



## **Live, Virtual and Constructive (LVC) Training Fidelity**

### **INTRODUCTION:**

This publication constitutes a Broad Agency Announcement (BAA) as contemplated in Federal Acquisition Regulation (FAR) 6.102(d)(2), the Department of Defense Grants and Agreements regulations (DoDGARS) 22.315(a) and 35.016, and DoD's Other Transaction Guide for Prototypes Projects, USD(AT&L), OT Guide, Jan 2001. A formal Request for Proposals (RFP), solicitation, and/or additional information regarding this announcement will not be issued.

The Office of Naval Research (ONR) will not issue paper copies of this announcement. The ONR reserves the right to select for award all some or none of the proposals in response to this announcement. The ONR reserves the right to fund all, some or none of the proposals received under this BAA. ONR provides 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 ONR to treat all proposals as sensitive competitive information and to disclose their contents only for the purposes of evaluation.

### **I. GENERAL INFORMATION**

#### **1. Agency Name -**

Office of Naval Research  
One Liberty Center  
875 N. Randolph Street  
Arlington, VA 22203-1995

**2. Research Opportunity Title -**

Live, Virtual and Constructive (LVC) Training Fidelity

**3. Program Name -**

Capable Manpower Future Naval Capability

**4. Research Opportunity Number -**

11-005

**5. Response Date -**

White Papers: 18 January 2011

Full Proposals: 1 April 2011

**6. Research Opportunity Description -**

The Office of Naval Research (ONR) is interested in receiving proposals for developing technology solutions addressing critical deficiencies in Live –Virtual – Constructive (LVC) training solutions for Naval aviation. As defined by the Department of Defense (DoD Instruction 1322.18) the components of LVC training include:

1) Live Simulations, which represent the natural physical environment in which individuals or teams operate their systems and platforms for rehearsal and training purposes. Typically, these environments are closely similar to the expected operational environments, with modifications to the systems and platforms that support performance assessment and maintain range safety.

2) Virtual Simulations, which are synthetic environments that include the replication of warfighting equipment and operational environmental conditions; allows for the sharing of a common environment which multiple users can access; and supports interactions with simulated entities (including objects, avatars, and equipment) that mirror, in response fidelity, those that would occur in the real world.

3) Constructive Simulations which are simulated forces that respond to trainee actions. Typically, real human inputs are needed to fully operate these simulated forces which then carry out the resultant actions in a synthetic environment. Semi-automated Forces (SAFs) are one example of constructive simulations; Wargaming models are another example.

Current LVC environments do not adequately satisfy training fidelity requirements in terms of: the Virtual Simulations in which training occurs; the behaviors exhibited by the Constructive Simulations; and, the integration of the Virtual and Constructive

components with the Live platforms and displays that trainees use. This call requests proposals that will improve the effectiveness of the training delivered by LVC technologies by delivering safer representations of Virtual and Constructive Simulations within Live platform displays; improving Virtual Simulation realism; and, creating more believable Constructive Simulation behaviors.

## **Introduction**

There are many challenges with maintaining carrier air wing readiness, including: extending the life of aviation assets, reducing total ownership costs, supplementing inadequate ranges, rising weapons systems costs, and limited training personnel (Sheehan, Merket, Sampson, Roberts, & Merritt, 2009<sup>1</sup>). In response to these challenges, the Naval Aviation Enterprise has established a Science and Technology Objective (STO) focusing on blending these different simulation applications into a single, integrated and optimized Live, Virtual and Constructive training capability (Naval Aviation Enterprise Science and Technology Objectives: NWP STO-1). The objective of this capability is to reduce the time required to create combat readiness and operational proficiency while cost-effectively maximizing transfer from the classroom/trainer to the operational environment, using LVC capabilities. Realizing this objective requires addressing and mitigating three critical limitations with LVC component technologies:

1) Live Simulations: Representing Constructive & Virtual simulations on Live aircraft displays requires the aviator to maintain awareness of the real flight environment while simultaneously operating in a simulated one. The additional performance challenges that result could negatively impact an aviator's ability to maintain safety-of-flight. Therefore, technology solutions are needed that will integrate these simulations into, and represent them on, live aircraft displays in a safe manner that does not degrade an aviator's ability to 'aviate-navigate-communicate.'

