipient (see 32 CFR parts 32 and 34)

32 CFR 34.11 Standards for Financial Management Systems

The Agency does not guarantee or insure the repayment of money borrowed by the Recipient (see section 11(b)). Fidelity bond coverage is not required (see section 11(c)).

32 CFR 34.12 Payment

This Agreement will employ the reimbursement method of payment (see 32 CFR 34.12(a)(1)). This Agreement does not provide for advance payments (see section 12(a)(2)). (See Article 5, subparagraphs 5.1.2 through 5.1.4) . See Article 5 – Fiscal Management for specifics concerning the payment process.

32 CFR 34.13 Cost Share or Match

This provision is applicable only if cost share or match is proposed. Should cost share or match be included, the parties to this agreement will mutually agree to its allowability, valuation, and necessary documentation.

32 CFR 34.14 Program Income

Should this agreement result in the generation of program income, the Recipient shall account for said funds, add them to the funds committed to the project, and they shall be used to further the program objectives. The Recipient shall have no obligation to the Government for program income earned after the expiration of the program. Costs incident to the generation of program income may be deducted from gross income to determine program income, provided these costs have not been charged to the award document. The Patent and Trademark Amendments (35 U.S.C. Chapter 18) apply to inventions made under this award.

32 CFR 34.15 Revision of Budget/Program Plans

See Article 6 of this agreement.

32 CFR 34.16 Audit

For profit Recipient(s) of this award are required to submit audit reports to the following address:

Grants Officer: Patricia J. Fox
Phone: (919) 549-4272
Fax: (919) 549-4373
Email: patricia.fox@us.army.mil

Defense Contract Management Administration (DCMA) Office
To be completed at award

Audit reports may be requested from the DoD Inspector General, or any of the Department of Army Policy directorates.

32 CFR 34.17 Allowable Costs

The For-Profit costs principles in 48 CFR parts 31 and 231 (Federal Acquisition Regulation and Defense Acquisition Regulations Supplement) as well as the supplemental information on allowability of audit costs in the 32 CFR 34.16(f) are applicable.

32 CFR 34.18 Fee/Profit

This Agreement does not provide for the payment of fee/profit to the Recipient or sub-recipients.

32 CFR 34.20 through 34.25 Property Standards

For-Profit Recipients may only purchase real property and equipment under this Agreement with the prior approval of the Grants Officer. Government approved Program Plans that include a budget indicating real property or equipment purchases will provide sufficient evidence of the required Grants Officer approval.

The Recipient receives conditional title to all real property and equipment purchased under this Agreement. ARL reserves the right to transfer title to any and all equipment or real property purchased under this Agreement to the Federal Government or to eligible third parties upon conclusion of this Agreement.

For-Profit organizations other than small business concerns shall comply with 35 U.S.C. 210(c) and Executive Order 12591 (3 CFR, 1987 Comp., p.220) which codifies a Presidential Memorandum on Government Patent Policy dated February 18, 1983.

ARL reserves the right to obtain, reproduce, publish, or otherwise use for Federal Government purpose the data first produced under this award, and authorize others to receive, reproduce, publish, or otherwise use such data for Federal purposes.

32 CFR 34.30 through 34.31 Procurement Standards

ARL reserves the right to review prior to award procurement documents such as request for proposals, or invitations for bids, independent cost estimates etc., during performance under this award. (see 32 CFR 34.31(b))

32 CFR 34.41 Reports

See Attachment 5 of this Agreement.

32 CFR 34.42 Records

32 CFR 34.50 through 34.52 Termination and Enforcement

In addition to the termination processes set forth at 32 CFR 34.51, this Agreement may also be terminated by the Grants Officer should available funds be insufficient to accomplish the goals or intent of the Agreement, or other convenience of the Government.

32 CFR 22.815 Claims, Disputes and Appeal

The Agency and Recipient will employ Alternative Dispute Resolution to resolve issues which arise during the performance of agreement. The Agency and Recipient recognize that disputes arising under this agreement are best resolved at the local working level by the parties directly involved. All Parties are encouraged to be imaginative in designing mechanisms and procedures to resolve disputes at this level. Any dispute arising under the agreement, which is not disposed of by agreement of the parties at the working level shall be submitted jointly to a senior manager of Agency and Recipient or their designee(s) for resolution (see section 815(c)(2)). The Grant Appeal Authority is the Director of Agency (see section 815(e)(2)). Pending the resolution of any dispute or claim pursuant to this Article, the Parties agree that performance of all obligations shall be pursued diligently in accordance with the Agreement.

