

U.S. ARMY RESEARCH OFFICE

BROAD AGENCY ANNOUNCEMENT FOR

QUANTUM COMPUTING RESEARCH IN NEW AND
EMERGING QUBITS & CROSS-QUANTUM SYSTEMS
SCIENCE & TECHNOLOGY



W911NF-17-S-0001

Issued by:

U.S. Army Contracting Command-Aberdeen Proving Ground

Research Triangle Park Division

P.O. BOX 12211

Research Triangle Park, NC 27709-2211

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I. OVERVIEW OF THE FUNDING OPPORTUNITY:

A. Required Overview Content

1. Federal Agency Name(s):

U.S. Army Research Office

Issuing Acquisition Office:

U.S. Army Contracting Command-Aberdeen Proving Ground, Research Triangle Park Division (ACC-APG RTP Division)

2. Funding Opportunity Title:

Quantum Computing Research in New and Emerging Qubits & Cross-Quantum Systems Science & Technology

3. Announcement Type

Initial Announcement

4. Research Opportunity Number:

W911NF-17-S-0001

5. Catalog of Federal Domestic Assistance (CFDA) Number:

12.431 – Basic Scientific Research

6. Response Dates:

White Papers: 4:00 PM Eastern Daylight Savings Time on: 30 March 2017

Proposals: 4:00 PM Eastern Daylight Savings Time on: 6 June 2017 See Section II, D, 4 for additional information.

B. Additional Overview Information

This Broad Agency Announcement (BAA) which sets forth research areas of interest to the Army Research Laboratory- Army Research Office (ARL-ARO) is issued under paragraph 6.102(d)(2) of the Federal Acquisition Regulation (FAR), and 10 USC 2358 which provides for the competitive selection of basic research proposals. Proposals submitted in response to this BAA and selected for award are considered to be the result of full and open competition and in full compliance with the provision of Public Law 98-369, "The Competition in Contracting Act of 1984" and subsequent amendments.

The Department of Defense agencies involved in this program reserve the right to select for award; all, some, or none of the proposals submitted in response to this announcement. The participating DoD agencies will provide no funding for direct reimbursement of proposal development costs. Technical and cost proposals (or any other material) submitted in response to this BAA will not be returned. It is the policy of participating DoD agencies to treat all proposals as sensitive, competitive information and to disclose their contents only for the purposes of evaluation.

II. DETAILED INFORMATION ABOUT THE FUNDING OPPORTUNITY

A. Program Description

The U.S. Army Research Office (ARO) in collaboration with the Laboratory for Physical Sciences (LPS) is soliciting proposals for research in two focused topic areas: (A) new and emerging qubit science and technology (NEQST) and (B) cross quantum technology systems (CQTS).

NEQST focuses on qubit systems that explore new operating regimes and environments, fundamentally new methods of fabrication, and new methods of design, control, or operation. These explorations should have in mind the development of quantum computation where the novel properties of these systems create significant advantages in coherence, fabrication, and/or qubit operation over current state-of-the-art qubits.

While NEQST focuses on developing new qubit and quantum gate technologies, CQTS focuses on combining existing disparate quantum technologies to provide functionality that significantly improves the performance of, or adds capability to, any of the individual qubit types. Topics of particular interest are quantum state transfer (e.g. microwave-to-optical), novel classical control paradigms, and quantum memories.

(Note: this BAA is concerned only with the circuit model of quantum computation)

(1) New and Emerging Qubit Science and Technology (NEQST):

NEQST is soliciting proposals in three research areas. A proposal may address more than one of these research areas and, in some cases, may be required to address more than one area to achieve proposed research milestones.

a. New qubits, operating regimes, and environments

Quantum information science and technology has seen steady progress since the motivating algorithmic discoveries of Shor and others. Continued research in qubit technology has resulted in the development of several different qubit technologies that can now perform two-qubit operations with less than 1% error per gate, with advances towards higher performance and larger qubit systems on the horizon. Simultaneously, quantum systems have been utilized in other applications, such as time keeping and sensing; often in this case only one qubit is needed allowing for higher temperature operation given the right choice of qubit (e.g., NV centers in diamond). Many advances are needed to push existing technologies towards the distant goal of fault-tolerant quantum computing or systems of similar complexity. This research topic assumes that today's high-performance qubits and quantum devices, along with anticipated advances, may not be the same devices on which future technology will be based. This topic seeks explorations of that future technology. For example, qubits that operate robustly (both alone and via two qubit gates) in "friendlier" environments such as at higher temperatures, pressures, or magnetic fields could enable cheaper, more portable or more scalable quantum devices, from repeaters to sensors to quantum computers. A proposal under this topic must articulate specifics of the novel physical system, advantages over current state-of-the-art qubit systems, technical

challenges to matching and surpassing current best qubit performance, and how one would attempt to construct, control and isolate the novel system. There must be no fundamental roadblocks to constructing quantum processors with the selected qubit. In particular, any proposal for investigation of new qubit systems must robustly address the question of fast and reliable two-qubit interactions (gates).

b. Fundamentally new methods of fabrication

This research topic seeks efforts in new methods of fabrication that may enable new qubit types with superior performance. For example, the perennial problem of noise might be solved by fully epitaxial fabrication techniques that could also enable new types of devices from epitaxial Josephson junctions to superconducting-semiconductors (super-semi) to engineered quantum materials. In addition, new methods of fabrication may be required to achieve the promised performance of the proposed qubit type. A particular area of interest is novel methods of fabricating planar semiconductor and superconductor qubits. Proposals under this topic must demonstrate fabrication of qubits and measure qubit performance.

c. New methods of design, control, or operation

This research topic is focused on design principles that enable easier or new means of control of multi-qubit systems. Example research topics include super-semi junctions, which can be gated by an electrostatic potential, topologically-motivated symmetry protection for physical devices, or other types of qubits and qubit/control combinations which reduce the complexity of classical control. These qubits may enable simpler forms of control with less overhead or reliance on available control technology (i.e. microwave generators or layers of error correction). A proposal under this topic must demonstrate control of qubits and measure qubit performance.

Within these research topics, a proposal must address the following questions or subset of questions that are relevant to the proposed research.

1. What is the physical qubit(s) or quantum system that is being proposed?
2. What are the compelling reasons to use this qubit or system?
3. What is known about this qubit in terms of experimental and theoretical results?
Please provide suitable references.
4. What are the appropriate metrics for the novel technology?
5. What are the challenges associated with fabricating and operating this qubit(s)?
6. What solutions are being suggested to overcome these challenges?
7. What is the timescale needed to demonstrate these solutions?
8. Are special experimental and fabrication resources needed?
9. Are supporting technologies readily available?

Irrespective of research topic, a proposal should identify aggressive yearly quantitative milestones that define a path toward demonstrating the performance of the proposed qubit system, with comparison to the current state-of-the-art.

Topics Outside of Scope of NEQST:

1. Bulk/ensemble systems without single qubit addressability
2. Transduction of quantum information

3. Quantum communication, networking, and key distribution
4. Quantum computing architectures, error correction, and logical qubits beyond considerations given to scaling to ~ 10 qubit devices.

(2) Cross-Quantum Technology Systems (CQTS):

Over the past few decades, many distinct qubit technologies have been developed including superconducting circuits, semiconductor quantum dots, trapped ions, neutral atoms, defects in solids, and photons. A few of these qubit types have demonstrated high performance, with gate fidelities of 1 and 2-qubit devices near error correction thresholds. Typically, however, these qubits operate in distinct environments, material systems and modalities thus restricting their use into certain regimes and limiting cross-compatibility. Thus, challenging paths exist to continue to improve the performance and functionality of these qubits. This research topic seeks an alternate path by combining distinct qubit technologies either to enhance the performance of the original qubit type or to add important new functionality. Examples of such performance parameters include qubit lifetime, gate fidelity, qubit readout, quantum memory, ease of qubit-qubit coupling, off-chip quantum information transfer and classical control. However, one of the main challenges to-be-addressed in cross-quantum technology is to develop schemes that avoid degrading the performance of the original individual quantum technologies after integration.

As an example, superconducting qubits have promising qubit lifetimes, they have demonstrated high fidelity qubit gates and are amenable to many types of qubit-qubit coupling schemes. However, challenges exist for off-chip communications, the availability of quantum memories, and the necessity of operation at mK temperatures. To tackle these challenges, various research groups in the community have begun exploring cross-quantum technology systems. For instance, spin ensembles are being coupled to superconducting circuits in an attempt to introduce long-lived quantum memories and to possibly provide an interface to optical photons. However, in most realizations to-date, the spin lifetimes in such systems are typically well below that of isolated samples and the superconducting circuitry is typically degraded due to the presence of magnetic fields and optical re-pumping pulses.

Another frequent challenge in quantum information processing approaches is long-distance off-chip quantum information transfer. Cross-quantum technology systems can play a major role here by providing a link between disparate or spatially separated quantum systems. For example, mechanical resonators prepared near the quantum ground state of motion or resonant low-loss electro-optics could serve as a bus between quantum states of microwave and optical photons or directly between spins, superconductors, and ions. Moreover, in the classical regime, such highly efficient converters may play a role in qubit control and readout at the base temperature of a dilution refrigerator.

CQTS is soliciting proposals in three research topics. A proposal may address more than one of these research topics. Integrated experimental and theoretical research efforts are encouraged.

a. Quantum-state-transfer from microwave to optical wavelengths

This topic focuses on low noise quantum state microwave-to-optical conversion. Many techniques have been proposed to achieve this functionality including using Rydberg atoms, opto-mechanical systems, spin ensembles, magnons, electro-optics etc. A proposal must address

an end goal of demonstrating the transfer of a prepared quantum state from the microwave to the optical domain and vice-versa. A proposal must include target metrics including transfer fidelity and success rate and must describe methods to characterize performance.

b. Classical, highly efficient, microwave-to-optical conversion:

Semiconducting and superconducting quantum systems are typically controlled and measured using high-speed dc and/or microwave signals. These signals are generated at room temperature and then sent into the qubit's cryogenic environment. An alternative approach would be to encode the control and readout signals into an optical carrier, and then convert into the appropriate control signals at cryogenic temperatures. A proposal must address an end goal of demonstrating single qubit control (e.g. Rabi oscillations) and/or readout using optical signals generated at room temperature. A proposal must include applicable target metrics such as conversion efficiency, readout fidelity, and thermal load and must describe how such metrics are to-be characterized.

c. Hybrid qubit systems

This topic focuses on improved qubit performance in a cross-quantum technology integrated device. Each individual qubit approach has strengths and challenges. The goal to this topic is to take advantage of the strengths of a given qubit technology while compensating for the challenges by integrating with a distinct qubit approach. Examples of such work from the literature include superconducting circuits coupled to semiconducting quantum dots, neutral atoms, magnons, spin ensembles or trapped ionized particles. A proposal must focus on successfully combining two disparate quantum systems in a manner that does not degrade the performance of each quantum system individually, while simultaneously obtaining the desired coupling strength. A proposal must clearly identify and detail the function of the combined system and anticipated performance gains, along with the major challenges associated with combining the technologies and the approaches proposed to overcome these challenges. Appropriate metrics must also be included (e.g. coupling rates, cooperativity, loss efficiency etc.) along with estimates of achievable performance levels of the target functionality.