2) Virtual Simulations: Human cognitive-perceptual processes are tuned to real world information. Consequently, the more accurately these processes are stimulated by the Virtual Simulation the greater the perceived realism, leading to more effective training. Currently, there is insufficient understanding of how virtual simulations should be developed to effectively interact with these processes to ensure effective training. Therefore research efforts are needed that will characterize these interactions, leading to guidelines and techniques to optimize the use of virtual simulations as part of Naval aviation centric LVC training.

3) Constructive Simulations: The quantity of Constructive forces, and the range of behaviors they can display, is limited by the capabilities of the human operators guiding them. New approaches are needed for increasing the autonomy of these Constructive Simulations and for increasing the realism of their interactions with trainees to make training both cost effective and performance enhancing. Specifically, research efforts are needed to develop forces that can use incoming data from the LVC training system to rapidly generate more tactically believable behaviors while reducing the need for human operator input.

## Technical Areas:

This call requests proposals that focus on three technical areas to overcome the limitations discussed above: 1) Virtual and Constructive Representations on Live Avionics Displays – develop symbologies and technologies to safely and effectively distinguish live, virtual, and constructive assets within the aviator’s actual platform; 2) Optimal Fidelity Synthetic Environments – build virtual environments with the necessary levels of cognitive-perceptual fidelity to provide the required realism for effective training; and 3) Tactically Behaving Semi-Automated Forces (TACSAF) – create constructive forces whose behaviors are tactically realistic and require minimal development guidance by human operators.

Proposals to each technical area must include measures of system effectiveness for assessing technology progress, and measures of performance for quantifying the benefit to human performance as measured against an initial baseline capability. Proposals may address a single technical area or more than one technical area. All proposed efforts must be compliant with the Navy Continuous Training Environment (NCTE) Interoperability Working Guide.

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### 1) Virtual-Constructive Representations on Live Avionics Displays

#### *Objective*

Establish design guidelines for the effective and safe representation of virtual and constructive assets on live displays, and develop the actual symbology to be used during experimentation and validation efforts.

#### *Scope*

Naval aviation-based LVC training systems display the virtual and constructive simulations onto trainees’ actual aircraft instruments. One important challenge with this approach is ensuring that using the aircraft’s systems for training does not increase trainee workload, reduce trainee awareness of the live, physical environment and does not introduce additional performance errors or safety-of-flight issues. The focus of this technical area is on determining the design symbology and network requirements that will allow the trainee to safely and effectively distinguish the live instrument/avionics representations from the virtual/constructive entities. Doing so requires developing safety of flight compliant symbology sets that address navigational task issues (e.g., obstacles in real vs. simulated world), accurate distance information, display of critical warnings and cautions, and other issues potentially generated from the lack of common experience in the distributed LVC environment or from the potential information interference that the

virtual and constructive simulations could introduce when superimposed on live instrumentation.

*S & T Issues:*

- Establish guidelines for presenting symbology on aircraft display systems that maintains original information, but that enables aviators to determine which are simulated and which are real
- Develop the software interface between Virtual and Constructive simulations and Live embedded cockpit systems
- Design and develop the Live avionics displays to maintain Safety of Flight
- Demonstrate reduced pilot workload, reduced fatigue and improved performance when training in LVC environment using these symbology sets and interfaces

*Desired Outcomes*

- Safe and effective live instrument/avionics stimulation from Virtual and Constructive entities
- New Safety of Flight compliant symbology sets
- Advances in communications/link for LVC

2) Optimal Fidelity Synthetic Environments

*Objective*

Determine the optimal characteristics of virtual simulations for Naval aviation training that will elicit the appropriate perceptual-cognitive responses necessary for effective training and develop those characteristics within a virtual simulation.

*Scope*

The human perceptual-cognitive system has evolved to detect information from the environment using multiple sensory systems, and to process and integrate this information to form context-appropriate responses. Consequently, the degree of realism in a simulation affects both how information is perceived and how it is acted upon. As a result, inappropriately presented simulated information can ultimately lead to incorrect training and reduced real world performance. While synthetic environments have been used to deliver flight training for over a quarter century, there is a lack of understanding of the scientific principles underlying the optimal fidelity requirements a synthetic environment should satisfy to ensure effective training.