32 CFR 34.61 through 34.63 After-the-Award Requirements

Appendix A to Part 34 – Contract Provisions

All contracts awarded by the Recipient, including those for amounts less than the simplified acquisition threshold, shall contain the following provisions as applicable:

- Equal Employment Opportunity (E.O. 11246, as amended by E.O. 11375, and supplemented by 41 CFR Chapter 60)
- Copeland “Anti-Kickback” Act (18 U.S.C. 874 and 40 U.S.C. 276c)
- Contract Work Hours and Safety Standards Act (40 U.S.C. 327-333)

- Rights to Inventions Made Under a Contract, Grant, or Cooperative Agreement (37 CFR Part 401)
- Clean Air Act (42 U.S.C. 7401 et seq.) and the Federal Water Pollution Control Act (33 U.S.C. 1251 et. seq.)
- Byrd Anti-Lobbying Amendment (31 U.S.C. 1352)
- Debarment and Suspension (E.O.s 12549 and 12689)

ATTACHMENT 3
National Policy Requirements

By signing this Agreement or accepting funds under this Agreement, the Recipient assures that it will comply with applicable provisions of the national policies on the following topics:

1. Nondiscrimination

- a. On the basis of race, color, or national origin, in Title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000d, et seq.), as implemented by DoD regulations at 32 CFR part 195.
- b. On the basis of sex or blindness, in Title IX of the Education Amendments of 1972 (20 U.S.C. 1681, et seq.). (Applicable to Educational Institutions only)
- c. On the basis of age, in the Age Discrimination Act of 1975 (42 U.S.C. 6101, et seq.), as implemented by Department of Health and Human Services regulations at 45 CFR part 90.
- d. On the basis of handicap, in Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. 794), as implemented by Department of Justice regulations at 28 CFR part 41 and DoD regulations at 32 CFR part 56.

2. Live Organisms. For human subjects, the Common Federal Policy for the Protection of Human Subjects, codified by the Department of Health and Human Services at 45 CFR part 46 and implemented by the Department of Defense at 32 CFR part 219.

3. Environmental Standards.

- a. Comply with the applicable provisions of the Clean Air Act (42 U.S.C. 7401, et. Seq.) and Clean Water Act (33 U.S.C. 1251, et. seq.), as implemented by Executive Order 11783 [3 CFR, 1971-1075 Comp., p. 799] and Environmental Protection Agency (EPA) rules at 40 CFR part 15. In accordance with the EPA rules, the Recipient further agrees that it will:

- Not use any facility on the EPA's List of Violating Facilities in performing any award that is nonexempt under 40 CFR 15.5, as long as the facility remains on the list.

- Notify the awarding agency if it intends to use a facility in performing this award that is on the List of Violating Facilities or that the Recipient knows has been recommended to be placed on the List of Violating Facilities.

- b. Identify to the awarding agency any impact this award may have on the quality of the human environment, and provide help the agency may need to comply with the National Environmental Policy Act (NEPA, at 42 U.S.C. 4231, et. seq.) and to prepare Environmental Impact Statements or other required environmental documentation. In such cases, the Recipient agrees to take no action that will have an adverse environmental impact (e.g., physical disturbance of a site such as breaking of ground) until the agency provides written notification of compliance with the environmental impact analysis process.

4. Officials Not to Benefit. No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this Agreement or to any benefit arising from it, in accordance with 41 U.S.C. 22.

5. Preference for U.S. Flag Carriers. Travel supported by U.S. Government funds under this Agreement shall use U.S. -flag air carriers (air carriers holding certificates under 49 USC 41102) for international air transportation of people and property to the extent that such service is available, in accordance with the International Air Transportation Fair Competitive Practices Act of 1974 (49 USC 40118) and the interpretative guidelines issued by the Comptroller General of the United States in the March 31, 1981, amendment to the Comptroller General Decision B138942.

6. Cargo Preference. The Recipient agrees that it will comply with the Cargo Preference Act of 1954 (46 U.S.C. 1241), as implemented by Department of Transportation regulations at 46 CFR 381.7, which require that at least 50 percent of equipment, materials or commodities procured or otherwise obtained with U.S. Government funds under this agreement, and which may be transported by ocean vessel, shall be transported on privately owned U.S.-flag commercial vessels, if available.