Topics outside the scope of CQTS:

1. Development of new candidate qubit systems
2. A 'hybrid' system simply consisting of a qubit and its readout photon e.g. a system only consisting of superconducting qubits and their microwave readout photons
3. A 'hybrid' system consisting of 2 coupled quantum devices in the same material platform e.g. two types of superconducting qubits in the same device, coupled implanted donors with gate defined dots, two different trapped ion species in the same trap
4. Cross-quantum technology systems with known fundamental unsurmountable limitations after integration e.g. weak coupling, degradation of performance etc.

We reserve the right to select and fund for award all, some, part, or none of the proposals received. There is no guarantee of an award.

The authority for NEQST & CQTS awards is 10 U.S.C. 2358 in accordance with 31 U.S.C. Chapter 63.

B. Federal Award Information

Anticipated awards will be made in the form of procurement contracts, grants, or cooperative agreements and are subject to the availability of appropriations. Multi-year projects must have clear goals for each year. Funding for subsequent years will be contingent upon satisfactory performance and the availability of funds.

The ACC-APG RTP Division has the authority to award a variety of instruments on behalf of ARL-ARO. The ACC-APG RTP Division reserves the right to use the type of instrument most appropriate for the effort proposed. Applicants should familiarize themselves with these instrument types and the applicable regulations before submitting a proposal. Following are brief descriptions of the possible award instruments.

1. Procurement Contract. A legal instrument, consistent with 31 U.S.C. 6303, which reflects a relationship between the Federal Government and a State Government, a local government, or other entity/contractor when the principal purpose of the instrument is to acquire property or services for the direct benefit or use of the Federal Government.

Contracts are primary governed by the following regulations:

- a. Federal Acquisition Regulation (FAR) <http://farsite.hill.af.mil/>
 - b. Defense Federal Acquisition Regulation Supplement (DFARS) <https://www.federalregister.gov/defense-federal-acquisition-regulation-supplement-dfars->
 - c. Army Federal Acquisition Regulation Supplement (AFARS) <http://farsite.hill.af.mil/VFAFAR1.HTM>
2. Grant - A legal instrument that, consistent with 31 U.S.C. 6304, is used to enter into a relationship:
 - a. The principal purpose of which is to transfer a thing of value to the recipient to carry out a public purpose of support or stimulation authorized by a law or the United States, rather than to acquire property or services for the DoD's direct benefit or use.
 - b. In which substantial involvement is not expected between the DoD and the recipient when carrying out the activity contemplated by the grant.
 - c. No fee or profit is allowed.
 3. Cooperative Agreement. A legal instrument which, consistent with 31 U.S.C. 6305, is used to enter into the same kind of relationship as a grant (see definition "grant"), except that substantial involvement is expected between the DoD and the recipient when carrying out the activity contemplated by the cooperative agreement. The term does not include "cooperative research and development agreements" as defined in 15 U.S.C. 3710a. No fee or profit is allowed.

4. Grants and cooperative agreements for Institutions of Higher Education and nonprofit organizations are primary governed by the following:
 - A. Federal statutes
 - B. Federal regulations
 - C. 2 CFR part 200, as modified and supplemented by DoD's interim Implementation found in 2 CFR part 1103
 - D. DoD R&D General Terms and Conditions dated July 2016
 - E. ACC-APG-RTP Division Assistance, Research General Terms and Conditions dated August 2016, hereinafter referred to as "Agency Specific Requirements"
 - F. Award-specific terms and conditions

5. Grants and cooperative agreements for for-profit and nonprofit organizations exempted from Subpart E—cost principles of part 200, are primary governed by the following:
 - a. Federal statutes
 - b. Federal regulations
 - c. DOD 3210.6-R, Part 34 - Administrative Requirements for Grants and Agreements with For-Profit Organizations

Copies of OMB regulations may be obtained from:

Executive Office of the President
Publications Service
New Executive Office Building
725 17th Street, N.W., Room 2200
Washington, DC 20503

Telephone: (202) 395-7332
FAX Requests: (202) 395-9068
<http://www.whitehouse.gov/OMB/grants>

An electronic copy of the DoDGARs may be found at <http://www.ecfr.gov> (Title 32: National Defense, Part 22 —DoD Grants and Agreements – Award and Administration

C. Eligibility Information

1. Eligible Applicants:

Eligible applicants under this BAA include degree-granting universities (foreign and domestic), nonprofit organizations, and for profit concerns (large and small businesses). Proposals are encouraged from Historically Black Colleges and Universities (as determined by the Secretary of Education to meet requirements of Title III of the Higher Education Act of 1965, as amended (20 U.S.C. §1061)) and from Minority Institutions defined as institutions "whose enrollment of a single minority or a combination of minorities exceeds 50 percent of the total enrollment." [20 U.S.C. § 1067k(3) and 10 U.S.C. § 2362]. However, no funds are specifically allocated for HBCU/MI participation.

2. Cost Sharing or Matching:

There is no requirement for cost sharing, matching, or cost participation to be eligible for award under this BAA and cost sharing and matching is not an evaluation factor used under this BAA.

3. Other:

a. Foreign owned, controlled, or influenced firms are advised that security restrictions may apply that could preclude their participation in these efforts. Before preparing a proposal, such firms are requested to contact the ARL Security and Counterintelligence Branch (301) 394-2411 concerning their eligibility.

b. Pursuant to the policy of FAR 35.017 and agency supplements, selected Federally Funded Research and Development Centers (FFRDC) may propose under this BAA. FFRDCs may propose as allowed by their sponsoring agency and in accordance with their sponsoring agency policy.

D. Application and Submission Information

1. Address to View Broad Agency Announcement

This BAA may be accessed from the following:

- 1) Grants.gov (www.grants.gov)
- 2) FedBizOpps (www.fbo.gov)
- 3) ARL website <http://www.arl.army.mil/www/default.cfm?Action=6&Page=8>.

Amendments, if any, to this BAA will be posted to these websites when they occur. Interested parties are encouraged to periodically check these websites for updates and amendments.

The following information is for those wishing to respond to the BAA:

2. Content and Form of Application Submission

a. General Information

A proposal submitted under this BAA must address unclassified fundamental research. Proposal submissions will be protected from unauthorized disclosure in accordance with applicable laws and DoD regulations. Applicants are expected to appropriately mark each page of their submission that contains proprietary information.

Applicants interested in responding to both research topics described in this BAA must submit separate White Papers and Full Proposals for each topic. The application process is in two stages as follows in section b (Submission of a White Paper) and section c (Submission of a Full Proposal):

Post-Employment Conflict of Interest: There are certain post-employment restrictions on former federal officers and employees, including special government employees (Section 207 of Title 18, U.S.C.). If an applicant believes a conflict of interest may exist, the situation should be discussed with Quantum Computing Program Point of Contact listed in Section G: Agency Contacts, who will then coordinate with appropriate ARO/ARL legal personnel prior to having applicant expend time and effort in preparing a white paper or proposal.

Statement of Disclosure Preference: Please complete ARO Form 52 or 52A stating your preference for release of information contained in your white paper or proposal. Copies of these forms are available at

<http://www.arl.army.mil/www/default.cfm?Action=29&Page=218#baaforms>.

NOTE: A white paper or proposal may be handled for administrative purposes by support contractors. These support contractors are prohibited from competing on BAA proposals and are bound by appropriate non-disclosure requirements.

Equipment: Normally, title to equipment or other tangible property purchased with Government funds vests with nonprofit institutions of higher education or with nonprofit research organizations if vesting will facilitate scientific research performed for the Government. For profit, organizations are expected to possess the necessary plant and equipment to conduct the proposed research. Deviations may be made on a case-by-case basis to allow commercial organizations to purchase equipment but disposition instructions must be followed.

b. Submission of a White Paper:

Stage 1 White Papers – Prospective applicants are strongly encouraged to submit White Papers. The purpose of requesting a White Paper is to minimize the labor and cost associated with the production of a detailed proposal that has very little chance of being selected for funding. Based on assessment of the White Papers, feedback will be provided to an applicant to enable that applicant to make a determination as to whether they should submit a proposal. If offerors have not submitted White Papers under Stage I of the BAA, offerors may still submit full proposals for consideration for funding.

White Paper Format and Content:

- White Papers must be submitted electronically to usarmy.rtp.rdecom-aro.mesg.qcbox@mail.mil in the following format:
- Single PDF file as an email attachment
- Page Size: 8 ½ x 11 inches
- Margins – 1 inch
- Font – No smaller than Times New Roman, 12 point
- Number of Pages – no more than ten (10) single-sided pages. Any pages exceeding the ten page limit will not be evaluated.

2. White Papers must contain the following:

- Title page. The title page should be labeled “Option # White Paper” and should include the BAA number, proposed title, Principal Investigator (PI) with telephone number and email address, and an executive summary. (Not to exceed one page.)
- Expected expenditures and justifications. (Not to exceed one page.)
- Curriculum vitae sketches. (Not to exceed one page.)
- Technical portion including all references and figures. Introduce the problem to be addressed, briefly survey related work, identify key obstacles, outline the proposed solution and well-defined objective, outline the yearly research plan with milestones, and state the impact if successful. (Not to exceed seven pages.)

c. Submission of a Proposal:

Stage 2 Proposal - After Stage 1 reviews are completed, interested offerors should submit proposals in accordance with the requirements set forth in this BAA.

Proposal must be in the following format:

- Paper size when printed - 8.5 x 11 inch paper
- Margins - 1 inch
- Spacing - single
- Font – No smaller than Times New Roman, 12 point
- Number of pages – **not to exceed twenty-five (25)** single-sided pages, including Abstract. The cover, table of contents, list of references, curriculum vitae and required forms are excluded from the page limitations.
- Pages exceeding the limit will not be evaluated.