Recurring deficits have been noted in several key representation capabilities including: visual representation (ground contours, lighting effects, atmospheric, damage representation), auditory simulation (radar, electro-optics), and kinesthetic feedback

(physiological cues such as acceleration forces; realistic cause-and-effect from specific actions taken; lag times in simulation responsiveness). Combined, these deficits reduce the plausibility of synthetic environments, creating a cognitive dissonance between the expected consequences of taking a particular action and the actual consequences of taking that action, within the synthetic environment. The net result is reduced training effectiveness. Addressing these fidelity deficits requires an improved understanding of the human factors and neuroergonomic principles underlying how the components of synthetic environments must be represented, in a manner that will ensure the effectiveness of the resultant training. Determining these principles for aviation training applications would not only improve training effectiveness but would also allow for a direct link between fidelity, training and readiness requirements and training effectiveness, leading to improved measures of ownership cost for LVC systems.

*S & T Issues:*

- Identify and understand the current features of synthetic environments and why they are insufficient to maximize training effectiveness
- Establish technologies to both determine cognitive fidelity requirements and to assess benefits of improved cognitive fidelity including but not limited to neurophysiological and behavioral approaches
- Develop fidelity specifications for Navy tactical tasks that map to Training & Readiness matrices
- Develop synthetic environment capabilities that demonstrate the effectiveness of identified fidelity features

*Desired Outcomes*

- Fidelity-realism tradeoffs targeted to training effectiveness, based on Naval aviation Training & Readiness matrices, accounting for at least 10% of Training and Readiness requirements
- Real-time physics-based environments satisfying these tradeoffs, with improved realism quantified using neurophysiological and human performance related metrics
- Open architecture extensibility

3) Tactically Behaving Semi-Automated Forces (TACSAF):

*Objective:*

Develop a software capability for developing simulated forces for Naval aviation training that are capable of generating contextually appropriate, tactically-realistic and adaptive behaviors with reduced human guidance.

### *Scope*

In constructive simulations, the simulated forces are only as adaptive and interactive as the operators who drive them. A more effective approach to creating realistic simulated forces is to develop a capability for these forces to be more autonomous in their abilities to adapt and interact with trainees. While fully autonomous behaviors are not expected, it is anticipated that successful efforts under this technical area will develop behavior representations that can self-organize following some level of initial scripting and authoring in response to events as they unfold in the Live and Virtual components. In addition to providing a more realistic and effective training experience, the resultant simulated forces would also require less input from their human operators, reducing manning and personnel costs.

The primary requirement of this technical area, which applies to both friendly ('blue') and adversarial ('red') forces is to instantiate tactically plausible behaviors in the simulated forces. This includes the ability to respond in realistic time frames. While the specific tactical behavior representation should be based on expert performance data, the manner in which these representations link these data with unfolding events should be generative, allowing for tactically-realistic and contextually relevant performance that requires minimal human operator guidance. Because these simulated forces are responding to trainee actions, they should also include the capability to rapidly assess trainee performance. Since current simulated forces are not built to interact with speech based technologies, and the Naval aviation domain presents unique language processing and production challenges, a secondary requirement is to enable these forces with speech recognition and speech synthesis capabilities that are tailored to Naval aviation's tactical environment. The end product should be instantiated within a Naval aviation training relevant environment, to demonstrate successful achievement of this technical area's objective.

### *S & T Issues*

- Human-in-the loop performance capture technologies
- Human performance modeling tools
- Behavioral representations (blue- and red- forces) that are able to adapt, update and evolve their behaviors in response to trainee actions with reduced human operator support
- Enhanced speech recognition and production capabilities specific to the Naval aviation environment and integrable with the simulated forces
- Simulated forces able to detect and understand context

### *Desired Outcomes*

- Generating novel and context appropriate tactical behaviors comparable to expert human performance ('Turing Test')
  - 20% reduction in human operator intervention with the constructive simulations
  - Less than 500ms time-to-generate constructive simulation behavior
  - 95% accuracy of the constructive simulation behavior compared to expert human performance outcomes
- Understanding and recognition of trainee speech, and generation of accurate simulated force speech
  - Speech generated in under 200 ms
  - 95% accuracy of speech recognition