7. Military Recruiters. As a condition for receipt of funds available to the Department of Defense (DoD) under this award, the Recipient agrees that it is not an institution of higher education (as defined in 32 CFR part 216) that has a policy or practice that either prohibits, or in effect prevents:

(a) The Secretary of a Military Department from maintaining, establishing, or operating a unit of the Senior Reserve Officers Training Corps (in accordance with 10 U.S.C. 654 and other applicable Federal laws) at that institution (or any subelement of that institution);

(b) Any student at that institution (or any subelement of that institution) from enrolling in a unit of the Senior ROTC at another institution of higher education;

(c) The Secretary of a Military Department or Secretary of Homeland Security from gaining access to campuses, or access to students (who are 17 years of age or older) on campuses, for purposes of military recruiting in a manner that is at least equal in quality and scope to the access to campuses and to students that is provided to any other employer; or

(d) Access by military recruiters for purposes of military recruiting to the names of students (who are 17 years of age or older and enrolled at that institution or any subelement of that institution); their addresses, telephone listings, dates and places of birth, levels of education, academic majors, and degrees received; and the most recent educational institutions in which they were enrolled. If the Recipient is determined, using the procedures in 32 CFR part 216, to be such an institution of higher education during the period of performance of this agreement, the Government will cease all payments of DoD funds under this agreement and all other DoD grants and cooperative agreements to the Recipient, and it may suspend or terminate such grants and agreements unilaterally for material failure to comply with the terms and conditions of award.

ATTACHMENT 4
Other Certifications

The following Certifications, which have been executed by the Recipient prior to award of this Agreement are on file with the issuing office, and are hereby incorporated herein by reference:

- a. Certification at Appendix A to 32 CFR Part 28 Regarding Lobbying

ATTACHMENT 5

Reporting Requirements

1. Quarterly Report - Throughout the term of the agreement, the Recipient shall submit or otherwise provide a quarterly report (Government Fiscal Quarter). Two (2) copies shall be submitted or otherwise provided to the CAM and one (1) copy shall be submitted or otherwise provided to the Agreements Administration Office. A copy of the letter of transmittal shall be submitted or otherwise provided to the Agreements Office. The report shall contain two (2) major sections:

- a. **Technical Status Report.** The technical status report will detail technical progress to date on research milestones, all problems, technical issues or major developments during the reporting period. The technical status report will include a report on the status of the collaborative activities during the reporting period. The technical status report will include the utilization of subject inventions by the Recipient.
- b. **Business Status Report.** The business status report will provide summarized details of the resource status of this Agreement, including the status of contributions by the Recipient. This report should compare the resource status with any payment and expenditure schedules or plans provided in the original agreement. Any major deviations shall be explained along with discussion of adjustment actions proposed.

2. Joint Papers and Presentations: Periodic joint papers and presentations will be given if/when determined necessary by the CAM.

3. Journal Articles: Journal articles in general and joint ARL/Recipient journal articles are strongly encouraged as a major reporting mechanism of this research effort.

4. Annual and Final Reports

a. The Recipient shall submit an Annual Report making full disclosure of all major technical developments and progress for the preceding 12 months of effort within sixty (60) calendar days of completion of the effort and for each additional 12 months of effort, through the life of this agreement. The report will also provide an accounting of all Federal funds expended during the term of the Agreement. With the approval of the Cooperative Agreement Manager, reprints of published articles may be attached to the Final Report.

b. The Recipient shall make distribution of the Final report as follows:

Cooperative Agreement Manager - 1 original plus 1 copy;
Agreement Administration Office - 1 copy, and the
Grants Officer - 1 copy of the letter of transmittal only.
One (1) copy of the Final Report shall be provided to:
Defense Technical Information Center (DTIC)
8725 John J. Kingman Road, Suite 0944
Ft. Belvoir, VA 22060-6218

5. Financial Reporting: Federal Financial Report (SF 425): Annual and Final Reports

1. Reporting period end dates fall on the end of the calendar year for annual reports (12/31) and the end date of the grant project or period for the final report. Annual reports are due 30 days after the reporting period end date, and the final report is due 90 days after the end date of the grant.

All financial reports shall be submitted to the Grant Administration Office identified in Block 6 of the SF 26. Copies of the forms and instructions may be found on the Internet at <http://www.aro.army.mil/forms/forms2.htm>.

The Recipient shall make distribution of the Annual and Final (SF425) Reports as follows:

Cooperative Agreement Manager - 1 original plus 1 copy;
Agreement Administration Office - 1 copy, and

Note: The SF 425 is a single form that consolidates and replaces the Federal Cash Transaction Report (FACTOR or SF 272/SF 272A) and the Financial Status Report (FSR or SF 269/SF 269A).

6. Federal Funding Accountability And Transparency Act (FFATA) Reporting

Appendix A to Part 170 - Award Term

I. Reporting Subawards and Executive Compensation.

A. Reporting of first-tier subawards.

1. **Applicability.** Unless you are exempt as provided in paragraph d. of this award term, you must report each action that obligates \$25,000 or more in Federal funds that does not include Recovery funds (as defined in section 1512(a)(2) of the American Recovery and Reinvestment Act of 2009, Pub. L. 111-5) for a subaward to an entity (see definitions in paragraph e of this award term).