NOTE: All proposals submitted under the terms and conditions cited in this BAA will be reviewed regardless of the feedback provided on a White Paper submission(s). If offerors have not submitted White Papers under Stage I of the BAA, offerors may still submit full proposals for consideration for funding. Full proposals must be submitted in order for the offeror to receive consideration for funding.

Proposals for Assistance Instruments must be submitted electronically through Grants.gov in a Portable Document Format (.PDF). Proposals for Contract must be submitted through email to:

usarmy.rtp.rdecom-aro.mesg.qcbox@mail.mil.

d. Preparing an Application

This format applies to all proposals submitted via email and via Grants.gov. Offerors' proposals should show the location of each section of the proposal, as well as major subdivisions of the project description.

COVER PAGE ARO FORM 51: for Contract proposals submitted by email. The Form SF 424 (R&R) is for all proposals submitted through Grants.gov (Assistance Instruments must submit through Grants.gov):

1. A Cover Page is required. Proposals will not be processed without either: (1) a signed Cover Page, ARO Form 51, or (2) an SF 424 R & R Form.
2. Should the project be carried out at a branch campus or other component of the submitting organization, that branch campus or component should be identified in the space provided (Block 11 on the ARO Form 51 and Block 12 on the SF424 R&R).
3. The title of the proposed project should be brief, scientifically representative, intelligible to a scientifically literate reader, and suitable for use in the public domain.
4. The proposed duration for which support is requested should be consistent with the nature and complexity of the proposed activity. Nevertheless, the federal awarding agency reserves the right to make awards with shorter or longer periods of performance.
5. Specification of a desired starting date for the project is important and helpful however, requested effective dates cannot be guaranteed.
6. Pursuant to 31 U.S.C. 7701, as amended by the Debt Collection Improvement Act of 1996 [Section 31001(I)(1), Public Law 104-134], federal agencies shall obtain each awardees' Taxpayer Identification Number (TIN). This number may be the Employer Identification Number for a business or non-profit entity or the Social Security Number for an individual. The TIN is being obtained for purposes of collecting and reporting on any delinquent amounts that may arise out of an awardees' relationship with the Government.
7. Offerors shall provide their organization's Unique Entity Identifier (formerly DUNS). This number is a nine-digit number assigned by Dun and Bradstreet Information Services. See Section II.D.3 of this BAA for requirements pertaining to the Unique Entity Identifier.
8. Offerors shall provide their assigned Commercial and Government Entity (CAGE) Code. The CAGE Code is a 5-character code assigned and maintained by the Defense Logistics Service Center (DLSC) to identify a commercial plant or establishment.

TABLE OF CONTENTS: Use the following Format for the Proposal Table of Contents, Forms are available at <http://www.arl.army.mil/www/default.cfm?page=218#forms>

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This format applies to proposals submitted via email and via Grants.gov. Offerors' proposals should show the location of each section of the proposal, as well as major subdivisions of the project description.

STATEMENT OF DISCLOSURE PREFERENCE (FORM 52 OR 52A): Complete and sign ARO Form 52 (Industrial Contractors) or ARO Form 52A (Educational and Nonprofit Organizations), form can be found at the following website: <http://www.arl.army.mil/www/default.cfm?page=218>.

RESEARCH AND RELATED Other Project Information: The form entitled "Research and Related Other Project Information" found at the following website: <http://www.arl.army.mil/www/default.cfm?page=218>, shall be completed and signed by all organizations.

PROJECT ABSTRACT:

1. The Project Abstract shall be completed on the form entitled "Publicly Releasable Abstract" found at the following website: <http://www.arl.army.mil/www/default.cfm?page=218>.
2. Unless otherwise instructed in this BAA, the Project Abstract shall include a concise statement of work and basic approaches to be used in the proposed effort. The abstract should include a statement of scientific objectives, methods to be employed, and the significance of the proposed effort to the advancement of knowledge.
3. The abstract should be no longer than one (1) page (maximum 4,000 characters).

4. The project abstract shall be marked by the applicant as publically releasable. By submission of the project abstract, the applicant confirms that the abstract is releasable to the public. For a proposal that results in a grant award, the project abstract will be posted to a searchable website available to the general public to meet the requirements of Title VII (General Provisions), Section 8123, of the Department of Defense Appropriations Act, 2015. (Division C of the Consolidated and Further Continuing Appropriations Act, Public Law 113-235) The website address is <https://dodgrantawards.dtic.mil/grants>

TECHNICAL PROPOSAL (PROJECT DESCRIPTION): The technical portion of the proposal shall contain the following:

1. **Technical Approach:** Introduce the problem to be addressed, survey related work, identify key obstacles, and outline the proposed solution and well-defined objective. Proposals should describe an approach to all technical areas with unambiguous and quantitative milestones. Proposers must justify the utility of the proposed work and highlight its benefits over the current state-of-the-art. Proposals should clearly address the expected key challenges and proposed methods to overcome these difficulties taking into consideration the current state of field. Proposers should set aggressive yearly quantitative milestones that define a path toward the end-of-the-program goals and analyze the impact if successful.
2. **Project Schedule, Milestones, and Deliverables:** A summary of the schedule of events, milestones, and a detailed description of the results and products to be delivered.
3. **Management Approach:** A discussion of the overall approach to the management of this effort, including brief discussions of: required facilities; relationships with any subawardees and with other organizations; availability of personnel; and planning, scheduling, and control procedures. A brief description of your organization, including if the offeror has extensive government contracting experience. If this information has been previously provided to the ARL/ARO, the information need not be provided again. A statement setting forth this condition should be made.
4. The names of other federal, state, local agencies, or other parties receiving the proposal and/or funding the proposed effort. If none, so state. Concurrent or later submission of the proposal to other organizations will not prejudice its review by the ARL/ARO if we are kept informed of the situation.
5. A statement regarding possible impact, if any, of the proposed effort on the environment considering as a minimum its effect upon water, atmosphere, natural resources, human resources, and any other values.
6. The offeror shall provide a statement regarding the use of Class I and Class II ozone- depleting substances. Ozone-depleting substances mean any substance designated as Class I by EPA, including but not limited chlorofluorocarbons, halons,

carbon tetrachloride, and methyl chloroform and any substance designated as Class II by EPA, including but not limited to hydrochlorofluorocarbons. See 40 C.F.R. Part 82 for detailed information. If Class I or II substances are to be utilized, a list shall be provided as part of the offeror's proposal. If none, so state.

7. The type of additional support, if any, requested (e.g., facilities, equipment, and materials).

BIOGRAPHICAL SKETCHES:

1. This Section shall contain the biographical sketches for senior personnel only.
 - a. Primary Principal Investigator: The "Primary" PI provides a single or initial point of communication between the sponsoring agency(s) and the awardee organization(s) about scientific matters. If not otherwise designated, the first PI listed will serve as the "Primary" PI. This individual can be changed with approval of the agency. The sponsoring agency(s) does not infer any additional scientific stature to this role among collaborating investigators.
 - b. Co-Principal Investigators: The individual(s) a research organization designates as having an appropriate level of authority and responsibility for the proper conduct of the research and submission of required reports to the agency. When an organization designates more than one PI, it identifies them as individuals who share the authority and responsibility for leading and directing the research, intellectually and logistically. The sponsoring agency(s) does not infer any distinction among multiple PIs.
2. The following information is required:
 - a. Relevant experience and employment history including a description of any prior Federal employment within one year preceding the date of proposal submission.
 - b. List of up to five (5) publications most closely related to the proposed project and up to five (5) other significant publications, including those being printed. Patents, copyrights, or software systems developed may be substituted for publications.
 - c. List of persons, other than those cited in the publications list, who have collaborated on a project or a book, article, report or paper within the last four (4) years. Include pending publications and submissions. Otherwise, state "None."

- d. Names of each investigator's own graduate or post graduate advisors and advisees. The information provided in "c" and "d" is used to help identify potential conflicts or bias in the selection of reviewers.
3. For the personnel categories of postdoctoral associates, other professionals, and students (research assistants), the proposal may include information on exceptional qualifications of these individuals that merit consideration in the evaluation of the proposal.
4. The biographical sketches are limited to three (3) pages per investigator and other individuals that merit consideration.

BIBLIOGRAPHY: A bibliography of pertinent literature is required. Citations must be complete (including full name of author(s), title, and location in the literature).

CURRENT AND PENDING SUPPORT:

1. All project support from whatever source must be listed. The list must include all projects requiring a portion of the principal investigator's and other senior personnel's time, even if they receive no salary support from the project(s).
2. The information should include, as a minimum:
 - (a) the project/proposal title and brief description,
 - (b) the name and location of the organization or agency presently funding the work or requested to fund such work,
 - (c) the award amount or annual dollar volume of the effort,
 - (d) the period of performance, and
 - (e) a breakdown of the time required of the principal investigator and/or other senior personnel.

FACILITIES, EQUIPMENT, AND OTHER RESOURCES: The offeror should include in the proposal a listing of facilities, equipment, and other resources already available to perform the research proposed.

BUDGET PROPOSAL (including DD Form 1861):

1. Each proposal must contain a budget for each year of support requested and a cumulative budget for the full term of requested support. The budget form (Form 99) may be reproduced as needed. Locally produced versions may be used, but you may not make substitutions in prescribed budget categories nor alter or rearrange the cost categories as they appear on the form. The proposal may request funds under any of the categories listed so long as the item is considered necessary to perform the proposed work and is not precluded by applicable cost principles. In addition to the forms, the budget proposal should include no more than five (5) pages of budget justification for each year.

2. A signed summary budget page must be included. The documentation pages should be titled "Budget Explanation Page" and numbered chronologically starting with the budget form. The need for each item should be explained clearly.

3. All cost data must be current and complete. Costs proposed must conform to the following principles and procedures:

Educational Institutions: 2 CFR Part 200 (formerly OMB Circular A-21)

Nonprofit Organizations: 2 CFR Part 200 (formerly OMB Circular A-122*)

Commercial Organizations: FAR Part 31, DFARS Part 231, FAR Subsection 15.403-5, and DFARS Subsection 215.403-5.

*For those nonprofit organizations specifically exempt from the provisions of 2 CFR Part 230, FAR Part 31 and DFARS Part 231 shall apply.

4. Sample itemized budgets and the information they must include for a contract and for grants and cooperative agreements can be found at Section II. H. (Other Information). Before award it must be established that an approved accounting system and financial management system exist.