Work funded under a BAA may include basic research, applied research and some advanced technology development (ATD). With regard to any restrictions on the conduct or outcome of work funded under this BAA, ONR will follow the guidance on and definition of "contracted fundamental research" as provided in the Under Secretary of Defense (Acquisition, Technology and Logistics) Memorandum of 24 May 2010. As defined therein the definition of "contracted fundamental research", in a DoD contractual context, includes [research performed under] grants and contracts that are (a) funded by Research, Development, Test, and Evaluation Budget Activity 1 (Basic Research), whether performed by universities or industry or (b) funded by Budget Activity 2 (Applied Research) and performed on campus at a university. The research shall not be considered fundamental in those rare and exceptional circumstances where the applied research effort presents a high likelihood of disclosing performance characteristics of military systems or manufacturing technologies that are unique and critical to defense, and where agreement on restrictions have been recorded in the contract or grant.

Pursuant to DoD policy, research performed under grants and contracts that are a) funded by Budget Category 6.2 (Applied Research) and NOT performed on-campus at a university or b) funded by Budget Category 6.3 (Advanced Research) does not meet the definition of "contracted fundamental research." In conformance with the USD(AT&L) guidance and National Security Decision Direction 189, ONR will place no restriction on the conduct or reporting of unclassified "contracted fundamental research," except as otherwise required by statute, regulation or Executive Order. For certain research projects, it may be possible that although the research being performed by the prime contractor is restricted research, a subcontractor may be conducting "contracted fundamental research." In those cases, it is the *prime contractor's responsibility* in the proposal to identify and describe the subcontracted unclassified research and include a statement confirming that the work has been scoped, negotiated, and determined to be fundamental research according to the prime contractor and research performer.

Normally, fundamental research is awarded under grants with universities and under contracts with industry. ATD is normally awarded under contracts and may require restrictions during the conduct of the research and DoD pre-publication review of



research results due to subject matter sensitivity. As regards to the present BAA, the Research and Development efforts to be funded will consist of applied research and advanced technology development. The funds available to support awards are Budget Activity 2 (Applied Research) and Budget Activity 3 (Advanced Technology Demonstration).

## **References**

Sheehan, J., Merket, D., Sampson, T., Roberts, J. & Merritt, S. (2009). Human System Capabilities-Based Training System Acquisition in Naval Aviation. In the *Human Systems Integration Symposium 2009 Proceedings*. American Society of Naval Engineers.

## **7. Point(s) of Contact -**

Questions of a technical nature shall be directed to the cognizant Technical Point of Contact, as specified below:

Dr. Amy Bolton  
Office of Naval Research  
One Liberty Center  
ONR Code 342, room 1042  
875 N. Randolph Street  
Arlington, VA 22203-1995  
e-mail: [amy.bolton@navy.mil](mailto:amy.bolton@navy.mil)

Questions of a business nature shall be directed to the cognizant Contract Specialist, as specified below:

Business Point of Contact:

Sean Palmer  
Contracting Officer  
ONR Code BD 254  
Office of Naval Research  
875 North Randolph Street  
Arlington, VA 22203  
Email Address: [sean.m.palmer@navy.mil](mailto:sean.m.palmer@navy.mil)

Questions of a security nature should be submitted to:

Diana Pacheco  
Industrial Security Specialist  
Office of Naval Research  
Security Department, Code 43  
One Liberty Center

875 North Randolph St.  
Arlington, VA 22203-1995  
Email Address: [diana.pacheco@navy.mil](mailto:diana.pacheco@navy.mil)

Note: All UNCLASSIFIED communications shall be submitted via e-mail. All questions of an UNCLASSIFIED nature to the Technical Point of Contract (POC) shall be sent via e-mail with a copy to the designated Business POC.

CLASSIFIED questions shall be handled through the ONR Security POC. Specifically, any entity wanting to ask a CLASSIFIED question shall send an email to the ONR Security POC with a copy to both the Technical POC and the Business POC stating that the entity would like to ask a CLASSIFIED question. DO NOT EMAIL ANY CLASSIFIED QUESTIONS. The Security POC will contact the entity and arrange for the CLASSIFIED question to be asked through a secure method of communication.

Questions submitted within 2 weeks prior to a deadline may not be answered, and the due date for submission of the white paper and/or full proposal will not be extended.