2. **Where and when to report.**

- i. You must report each obligating action described in paragraph a.1. of this award term to www.fsrc.gov.
- ii. For subaward information, report no later than the end of the month following the month in which the obligation was made. (For example, if the obligation was made on November 7, 2010, the obligation must be reported by no later than December 31, 2010.)

3. **What to report.** You must report the information about each obligating action that the submission instructions posted at www.fsrc.gov specify.

B. Reporting Total Compensation of Recipient Executives.

1. **Applicability and what to report.** You must report total compensation for each of your five most highly compensated executives for the preceding completed fiscal year, if –

- i. The total Federal funding authorized to date under this award is \$25,000 or more;
- ii. In the preceding fiscal year, you received—
 - (a) 80 percent or more of your annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards); and
 - (b) \$25,000,000 or more in annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards); and
- iii. The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at <http://www.sec.gov/answers/execomp.htm>.)

2. **Where and when to report.** You must report executive total compensation described in paragraph b.1. of this award term:

- i. As part of your registration profile at www.ccr.gov.
- ii. By the end of the month following the month in which this award is made, and annually thereafter.

C. Reporting of Total Compensation of Sub-recipient Executives.

1. **Applicability and what to report.** Unless you are exempt as provided in paragraph D. of this award term, for each first-tier sub-recipient under this award, you shall report the names and total compensation of each of the

sub-recipient's five most highly compensated executives for the sub-recipient's preceding completed fiscal year, if

i. In the sub-recipient's preceding fiscal year, the sub-recipient received –

(a) 80 percent or more of its annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards); and

(b) \$25,000,000 or more in annual gross revenues from Federal procurement contracts (and subcontracts), and Federal financial assistance subject to the Transparency Act (and subawards); and

ii. The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information,

see the U.S. Security and Exchange Commission total compensation filings at

<http://www.sec.gov/answers/execom.htm>.)

2. Where and when to report. You must report sub-recipient executive total compensation described in paragraph C.1. of this award term:

i. To the Recipient.

ii. By the end of the month following the month during which you make the subaward. For example, if a subaward is obligated on any date during the month of October of a given year (i.e., between October 1 and 31), you must report any required compensation information of the sub-recipient by November 30 of that year.

D. Exemptions.

1. If, in the previous tax year, you had gross income, from all sources, under \$300,000, you are exempt from the requirements to report:

i. subawards, and

ii. The total compensation of the five most highly compensated executives of any sub-recipient.

E. Definitions. For purposes of this award term:

1. Entity means all of the following, as defined in 2 CFR part 25:

i. A Governmental organization, which is a State, local government, or Indian tribe;

ii. A foreign public entity;

iii. A domestic or foreign nonprofit organization;

iv. A domestic or foreign for-profit organization;

v. A Federal agency, but only as a sub-recipient under an award or subaward to a non-Federal entity.

2. Executive means officers, managing partners, or any other employees in management positions.

3. Subaward:

i. This term means a legal instrument to provide support for the performance of any portion of the substantive project or program for which you received this award and that you as the Recipient award to an eligible sub-recipient.

ii. The term does not include your procurement of property and services needed to carry out the project or program (for further explanation, see Sec. --.210 of the attachment to OMB Circular A-133, "Audits of States, Local Governments, and Non-Profit Organizations").

iii. A subaward may be provided through any legal agreement, including an agreement that you or a sub-recipient considers a contract.

4. Sub-recipient means an entity that:

- i. Receives a subaward from you (the Recipient) under this award; and
- ii. Is accountable to you for the use of the Federal funds provided by the subaward.

5. Total compensation means the cash and noncash dollar value earned by the executive during the Recipient's or sub-recipient's preceding fiscal year and includes the following (for more information see 17 CFR 229.402(c)(2)):

- i. Salary and bonus.
- ii. Awards of stock, stock options, and stock appreciation rights. Use the dollar amount recognized for financial statement reporting purposes with respect to the fiscal year in accordance with the Statement of Financial Accounting Standards No. 123 (Revised 2004) (FAS 123R), Shared Based Payments.
- iii. Earnings for services under nonequity incentive plans. This does not include group life, health, hospitalization or medical reimbursement plans that do not discriminate in favor of executives, and are available generally to all salaried employees.

ATTACHMENT 6 Articles of Collaboration

(To be added at award)

ATTACHMENT 7 Initial Program Plan and Budget

INITIAL PROGRAM PLAN

(To be completed in accordance with Article 3.)