APPENDICES: Some situations require that special information and supporting documents be included in the proposal before funding can be approved. Such information and documentation should be included by appendix to the proposal.

e. Submission of Complete Research Proposals

Proposals must be submitted through the offeror's organizational office having responsibility for Government business relations. All signatures must be that of an official authorized to commit the organization in business and financial affairs. Proposals must be submitted electronically using one of the two following formats, based on award type sought. The content will remain the same whether using email or Grants.gov.

EMAIL SUBMISSION (for Contracts only):

1. Proposal requesting award of a contract must be emailed directly to usarmy.rtp.rdecom-aro.msg.qcbox@mail.mil.

Do not email full proposals to the Quantum Computing Program Point of Contact. All e-mailed proposals must contain the information outlined in Section II, D, 2, entitled “*Table of Contents*” including the electronic forms as follows:

- (a) ARO Form 51, Proposal Cover Page;
- (b) ARO Form 99, Summary Proposal Budget or equivalent,
- (c) ARO Current and Pending Support (unnumbered form),
- (d) ARO Form 52 or ARO Form 52a.
- (e) "FAR 52.209-11 – Representation by Corporations Regarding Delinquent Tax Liability or a Felony Conviction under any Federal Law (Feb 2016). See Note below."

These forms may be accessed at

<http://www.arl.army.mil/www/default.cfm?page=218#forms> under BAA Forms. The fillable PDF forms may be saved to a working directory on a computer and opened and filled in using the latest compatible Adobe Reader software application found at this Grants.Gov: <http://www.grants.gov/web/grants/support/technical-support/software/adobe-reader-compatibility.html>.

Note: A completed 52.209-11 – Representation by Corporations Regarding Delinquent Tax Liability or a Felony Conviction under any Federal Law (Feb 2016), is not required if the offeror's SAM Certifications and Representations have been updated since March 2016. If the offeror's SAM has not be updated since March 2016, the completed representation must be submitted and include POC information and signature of the authorized representative.

2. All forms requiring signature must be completed, printed, signed, and scanned into a PDF document. All documents must be combined into a single PDF formatted file to be attached to the e-mail.

3. Proposal documents (excluding required forms) must use the following format:

- Page Size – 8 ½ x 11 inches
- Margins – 1 inch
- Spacing – single
- Font – Times New Roman, 12 point, single-sided pages

GRANTS.GOV SUBMISSION (For all Assistance Instruments):

1. Grants.gov Registration (See *Section II.D.2.f. Grants.gov Registration* below) must be accomplished prior to application through this process. Note- All web links referenced in this section and “*Grants.gov Registration*” (below) are current as of 24 January 2015, but are subject to change by grants.gov and may not be updated here.

2. Specific forms are required for submission of a proposal. The forms are contained in the Application Package available through the Grants.gov application process. To access these materials, go to <http://www.grants.gov>, select "Apply for Grants," and then select "Download Application Package." A Grant Application Package and Application Instructions are available for download through the Grants.Gov Apply portal under CFDA Number 12.431/Funding Opportunity Number W911NF-17-S-0001. The following documents are mandatory: (1) Application for Federal Assistance (Research and Related) (SF 424 (R&R)), and (2) Attachments form.

(a) The SF 424 (R&R) form is to be used as the cover page for all proposals.

Authorized Organization Representative (AOR) usernames and passwords serve as "electronic signatures" when your organization submits applications through Grants.gov. By using the SF 424 (R&R), proposers are providing the certification required by 32 CFR Part 28 regarding lobbying. The SF 424 (R&R) must be fully completed. Block 11, "Descriptive Title of Applicant's Project," **must reference the research option area being addressed in the effort.**

(b) The Attachments form must contain the information outlined in Section II, D, 2 (d. *Preparing an Application*), entitled "Table of Contents" of this BAA including the electronic forms as follows:

- (1) Research and Related Other Project Information;
- (2) ARO Form 99, Summary Proposal Budget;
- (3) ARO Current and Pending Support (unnumbered form)
- (4) Representation by Corporations Regarding conviction of a Felony Criminal Violation under any Federal or State Law and Representation by Corporations Regarding an Unpaid Delinquent Tax Liability

Items (1)-(4) forms may be accessed at <http://www.arl.army.mil/www/default.cfm?page=218#forms> Item (4) "Representation relating to Tax Liability and Felony Convictions" may be submitted on a word document and attached to available field within the attachments form. The fillable PDF forms may be saved to a working directory on a computer and opened and filled in using the latest compatible Adobe Reader software application found at this Grants.Gov: <http://www.grants.gov/web/grants/support/technical-support/software/adobe-reader-compatibility.html>.

Note: Representation by Corporations Regarding Conviction of a Felony Criminal Violation and Unpaid Delinquent Tax Liability require POC information and signature of the authorized representative.

(c) All documents must be combined into separate and single PDF formatted files titled using the Table of Contents names listed in "*Section II.D.2.d. Preparing an Application*": Preparation of complete Research Proposals". Include "W911NF-17-S-0001" in title so the proposal will be distinguished from other BAA submissions and upload using the mandatory Attachments form.

(d) The training demonstration at <http://www.grants.gov/documents/19/23905/GrantsGovApplicantGeneralOverview.pdf/a57fc764-d310-410d-a8c1-057986464745> will assist AORs in the application process. Remember that you must open and complete the Application for Federal Assistance (Research and Related) (SF 424 (R&R)) first, as this form will automatically populate data fields in other forms. If you encounter any problems, contact customer support at 1-800-518-4726 or at support@grants.gov. If you forget your user name or password, follow the instructions provided in the Credential Provider tutorial. Tutorials may be printed by right-clicking on the tutorial and selecting "Print".

(e) As it is possible for grants.gov to reject the proposal during this process, it is strongly recommended that proposals be uploaded at least two days before any established deadline in the BAA so that they will not be received late and be ineligible for award consideration. It is also recommended to start uploading proposals at least two days before the deadline to plan ahead for any potential technical and/or input problems involving the applicant's own equipment.

f. Grants.Gov Registration

Registration. Each organization that desires to submit applications via Grants.Gov must complete a one-time registration. There are several one-time actions your organization must complete in order to submit applications through Grants.gov (e.g., obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, register with the System for Award Management (SAM), register with the credential provider, register with Grants.gov and obtain approval for an Authorized Organization Representative (AOR) to submit applications on behalf of the organization). To registered please see <http://www.grants.gov/web/grants/applicants/organization-registration.html>

Please note the registration process for an Organization or an Individual can take between three to five business days or as long as four weeks if all steps are not completed in a timely manner.

Questions relating to the registration process, system requirements, how an application form works, or the submittal process should be directed to Grants.gov at 1-800-518-4726 or support@grants.gov.

3. Unique Entity Identifier and System for Award Management (SAM)

Each applicant (unless the applicant is an individual or Federal awarding agency that is excepted from those requirements under 2 CFR §25.110(b) or (c), or has an exception approved by the Federal awarding agency under 2 CFR §25.110(d)) is required to:

- (i) Be registered in SAM before submitting its application;
- (ii) provide a valid unique entity identifier in its application; and
- (iii) continue to maintain an active SAM registration with current information at all times during which it has an active Federal award or an application or plan under consideration by a Federal awarding agency.

The Federal awarding agency may not make a Federal award to an applicant until the applicant has complied with all applicable unique entity identifier and SAM requirements. If an applicant has not fully complied with the requirements by the time the Federal awarding agency is ready to make a Federal award, the Federal awarding agency may determine that the applicant is not qualified to receive a Federal award and use that determination as a basis for making a Federal award to another applicant.

4. Submission Dates and Times:

White Papers:

White Papers must be submitted electronically via e-mail to usarmy.rtp.rdecom-aro.mesg.qcbox@mail.mil and received at the Army Research Office by 4:00 PM Eastern Daylight Savings Time on 30 March 2017. The email subject line should contain the following: W911NF-17-R-0001 White Paper - NEQST. White Papers received after the deadline will not be reviewed. Feedback on the White Papers will be e-mailed directly to the proposed principal investigators by 28 April 2017.

Proposals:

Proposals transmitted to be considered for award must be received by Grants.gov **no later than 4:00 PM Eastern Daylight Savings Time on 6 June 2017.**

Applicants are responsible for submitting electronic proposals in sufficient time to insure Grants.gov receives it by the time specified in this BAA. If the electronic proposal is received by Grants.gov after the exact time and date specified for receipt of offers, it will be considered “late” and will not be considered for award. Acceptable evidence to establish the time of receipt by Grants.gov includes documentary evidence of receipt maintained by Grants.gov.

Because of potential problems involving the applicants’ own equipment, to avoid the possibility of late receipt and resulting in ineligibility for award consideration, it is strongly recommended that proposals be uploaded at least two business days before the deadline established in the BAA.

If an emergency or unanticipated event interrupts normal Government processes so that proposals cannot be received at grants.gov by the exact time specified in the solicitation, and urgent Government requirements preclude amendment of the solicitation closing date, the time specified for receipt of proposals will be deemed to be extended to the same time of day specified in the solicitation on the first work day on which normal Government processes resume.

Proposal Receipt Notices – After a proposal is submitted to Grants.gov, the AOR will receive a series of three emails from Grants.gov. The first two emails will be received within 24 to 48 hours after submission. The first email will confirm time of receipt of the application by the Grants.gov system and the second will indicate that the application has either been successfully validated by the system prior to transmission to the grantor agency or has been rejected due to errors. A third email will be received once the agency has confirmed receipt of the proposal. The document, Tracking Your Application Package, located at <http://www.grants.gov/assets/TrackingYourApplicationPackage.pdf> explains this process. The proposal is not considered received until the AOR receives email #3.

5. Intergovernmental Review

Not Applicable

6. Funding Restrictions:

Multiple awards are anticipated. Expected duration and funding requests for the BAA research topics are described in the table below.

Topic #	Topic Title	Max. Funding/year	Duration
II.A.1.a	NEQST: New qubits, operating regimes, and environments	\$500K	1-3 years
II.A.1.b	NEQST: Fundamentally new methods of fabrication	\$500K	1-3 years
II.A.1.c	NEQST: New methods of design, control, or operation	\$500K	1-3 years
II.A.2.a	CQTS: Quantum-state-transfer from microwave to optical wavelengths	\$1000K	1-4 years
II.A.2.b	CQTS: Classical, highly efficient, microwave-to-optical conversion	\$1000K	1-4 years
II.A.2.c	CQTS: Hybrid qubit systems	\$500K	1-3 years

The actual amount of each award will be contingent on availability of funds and the scope of the proposed work. Depending on the results of the proposal evaluation, there is no guarantee that any of the proposals submitted in response to a particular research topic will be recommended for funding. On the other hand, more than one proposal may be recommended for funding for a research topic.