Amendments will be posted to one or more of the following webpages:

- Federal Business Opportunities (FEDBIZOPPS) Webpage – <https://www.fbo.gov/>
- Grants.gov Webpage – <http://www.grants.gov/>
- ONR Broad Agency Announcement (BAA) Webpage – <http://www.onr.navy.mil/en/Contracts-Grants/Funding-Opportunities/Broad-Agency-Announcements.aspx>

## **8. Instrument Type(s) -**

It is anticipated that awards will be in the form of contracts. However, the Government reserves the right to award cooperative agreements, grants, or other transaction agreements to appropriate parties, should the situation warrant use of an instrument other than a contract. It is strongly preferred that one institution act as the lead institution for each technical area and that a single award be issued to the lead institution which would then issue sub-awards to the other non-Federal participants. Should a project include a request for funding to a Federal entity, funds to that entity will be provided separately.

## **9. Catalog of Federal Domestic Assistance (CFDA) Numbers -**

12.300

## **10. Catalog of Federal Domestic Assistance (CFDA) Titles -**

DOD Basic and Applied Scientific Research

## **11. Other Information -**

FAR Part 35 restricts the use of the Broad Agency Announcements (BAAs), such as this, to the acquisition of basic and applied research and that portion of advanced technology development not related to the development of a specific system or hardware procurement. Contracts and grants and other assistance agreements made under BAAs are for scientific study and experimentation directed towards advancing the state of the art and increasing knowledge or understanding.

**THIS ANNOUNCEMENT IS NOT FOR THE ACQUISITION OF TECHNICAL, ENGINEERING AND OTHER TYPES OF SUPPORT SERVICES.**

In the case of funded proposals for the production and testing of prototypes, ONR may during the contract period add a contract line item or contract option for the provision of advanced component development or for the delivery of additional prototype units. However, such a contract addition shall be subject to the limitation contained in Section 819 of the National Defense Authorization Act for Fiscal Year 2010.

## **II. AWARD INFORMATION**

- Anticipated Number of Awards

Three (3) to five (5)

- Anticipated Range of Individual Award Amounts per Annum

Technical Area 1: \$500K-\$750K

Technical Area 2: \$600K-\$900K

Technical Area 3: \$700K-\$1M

- Anticipated Period of Performance

Three (3) years with two 1 year options

## **III. ELIGIBILITY INFORMATION**

All responsible sources from academia and industry may submit proposals under this BAA. Historically Black Colleges and Universities (HBCUs) and Minority Institutions (MIs) are encouraged to submit proposals and join others in submitting proposals. However, no portion of this BAA will be set aside for HBCU and MI participation.

Federally Funded research & Development Centers (FFRDCs), including Department of Energy National Laboratories, are not eligible to receive awards under this BAA. However, teaming arrangements between FFRDCs and eligible principal bidders are allowed so long as they are permitted under the sponsoring agreement between the Government and the specific FFRDC.

Navy laboratories and warfare centers as well as other Department of Defense and civilian agency laboratories are also not eligible to receive awards under this BAA and should not directly submit either white papers or full proposals in response to this BAA. If any such organization is interested in one or more of the programs described herein, the organization should contact an appropriate ONR POC to discuss its area of interest. The various scientific divisions of ONR are identified at <http://www.onr.navy.mil/>. As with FFRDCs, these types of federal organizations may team with other responsible sources from academia and industry that are submitting proposals under this BAA.

Teams are also encouraged and may submit proposals in any and all areas. However, Offerors must be willing to cooperate and exchange software, data and other information in an integrated program with other contractors, as well as with system integrators, selected by ONR.

Some topics cover export controlled technologies. Research in these areas is limited to “U.S. persons” as defined in the International Traffic in Arms Regulation (ITAR) – 22 CFR § 1201.1 et seq. (See Section VII, Other Information)

#### **IV. APPLICATION AND SUBMISSION INFORMATION**

##### **1. Application and Submission Process -**

White Papers are required prior to submitting a Full Proposal. Unclassified white papers shall be submitted by e-mail to the Technical Point of Contact in Paragraph 7 above (see Section I, GENERAL INFORMATION). The Navy’s initial evaluation of the White Papers should give Offerors some indication of whether a Full Proposal would likely result in an award. Initial Navy evaluations of the White Papers will be issued via email notification. Detailed technical and cost proposals will be subsequently encouraged from those Offerors whose proposed technologies have been identified through the above-referenced email as being of “particular value” to the Navy. However, any such encouragement does not assure a subsequent award. Any Offeror may submit a Full Proposal even if its White Paper was not identified as being of “particular value.”