7. Other Submission Requirements:

Information To Be Requested From Successful Offerors- Offerors whose proposals are accepted for funding will be contacted before award to provide additional information required for award. The required information is normally limited to clarifying budget explanations, representations, certifications, and some technical aspects.

For Contracts Only- Performance Work Statements (PWS)- prior to award the Contracting Officer may request that the contractor submit a PWS for the effort to be performed, which will be incorporated into the contract at the time of award.

An applicant may withdraw a proposal at any time before award by written notice or by email. Notice of withdrawal shall be sent to the Contracting/Grants Officer identified in Section G, of this BAA. Withdrawals are effective upon receipt of notice by the Contracting/Grants Officer.

E. Application Review Information:

1. Criteria:

- a. Proposals submitted in response to this BAA will be evaluated on the following criteria, of most importance, both of equal weight:
 - (i) Scientific and technical merits of the proposed research; and
 - (ii) Potential contribution of the research, if successful, to significantly enhance the feasibility of quantum computing.
- b. Other evaluation criteria, of lesser importance, but weighted equal to each other include:
 - (i) Experience and qualifications of the principal investigator, other key research personnel, and the institution sponsoring the proposal; and
 - (ii) The realism and reasonableness of cost.

NOTE: Cost sharing will not be considered in the evaluation.

2. Review and Selection Process:

The proposal selection process will be conducted based upon a technical review by a panel of scientists according to the evaluation criteria specified in Section E.1 (*Criteria*). Each proposal will be evaluated based on the merit and relevance of the specific proposal as it relates to the research topic rather than against other proposals for research in the same general area.

3. Recipient Qualification

- a. For Grant, Cooperative Agreement:

In accordance with OMB guidance in parts 180 and 200 of Title 2, CFR, it is DoD policy that DoD Components must report and use integrity and performance information in the Federal Awardee Performance and Integrity Information System (FAPIIS), or any successor system designated by OMB, concerning grants, cooperative agreements, and TIAs as follows:

- (i) If the total Federal share will be greater than the simplified acquisition threshold on any Federal award under a notice of funding opportunity (see §200.88 Simplified Acquisition Threshold):

(a) The Federal awarding agency, prior to making a Federal award with a total amount of Federal share greater than the simplified acquisition threshold, will review and consider any information about the applicant that is in the designated integrity and performance system accessible through SAM (currently FAPIIS) (see 41 U.S.C. 2313);

(b) An applicant, at its option, may review information in the designated integrity and performance systems accessible through SAM and comment on any information about itself that a Federal awarding agency previously entered and is currently in the designated integrity and performance system accessible through SAM;

(c) The Federal awarding agency will consider any comments by the applicant, in addition to the other information in the designated integrity and performance system, in making a judgment about the applicant's integrity, business ethics, and record of performance under Federal awards when completing the review of risk posed by applicants as described in §200.205 Federal awarding agency review of risk posed by applicants.

(ii) If the total Federal share exceeds \$500,000 on any Federal award under a notice of funding opportunity, the post-award reporting requirements reflected in Appendix XII to Part 200 of Title 2 CFR will be included in the award document. This requirement also applies to modifications of awards that: 1) increase the scope of the award, 2) are issued on or after January 1, 2016, and 3) increase the federal share of the award's total value to an amount that exceeds \$500,000.

b. For Assistance awards recipients will be required to submit the following representation prior to award:

Representations under DoD Assistance Agreements: Appropriations Provisions on Tax Delinquency and Felony Convictions

The applicant is () is not () a “Corporation” meaning any entity, including any institution of higher education, other nonprofit organization, or for-profit entity that has filed articles of incorporation.

If the applicant is a “Corporation” please complete the following representations:

(1) The applicant represents that it is () is not () a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

(2) The applicant represents that it is () is not () is not a corporation that was convicted of a criminal violation under any Federal law within the preceding 24 months.

The “Representation relating to Tax Liability and Felony Convictions”, the form may be accessed at <http://www.arl.army.mil/www/default.cfm?page=218#forms>.

NOTE: If an applicant responds in the affirmative to either of the above representations, the applicant is ineligible to receive an award unless the agency suspension and debarment official (SDO) has considered suspension or debarment and determined that further action is not required to protect the Government’s interests. The applicant therefore should provide information about its tax liability or conviction to the agency’s SDO as soon as it can do so, to facilitate completion of the required considerations before award decisions are made. Applicant’s authorized representative must sign and date form.

c. For CONTRACT Proposals:

(i) The Federal Awardee Performance and Integrity Information System (FAPIIS) will be checked prior to making an award. The web address is: <http://www.fapiis.gov/fapiis/index.jsp>. The applicant representing the entity may comment in this system on any information about itself that a Federal Government Official entered. The information in FAPIIS will be used in making a judgment about the entity’s integrity, business ethics, and record of performance under Federal awards that may affect the official’s determination that the applicant is qualified to receive an award.

(ii) For contracts, the following representation must be submitted prior to award if the offeror's SAM Representations and Certifications are not dated after March 2016. If the offeror's SAM Representations and Certifications have been updated after March 2016, this representation is not required to be submitted separately.

FAR 52.209-11: Representation by Corporations Regarding Delinquent Tax Liability or a Felony Conviction under any Federal Law (Feb 2016)

(a) As required by sections 744 and 745 of Division E of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub. L 113-235), and similar provisions, if contained in subsequent appropriations acts, the Government will not enter into a contract with any corporation that--

(1) Has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability, where the awarding agency is aware of the unpaid tax liability, unless an agency has considered suspension or debarment of the corporation and made a determination that suspension or debarment is not necessary to protect the interests of the Government; or

(2) Was convicted of a felony criminal violation under any Federal law within the preceding 24 months, where the awarding agency is aware of the conviction, unless an agency has considered suspension or debarment of the corporation and made a determination that this action is not necessary to protect the interests of the Government.

(b) The Offeror represents that—

(1) It is is not a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability; and

(2) It is is not a corporation that was convicted of a felony criminal violation under a Federal law within the preceding 24 months.

F. Award Administration Information:

1. Award Notices:

Initial notification of selection of proposals for funding will be e-mailed by ARO to successful offerors on or about 10 July 2017. Unsuccessful offerors will be notified shortly thereafter.

The notification e-mail must not be regarded as an authorization to commit or expend funds. The Government is not obligated to provide any funding until a Government Contracting/ Grants Officer signs the grant, cooperative agreement or contract award document.

Applicants whose proposals are recommended for negotiation of award will be contacted by a Contract/Grant Specialist to discuss additional information required for award. This may include representations and certifications, revised budgets or budget explanations, certificate of current cost or pricing data, subcontracting plan for small businesses, and other information as applicable to the proposed award.

2. Administrative and National Policy Requirements:

a. Required Certifications

(i) For CONTRACT Proposals:

Certifications Required for Contract Awards. Certifications and representations shall be completed by successful offerors prior to award. Federal Acquisition Regulation (FAR) Online Representations and Certifications are to be completed through SAM at website <https://www.SAM.gov>. Defense FAR Supplement and contract specific certification packages will be provided to the contractor for completion prior to award.

(ii) For GRANT and COOPERATIVE AGREEMENT Proposals:

Grant awards greater than \$100,000 require a certification of compliance with a national policy mandate concerning lobbying. Statutes and Government-wide regulations require the certification to be submitted prior to award. The certification is set forth at Appendix A to 32 CFR 28 regarding lobbying. When submitting your grant through Grants.gov, by completing blocks 18 and 19 of the Standard Form 424 Research and Related (R&R) Form, the grant applicant is providing the certification on lobbying required by 32 CFR Part 28, otherwise a signed copy by the authorized representative must be provided. Below is the required certification:

(a). CERTIFICATION AT APPENDIX A TO 32 CFR PART 28 REGARDING LOBBYING: Certification for Contracts, Grants, Loans, and Cooperative Agreements The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

(b). PROHIBITION ON CONTRACTING WITH ENTITIES THAT REQUIRED CERTAIN INTERNAL CONFIDENTIALITY AGREEMENTS – REPRESENTATION

Agreement with the representation below will be affirmed by checking the “I agree” box in block 17 of the SF424 (R&R) as part of the electronic proposal submitted via Grants.gov. The representation reads as follows:

By submission of its proposal or application, the applicant represents that it does not require any of its employees, contractors, or subrecipients seeking to report fraud, waste, or abuse to sign or comply with internal confidentiality agreements or statements prohibiting or otherwise restricting those employees, contractors, subrecipients from lawfully reporting that waste, fraud, or abuse to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information.

Note that: (1) the basis for this representation is a prohibition in section 743 of the Financial Services and General Government Appropriations Act, 2015, Pub. L. 113-235) on provision of funds through grants and cooperative agreements to entities with certain internal confidentiality agreements or statements; and 2) section 743 states that it does not contravene requirements applicable to Standard Form 312, Form 4414, or any other form issued by a Federal department or agency governing the nondisclosure of classified information.

b. Policy Requirements

(i) Protection of Human Subjects:

(a) Assistance Instruments Only. All research involving human subjects must be conducted in accordance with 32 CFR 219, 10 U.S.C. 980, and DoDI 3216.02, and AR 70-25 as well as other applicable federal and state regulations.

Contractors/grantees must be cognizant of and abide by the additional restrictions and limitations imposed on the DoD regarding research involving human subjects, specifically as regards vulnerable populations (32 CFR 219 modifications to subparts B- D of 45 CFR 46), recruitment of military research subjects (32 CFR 219), and surrogate consent (10 U.S.C. 980). The regulations mandate that all DoD activities, components, and agencies protect the rights and welfare of human subjects of study in DoD-supported research, development, test and evaluation, and related activities hereafter referred to as “research”. The requirement to comply with the regulations applies to new starts and to continuing research.

Notwithstanding any other provision contained in an assistance award or incorporated by reference therein, the Recipient is expressly forbidden to use or subcontract for the use of human subjects in any manner whatsoever without the prior express written approval of the applicable protocol proposed for an award as required by AR 70-25 in addition to the institution's approval. Non-compliance with any part of this provision may result in withholding of funds and/or the termination of an award.

The Principal Investigators will notify the Army technical representatives within 24 hours if any of the following occur: (1) the protocol is suspended; (2) a death occurs as a consequence of the research protocol; or (3) a life-threatening, adverse event occurs as a consequence of the research protocol.

(b) For Contracts, the appropriate clauses shall be added.

(ii) ANIMAL USE.

(a) Assistance Instruments Only. DODI 3216.01 and AR 40-33, provides policy and requirements for the use of animals in DOD-funded research. The DoD definition of animal is any live nonhuman vertebrate. All proposals that involve the use of animals must address compliance with DoDI 3216.01 and AR 40-33.

Provisions include rules on animal acquisition, transport, care, handling, and use in 9 CFR parts 1-4, Department of Agriculture rules implementing the Laboratory Animal Welfare Act of 1966 (7 U.S.C. 2131-2156), and guidelines in the National Academy of Sciences (NAS) "Guide for the Care and Use of Laboratory Animals" (1996), including the Public Health Service Policy and Government Principles Regarding the Care and Use of Animals in Appendix D to the Guide.

Notwithstanding any other provision contained in this award or incorporated by reference therein, the Recipient is expressly forbidden to use or subcontract for the use of laboratory animals in any manner whatsoever without the prior express written approval of the applicable protocol proposed for this award as required by AR 40-33 in addition to the institution's approval. Non-compliance with this provision may result in withholding of funds and/or termination of the award.

The Principal Investigator will notify the Army technical representatives within 24 hours if any of the following occur: (1) the protocol is suspended; or (2) a life-threatening, adverse event occurs as a consequence of the research protocol.

(b) For Contracts, the appropriate clauses shall be added.

(iii) BIOLOGICAL DEFENSE SAFETY PROGRAM REQUIREMENTS: For All Awards. Successful offerors whose Principal Investigators are conducting research with Bio-safety Levels 3 and 4 material must prepare a Facility Safety Plan in accordance with 32 Code of Federal Regulations (CFR) 626.18. See URL: www.access.gpo.gov/nara/cfr/waisidx_99/32cfr626_99.html for a copy of 32 CFR 626.18, Biological Defense Safety Program.

(iv) MILITARY RECRUITING: For Assistance Instruments Only. This is to notify potential offerors that each grant or cooperative agreement awarded under this announcement to an institution of higher education must include the following term and condition:

"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 of denying, and that it is not an institution of higher education that effectively prevents, the Secretary of Defense from obtaining for military recruiting purposes: (A) entry to campuses or access to students on campuses or (B) access to directory information pertaining to students. 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, and therefore to be in breach of this clause, 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."

If your institution has been identified under the procedures established by the Secretary of Defense to implement Section 558, then: (1) no funds available to DOD may be provided to your institution through any grant, including any existing grant, (2) as a matter of policy, this restriction also applies to any cooperative agreement, and (3) your institution is not eligible to receive a grant or cooperative agreement in response to this solicitation.

(v) **MILITARY RECRUITING: For Contracts Only.** This is to notify potential offerors that each contract awarded under this announcement to an institution of higher education shall include the following clause: Defense Federal Acquisition Regulation Supplement (DFARS) clause 252.209-7005, Military Recruiting on Campus.

(vi) **SUBCONTRACTING: For Contracts Only.** This section is applicable to contracts where the dollar threshold is expected to exceed to \$700,000.00. Pursuant to Section 8(d) of the Small Business Act [15 U.S.C. 637(d)], it is the policy of the Government to enable small business concerns to be considered fairly as subcontractors under all research agreements awarded to prime contractors. The required elements of the Subcontracting Plan are set forth by FAR 52.219-9 (DEVIATION 2013-O0014) and DFARS 252.219-7003.

Subcontracting Plan Goals. Small business subcontracting goals are established on an individual contract basis. The applicant is requested to consider, when appropriate, the Governments' subcontracting goals. When applied to R&D the small business-subcontractor plan should result in the best mix of cost schedule and performance.

3. Reporting:

Additional reports including number and types will be specified in the award document, but will include as a minimum monthly financial status reports. The reports shall be prepared and submitted in accordance with the procedures contained in the award document and mutually agreed upon before award. Reports and briefing material will also be required as appropriate to document progress in accomplishing program metrics. A final report that summarizes the project and tasks will be required at the conclusion of the performance period for the award.

ARMY MANPOWER CONTRACTOR REPORTING: For Contracts Only. The Office of the Assistant Secretary of the Army (Manpower & Reserve Affairs) operates and maintains a

secure Army data collection site where the contractor will report ALL contractor manpower (including subcontractor manpower) required for performance of this contract. The contractor is required to completely fill in all the information in the format using the following web address: <https://cmra.army.mil/>. The required information includes:

- (1) Contracting Office, Contracting Officer, Contracting Officer's Technical Representative;
- (2) Contract number, including task and delivery order number;
- (3) Beginning and ending dates covered by reporting period;
- (4) Contractor name, address, phone number, e-mail address, identity of contractor employee entering data;
- (5) Estimated direct labor hours (including sub-contractors);
- (6) Estimated direct labor dollars paid this reporting period (including sub- contractors);
- (7) Total payments (including sub-contractors);
- (8) Predominate Federal Service Code (FSC) reflecting services provided by contractor (and separate predominant FSC for each sub-contractor if different);
- (9) Estimated data collection cost;
- (10) Organizational title associated with the Unit Identification Code (UIC) for the Army Requiring Activity (the Army Requiring Activity is responsible for providing the contractor with its UIC for the purposes of reporting this information);
- (11) Locations where contractor and sub-contractors perform the work (specified by zip code in the United States and nearest city, country, when in an overseas location, using standardized nomenclature provided on website);
- (12) Presence of deployment or contingency contract language; and
- (13) Number of contractor and sub-contractor employees deployed in theater this reporting period (by country).

As part of its submission, the contractor will also provide the estimated total cost (if any) incurred to comply with this reporting requirement. Reporting period will be the period of performance not to exceed 12 months ending 30 September of each government fiscal year and must be reported by 31 October of each calendar year.

Contractors may use a direct XML data transfer to the database server or fill in the fields on the website. The XML direct transfer is a format for transferring files from a contractor's systems to the secure web site without the need for separate data entries for each required data element at the web site. The specific formats for the XML direct transfer may be downloaded from the web site.

G. Agency Contacts:

Questions of a technical nature or a programmatic nature shall be directed as specified below:

Quantum Computing Program Point of Contact:

Dr. T.R. Govindan
Army Research Office
Email Address: t.r.govindan.civ@mail.mil

Questions of a business nature shall be directed to the cognizant Grants/Contracting Officer, as specified below:

Mr. Andrew Day
Contracting/Grants Officer
Email address: andrew.day.civ@mail.mil

Comments or questions submitted should be concise and to the point, eliminating any unnecessary verbiage. In addition, the relevant part and paragraph of the Broad Agency Announcement (BAA) should be referenced.

H. Other Information:

Below are 2 separate outlines of the informational requirements for a sample cost proposal. H.1. is for a procurement contract and H.2 for grants and cooperative agreements.

1. CONTRACT Proposals:

Cost Proposal – {No Page Limit} Cover sheet to include:

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

I. Reasoning for Submitting a Strong Cost Proposal

The ultimate responsibility of the Contracting Officer is to ensure that all prices offered in a proposal are fair and reasonable before contract award [FAR 15.4]. To establish the reasonableness of the offered prices, the Contracting Officer may ask the offeror to provide various supporting documentation that assists in this determination. The offeror's ability to be responsive to the Contracting Officer's requests can expedite contract award. As specified in Section 808 of Public Law 105-261, an offeror who does not comply with a requirement to submit information for a contract or subcontract in accordance with paragraph (a)(1) of FAR 15.403-3 may be ineligible for award.

II. DCAA-Accepted Accounting System

- A) Before a contract can be awarded, the Contracting Officer must confirm that the offeror has a Defense Contract Audit Agency (DCAA)-accepted accounting system in place for accumulating and billing costs under Government contracts [FAR 53.209-1(f)]. If the offeror has DCAA correspondence, which documents the acceptance of their accounting system, this should be provided to the Contracting Officer (i.e. attached or referenced in the proposal). Otherwise, the Contracting Officer will submit an inquiry directly to the appropriate DCAA office and request a review of the offeror's accounting system.
- B) If an offeror does not have a DCAA-accepted accounting system in place, the DCAA review process can take several months depending upon the availability of the DCAA auditors and the offeror's internal processes. This will cause a delay in contract award.
- C) For more information about cost proposals and accounting standards, view the link titled "Information for Contractors" on the main menu on their website.

III. Field Pricing Assistance

During the pre-award cost audit process, the Contracting Officer will solicit support from DCAA to determine commerciality and price reasonableness of the proposal [FAR 15.404-2]. Any proprietary information or reports obtained from DCAA field audits will be appropriately identified and protected within the Government.

IV. Sample Cost Proposal – "Piece by Piece"

- A) To help guide offerors through the pre-award cost audit process, a sample cost proposal is detailed below. This sample also allows the offeror to see exactly what the Government is looking for; therefore, all cost and pricing back-up data can be provided to the Government in the first cost proposal submission. Review each cost element within the proposal, and take note of the types of documentation that the Contracting Officer will require from the offeror.

B) Direct Labor: The first cost element included in the cost proposal is Direct Labor. The Department of Defense (DoD) requires each proposed employee to be listed by name and labor category.

Below is the Direct Labor as proposed by our sample offeror:

DIRECT LABOR		YEAR 1			YEAR 2		
Employee Name	Labor Category	Direct Hourly Rate	Hours	Total Direct Labor	Direct Hourly Rate	Hours	Total Direct Labor
Andy Smith	Program Manager	\$55.00	720.00	\$39,600.00	\$56.65	720.00	\$40,788.00
Bryan Andrew	Senior Engineer	\$40.00	672.00	\$26,880.00	\$41.20	672.00	\$27,686.40
Cindy Thomas	Principal Engineer	\$50.00	512.00	\$25,600.00	\$51.50	512.00	\$26,368.00
David Porter	Entry Level Engineer	\$10.00	400.00	\$4,000.00	\$10.30	400.00	\$4,120.00
Edward Bean	Project Administrator	\$25.00	48.00	\$1,200.00	\$25.75	48.00	\$1,236.00
Subtotal Direct Labor (DL)				\$97,280.00			\$100,198.40

- 1) For this cost element, the Contracting Officer requires the offeror to provide adequate documentation in order to determine that each labor rate for each employee/labor category is fair and reasonable. The documentation will need to explain how these labor rates were derived. For example, if the rates are DCAA- approved labor rates, provide the Contracting Officer with copies of the DCAA documents stating the approval. This is the most acceptable means of documentation to determine the rates fair and reasonable. Other types of supporting documentation may include General Service Administration (GSA) contract price lists, actual payroll journals, or Salary.com research. If an employee listed in a cost proposal is not a current employee (maybe a new employee, or one contingent upon the award of this contract), a copy of the offer letter stating the hourly rate - signed and accepted by the employee - may be provided as adequate documentation. Sometimes the hourly rates listed in a proposal are derived through subjective processes, i.e., blending of multiple employees in one labor category, or averaged over the course of the year to include scheduled payroll increases, etc. These situations should be clearly documented for the Contracting Officer.
- 2) Another cost element in Direct Labor is labor escalation, or the increase in labor rates from Year 1 to Year 2. In the example above, the proposed labor escalation is 3% (ex., Andy Smith increased from \$55.00/hr in Year 1, by 3% to \$56.65/hr in Year 2). Often times, an offeror may not propose escalation on labor rates during a 24-month

period. Whatever the proposed escalation rate is, please be prepared to explain why it is fair and reasonable [ex., A sufficient explanation for our sample escalation rate would be the Government's General Schedule Increase and Locality Pay for the same time period (name FY) in the same location (name location) was published as 3.5%, therefore a 3% increase is fair and reasonable].

C) Other Direct Costs (ODCs): This section of the cost proposal includes all other directly related costs required in support of the effort i.e., materials, subcontractors, consultants, travel, etc. Any cost element that includes various items will need to be detailed in a cost breakdown to the Contracting Officer.

1) Direct Material Costs: This subsection of the cost proposal will include any special tooling, test equipment, and material costs necessary to perform the project. Items included in this section will be carefully reviewed relative to need and appropriateness for the work proposed, and must, in the opinion of the Contracting Officer, be advantageous to the Government and directly related to the specific topic.

a) The Contracting Officer will require adequate documentation from the offeror to determine the cost reasonableness for each material cost proposed. The following methods are ways in which the Contracting Officer can determine this [FAR 15.403-1].

i) Adequate Price Competition. A price is based on adequate price competition when the offeror solicits and receives quotes from two or more responsible vendors for the same or similar items or services. Based on these quotes, the offeror selects the vendor who represents the best value to the Government. The offeror will be required to provide copies of all vendor quotes received to the Contracting Officer.

Note: Price competition is not required for items at or below the micropurchase threshold (\$3,000) [FAR 15.403-1]. If an item's unit cost is less than or equal to \$3,000, price competition is not necessary. However, if an item's total cost over the period of performance (unit cost * quantity is higher than \$3,000, two or more quotes must be obtained by the offeror.

ii) Commercial Prices. Commercial prices are those published on current price lists, catalogs, or market prices. This includes vendors who have prices published on a GSA-schedule contract. The offeror will be required to provide copies of such price lists to the Contracting Officer.

iii) Prices set by law or regulation. If a price is mandated by the Government (i.e. pronouncements in the form of periodic rulings, reviews, or similar actions of a governmental body, or embodied in the laws) that is sufficient to set a price.

b) Below is the list of Direct Material costs included in our sample proposal:

i)

DIRECT MATERIAL COSTS:	YEAR 1	YEAR 2
Raw Materials	\$35,000.00	\$12,000.00
Computer for experiments	\$4,215.00	\$0.00
Cable (item #12-3657, 300 ft)	\$1,275.00	\$0.00
Software	\$1,825.00	\$1,825.00
Subtotal Direct Materials Costs (DM):	\$42,315.00	\$13,825.00

ii) “Raw Materials”: This is a generic label used to group many material items into one cost item within the proposal. The Contracts Officer will require a detailed breakout of all the items that make up this cost. For each separate item over \$3,000 (total for Year 1 + Year 2), the offeror must be able to provide either competitive quotes received, or show that published pricing was used.

iii) “Computer for experiments”: Again, this item is most likely a grouping of several components that make up one system. The Contracts Officer will require a detailed breakout of all the items that make up this cost. For each separate item over \$3,000 (total for Year 1 + Year 2), the offeror must be able to provide either competitive quotes received, or show that published pricing was used.

iv) “Cable”: Since this item is under the simplified acquisition threshold of \$3,000, competitive quotes or published pricing are not required. Simply provide documentation to show the Contracting Officer where this price came from.

v) “Software”: This cost item could include either one software product, or multiple products. If this includes a price for multiple items, please provide the detailed cost breakdown. Note: The price for Year 1 (\$1,825) is below the simplified acquisition threshold; however, in total (Year 1 + Year 2) the price is over \$3,000, so competitive quotes or published pricing documentation must be provided.

c) Due to the specialized types of products and services necessary to perform these projects, it may not always be possible to obtain competitive quotes from more than one reliable source. Each cost element over the simplified acquisition threshold (\$3,000) must be substantiated. There is always an explanation for HOW the cost of an item was derived; show us how you came up with that price!

- d) When it is not possible for an offeror to obtain a vendor price through competitive quotes or published price lists, a Contracting Officer may accept other methods to determine cost reasonableness. Below are some examples of other documentation, which the Contracting Officer may accept to substantiate costs:
- i) Evidence that a vendor/supplier charged another offeror a similar price for similar services. Has the vendor charged someone else for the same product? (Two (2) to three (3) invoices from that vendor to different customers may be used as evidence.)
 - ii) Previous contract prices. Has the offeror charged the Government a similar price under another Government contract for similar services? If the Government has already paid a certain price for services, then that price may already be considered fair and reasonable. (Provide the contract number, and billing rates for reference.)
 - iii) DCAA approved. Has DCAA already accepted or verified specific cost items included in your proposal? (Provide a copy of DCAA correspondence that addressed these costs.)
- 2) Below is the remaining ODC portion of our proposal including equipment, subcontractors, consultants, and travel. Assume in this scenario that competitive quotes or catalog prices were not available for these items:

OTHER DIRECT COSTS:	YEAR 1	YEAR 2
Equipment Rental for Analysis	\$5,500.00	\$5,600.00
Subcontractor – Lockheed	\$25,000.00	\$0.00
Consultant: John Bowers	\$0.00	\$12,000.00
Travel	\$1,250.00	\$1,250.00
Subtotal Other Direct Costs (ODC):	\$31,750.00	\$18,850.00

- a) “Equipment Rental for Analysis”: The offeror explains that the Year 1 cost of \$5,500 is based upon 250 hours of equipment rental at an hourly rate of \$22.00/hr. One (1) invoice from the vendor charging another vendor the same price for the same service is provided to the Contracting Officer as evidence. Since this cost is over the simplified acquisition threshold, further documentation to determine cost reasonableness is required. The offeror is able to furnish another invoice charging a second vendor the same price for the same service.
- b) “Subcontractor – Widget, Inc.”: The offeror provides a copy of the subcontractor quote to the Contracting Officer in support of the \$25,000 cost. This subcontractor quote must include sufficient detailed information (equivalent to the data included in the prime’s proposal to the Government), so that the Contracting Officer can make a determination of cost reasonableness.

- i) As stated in Section 3.5(c)(6) of the DoD Cost Proposal guidance, “All subcontractor costs and consultant costs must be detailed at the same level as prime contractor costs in regards to labor, travel, equipment, etc. Provide detailed substantiation of subcontractor costs in your cost proposal.”
- ii) In accordance with FAR 15.404-3, “the Contracting Officer is responsible for the determination of price reasonableness for the prime contract, including subcontracting costs”. This means that the subcontractor’s quote/proposal may be subject to the same scrutiny by the Contracting Officer as the cost proposal submitted by the prime. The Contracting Officer will need to determine whether the subcontractor has an accepted purchasing system in place and/or conduct appropriate cost or price analyses to establish the reasonableness of proposed subcontract prices. Due to the proprietary nature of cost data, the Subcontractor may choose to submit their pricing information directly to the Contracting Officer and not through the prime. This is understood and encouraged.
- iii) When a subcontractor is selected to provide support under the prime contract due to their specialized experience, the Contracting Officer may request sole source justification from the offeror.
- c) “Consultant – John Bowers”: Again, the offeror shall provide a copy of the consultant’s quote to the Contracting Officer as evidence. In this example, the consultant will be charging an hourly rate of \$125 an hour for 96 hours of support. The offeror indicates to the Contracting Officer that this particular consultant was used on a previous contract with the Government (provide contract number), and will be charging the same rate. A copy of the consultant’s invoice to the offeror under the prior contract is available as supporting evidence. Since the Government has paid this price for the same services in the past, determination has already been made that the price is fair.
- d) “Travel”: The Contracting Officer will require a detailed cost breakdown for travel expenses to determine whether the total cost is reasonable based on Government per diem and mileage rates. This breakdown shall include the number of trips, the destinations, and the number of travelers. It will also need to include the estimated airfare per round trip, estimated car rental, lodging rate per trip, tax on lodging, and per diem rate per trip. The lodging and per diem rates must coincide with the Joint Travel Regulations. Please see the following website to determine the appropriate lodging and per diem rates: <http://perdiem.hqda.pentagon.mil/perdiem/conus2009.txt>. Additionally, the offeror must provide why the airfare is fair and reasonable as well. Sufficient back up for both airfare and car rental would include print outs of online research at the various travel search engines (Expedia, Travelocity, etc.) documenting the prices for airfare and car rentals thus proving why your chosen rate is fair and reasonable.

i) Below is a sample of the travel portion:

TRAVEL		Trips	Travelers	Nights	Days	Unit Cost	Total Travel
Airfare	per roundtrip	1	1			\$996.00	\$996.00
Lodging	per day	1	1	1		\$75.00	\$75.00
Tax on Lodging							
(12%)	per day	1	1	1		\$9.00	\$9.00
Per Diem	per day	1	1		2	\$44.00	\$88.00
Automobile Rental					2		
Rental	per day	1	1			\$41.00	\$82.00
Subtotal Travel							\$1,250.00

D) Indirect Rates: Indirect rates include elements such as Fringe Benefits, General & Administrative (G&A), Overhead, and Material Handling costs. The offeror shall indicate in the cost proposal both the indirect rates (as a percentage) as well as how those rates are allocated to the costs in the proposal.

Below is the Indirect portion of our sample proposal

INDIRECTS	YEAR 1	YEAR 2
Subtotal Direct Labor (DL):	\$97,280.00	\$100,198.40
Fringe Benefits, if not included in Overhead, rate (15.0000 %) X DL =	\$14,592.00	\$15,029.76
Labor Overhead (rate 45.0000 %) X (DL + Fringe) =	\$50,342.40	\$51,852.67
Total Direct Labor (TDL):	\$162,214.40	\$167,080.83

- 1) In this example, the offeror includes a Fringe Benefit rate of 15.00% that is allocated to the Direct Labor costs. They also propose a Labor Overhead rate of 45.00% that is allocated to the Direct Labor costs plus the Fringe Benefits.
- 2) All indirect rates and the allocation methods of those rates must be verified by the Contracting Officer. In most cases, DCAA documentation supporting the indirect rates and allocation methods can be obtained through a DCAA field audit or proposal review. Many offerors have already completed such reviews and have this documentation readily available. If an offeror is unable to participate in a DCAA review to substantiate indirect rates, the Contracting Officer may request other accounting data from the offeror to make a determination.

E.) Cost of Money (COM): If Cost of Money (an imputed cost that is not a form of interest on borrowings (see FAR 31.205-20); an “incurred cost” for cost-reimbursement purposes under applicable cost-reimbursement contracts and for progress payment purposes under fixed-price contracts; and refers to— (1) Facilities capital cost of money (48 CFR 9904.414); and (2) Cost of money as an element of the cost of capital assets under construction (48 CFR 9904.417)) is proposed in accordance with FAR 31.205-10, a DD Form 1861 is required to be completed and submitted with the contractor’s proposal.

F.) Fee/Profit: The proposed fee percentage will be analyzed in accordance with DFARS 215.404, the Weighted Guidelines Method.

G.) Subcontracting Plan: If the total amount of the proposal exceeds \$700,000 and the offeror is a large business or an institute of higher education (other than HBCU/MI) and the resultant award is a contract, the offeror shall be prepared to submit a subcontracting plan for small business and small disadvantaged business concerns. A mutually agreeable plan will be included in and made a part of the contract (see the goals listed at Section II, F, 2, b).

2. GRANT and COOPERATIVE AGREEMENT Proposals:

Before award it must be established that an approved accounting system and financial management system exist.

A.) Direct Labor: Show the current and projected salary amounts in terms of man-hours, man-months, or annual salary to be charged by the principal investigator(s), faculty, research associates, postdoctoral associates, graduate and undergraduate students, secretarial, clerical, and other technical personnel either by personnel or position. State the number of man-hours used to calculate a man-month or man-year. For proposals from universities, research during the academic term is deemed part of regular academic duties, not an extra function for which additional compensation or compensation at a higher rate is warranted. Consequently, academic term salaries shall not be augmented either in rate or in total amount for research performed during the academic term. Rates of compensation for research conducted during non-academic (summer) terms shall not exceed the rate for the academic terms. When part or all of a person's services are to be charged as project costs, it is expected that the person will be relieved of an equal part or all of his or her regular teaching or other obligations. For each person or position, provide the following information:

- 1) The basis for the direct labor hours or percentage of effort (e.g., historical hours or estimates).
- 2) The basis for the direct labor rates or salaries. Labor costs should be predicted upon current labor rates or salaries. These rates may be adjusted upward for forecast salary or wage cost-of-living increases that will occur during the agreement period. The cost proposal should separately identify the rationale applied to base salary/wage for cost-of-living adjustments and merit increases. Each must be fully explained.

- 3) The portion of time to be devoted to the proposed research, divided between academic and non-academic (summer) terms, when applicable.
- 4) The total annual salary charged to the research project.
- 5) Any details that may affect the salary during the project, such as plans for leave and/or remuneration while on leave.

B.) Fringe Benefits and Indirect Costs (Overhead, General and Administrative, and Other): The most recent rates, dates of negotiation, the base(s) and periods to which the rates apply must be disclosed and a statement included identifying whether the proposed rates are provisional or fixed. If the rates have been negotiated by a Government agency, state when and by which agency. A copy of the negotiation memorandum should be provided. If negotiated forecast rates do not exist, offerors must provide sufficient detail to enable a determination to be made that the costs included in the forecast rate are allocable according to applicable OMB Circulars or FAR/DFARS provisions. Offerors' disclosure should be sufficient to permit a full understanding of the content of the rate(s) and how it was established. As a minimum, the submission should identify:

- 1) All individual cost elements included in the forecast rate(s);
- 2) Bases used to prorate indirect expenses to cost pools, if any;
- 3) How the rate(s) was calculated;
- 4) Distribution basis of the developed rate(s);
- 5) Bases on which the overhead rate is calculated, such as "salaries and wages" or "total costs," and
- 6) The period of the offeror's fiscal year.

C.) Permanent Equipment: If facilities or equipment are required, a justification why this property should be furnished by the Government must be submitted. State the organization's inability or unwillingness to furnish the facilities or equipment. Offerors must provide an itemized list of permanent equipment showing the cost for each item. Permanent equipment is any article or tangible nonexpendable property having a useful life of more than one year and an acquisition cost of \$5,000 or more per unit. The basis for the cost of each item of permanent equipment included in the budget must be disclosed, such as:

- 1) Vendor Quote: Show name of vendor, number of quotes received and justification, if intended award is to other than lowest bidder.

- 2) Historical Cost: Identify vendor, date of purchase, and whether or not cost represents lowest bid. Include reason(s) for not soliciting current quotes.
- 3) Engineering Estimate: Include rationale for quote and reason for not soliciting current quotes. If applicable, the following additional information shall be disclosed in the offeror's cost proposal:
 - 4) Special test equipment to be fabricated by the awardee for specific research purposes and its cost.
 - 5) Standard equipment to be acquired and modified to meet specific requirements, including acquisition and modification costs, listed separately.
 - 6) Existing equipment to be modified to meet specific research requirements, including modification costs. Do not include equipment the organization will purchase with its funds if the equipment will be capitalized for Federal income tax purposes. Proposed permanent equipment purchases during the final year of an award shall be limited and fully justified.
- 7) Grants and cooperative agreements may convey title to an institution for equipment purchased with project funds. At the discretion of the contracting/grants officer, the agreement may provide for retention of the title by the Government or may impose conditions governing the equipment conveyed to the organization per the governing laws and regulations.

D.) Travel: Forecasts of travel expenditures (domestic and foreign) that identify the destination and the various cost elements (airfare, mileage, per diem rates, etc.) must be submitted. The costs should be in sufficient detail to determine the reasonableness of such costs. Allowance for air travel normally will not exceed the cost of round-trip, economy air accommodations. Specify the type of travel and its relationship to the research project. Requests for domestic travel must not exceed \$3,000 per year per principal investigator. Separate, prior approval by the ARL is required for all foreign travel (i.e., travel outside the continental U.S., its possessions and Canada). Foreign travel requests must not exceed \$1,800 each per year per principal investigator. Special justification will be required for travel requests in excess of the amounts stated above and for travel by individuals other than the principal investigator(s). Individuals other than the principal investigator(s) are considered postdoctoral associates, research associates, graduate and undergraduate students, secretarial, clerical, and other technical personnel. Additional travel may be requested for travel to Army laboratories and facilities to enhance agreement objectives and to achieve technology transfer.

E.) Participant Support Costs: This budget category refers to costs of transportation, per diem, stipends, and other related costs for participants or trainees (but not employees) in connection with ARL-sponsored conferences, meetings, symposia, training activities, and workshops (see the "Other Programs" section as described earlier in this BAA). Generally, indirect costs are not allowed on participant support costs. The number of participants to

be supported should be entered in the parentheses on the budget form. These costs should also be justified in the budget justification page(s) attached to the cost proposal.

F.) Materials, Supplies, and Consumables: A general description and total estimated cost of expendable equipment and supplies are required. The basis for developing the cost estimate (vendor quotes, invoice prices, engineering estimate, purchase order history, etc.) must be included. If possible, provide a material list.

G.) Publication, Documentation, and Dissemination: The budget may request funds for the costs of preparing, publishing, or otherwise making available to others the findings and products of the work conducted under an agreement, including costs of reports, reprints, page charges, or other journal costs (except costs for prior or early publication); necessary illustrations, cleanup, documentation, storage, and indexing of data and databases; and development, documentation, and debugging of software.

H.) Consultant Costs: Offerors normally are expected to utilize the services of their own staff to the maximum extent possible in managing and performing the project's effort. If the need for consultant services is anticipated, the nature of proposed consultant services should be justified and included in the technical proposal narrative. The cost proposal should include the names of consultant(s), primary organizational affiliation, each individual's expertise, daily compensation rate, number of days of expected service, and estimated travel and per diem costs.

I.) Computer Services: The cost of computer services, including computer-based retrieval of scientific, technical, and educational information, may be requested. A justification/explanation based on the established computer service rates at the proposing organization should be included. The budget also may request costs, which must be shown to be reasonable, for leasing automatic data processing equipment. The purchase of computers or associated hardware and software should be requested as items of equipment.

J.) Subawards (subcontracts or subgrants): A precise description of services or materials that are to be awarded by a subaward must be provided. For subawards totaling \$10,000 or more, provide the following specific information:

- 1) A clear description of the work to be performed.
- 2) If known, the identification of the proposed subawardee and an explanation of why and how the subawardee was selected or will be selected.
- 3) The identification of the type of award to be used (cost reimbursement, fixed price, etc.).
- 4) Whether or not the award will be competitive and, if noncompetitive, rationale to justify the absence of competition.
- 5) A detailed cost summary.

K.) Other Direct Costs: Itemize and provide the basis for proposed costs for other anticipated direct costs such as communications, transportation, insurance, and rental of equipment other than computer related items. Unusual or expensive items shall be fully explained and justified.

L.) Profit/ Fee: Profit/ fee is not allowed for the Recipient of or subaward to an assistance instrument, where the principal purpose of the activity to be carried out is to stimulate or support a public purpose (i.e., to provide assistance), rather than acquisition (i.e., to acquire goods and services for the direct benefit of the United States Government). A subaward is an award of financial assistance in the form of money, or property in lieu of money, made under a DoD grant or cooperative agreement by a recipient to an eligible subrecipient. The term includes financial assistance for substantive program performance by the subrecipient of a portion of the program for which the DoD grant or cooperative agreement was made. It does not include the recipient's procurement of goods and services needed to carry out the program.

M.) Subcontracting Plan: Subcontracting plans do not apply to assistance instruments.

CONTRACT FACILITIES CAPITAL COST OF MONEY: If cost of money is proposed, a completed Contract Facilities Capital Cost of Money (FCCM) (DD Form 1861) is required.