##### **2. Content and Format of White Papers/Full Proposals -**

White Papers and Full Proposals submitted under the BAA are expected to be unclassified. However, confidential/classified proposals are permitted. Contracts or other instruments resulting from a classified proposal will be unclassified.

For unclassified white papers and proposals, please refer to section 3. “Address for the Submission of White Papers and Full Proposals”.

For Statement of Work, please refer to sub-section b. FULL PROPOSALS, Volume 1: Technical Proposal, Statement of Work.

Classified Proposal Instructions:

Classified proposals shall be submitted directly to the attention of ONR's Document Control Unit at the following address and marked in the following manner:

OUTSIDE ENVELOPE (no classification marking):

“Office of Naval Research  
Attn: Document Control Unit  
ONR Code 43  
875 N. Randolph St.  
Arlington, VA 22203-1995”

The inner wrapper of the classified White Paper and/or Full Proposal should be addressed to the attention of the TPOC, Dr. Amy Bolton, ONR Code 342 and marked in the following manner:

“Program: Capable Manpower Future Naval Capability  
Office of Naval Research  
Attn: Dr. Amy Bolton  
ONR Code 342  
875 N. Randolph St.  
Arlington, VA 22203-1995”

An ‘unclassified’ Statement of Work (SOW) must accompany any classified proposal.

Proposal submissions will be protected from unauthorized disclosure in accordance with FAR Subpart 15.207, applicable law, and DoD/DoN regulations. Offerors are expected to appropriately mark each page of their submission that contains proprietary information.

IMPORTANT NOTE: Titles given to the White Papers/Full Proposals should be descriptive of the work they cover and not be merely a copy of the title of this solicitation.

**a. WHITE PAPERS**

**White Paper Format**

- Paper Size – 8.5 x 11 inch paper
- Margins – 1 inch
- Spacing – single or double-spaced
- Font – Times New Roman, 12 point
- Number of Pages – No more than 9 single-sided pages (excluding cover page and resumes). White Papers exceeding the page limit may not be evaluated.
- Copies – Electronic (email) submissions should be sent to the attention of the TPOC at: ([amy.bolton@navy.mil](mailto:amy.bolton@navy.mil)). The subject line of the email shall read

“ONR BAA 11-005 White Paper Submission.” The white paper must be a Microsoft Word or .PDF format attachment to the email.

**NOTE: 1) Do not send hardcopies of White Papers (including facsimiles) as only electronic submissions will be accepted and reviewed; 2) Do not send .ZIP files; 3) Do not send password protected files.**

### **White Paper Content**

- Cover Page – The Cover Page shall be labeled “PROPOSAL WHITE PAPER”, and shall include the BAA number, proposed title, Offeror’s administrative and technical points of contact, with telephone numbers, facsimile numbers, and Internet addresses, and shall be signed by an authorized officer.
- Technical and Operational Concept – One page summary of the technical ideas for the proposed research, the project objectives, the concept of operation for the new capabilities to be delivered, and the expected operational performance improvements.
- Deliverables – One page summary of the deliverables associated with the proposed research.
- Schedule and Milestones – One page summary of the schedule and milestones for the proposed research, including rough estimates of cost for each year of the effort and total cost.
- Key Personnel – One page listing of key personnel along with the approximate percentage of time to be expended by each person during each contract year.
- Qualifications – Two page concise summary of the qualifications of key personnel.
- Three page technical rationale and approach which contains arguments to substantiate claims made in the summary of technical ideas and is consistent with the summary of deliverables and the summary of the schedule and milestones for the proposed research. A plan for demonstrating and evaluating the operational effectiveness of the Offeror’s proposed products or processes in field experiments and/or tests in a simulated environment should be included.

### **b. FULL PROPOSALS**

**INSTRUCTIONS FOR CONTRACT, COOPERATIVE AGREEMENTS AND OTHER TRANSACTION AGREEMENTS** (Does not include Grants)

**NOTE:** *Submission instructions for BAAs issued after FY2010 have changed significantly from previous requirements. Potential Offerors are advised to carefully read and follow the instructions below. The new format and requirements have been developed to streamline and ease both the submission and review of proposals. Both the Template and the Spreadsheet have instructions imbedded into them that will assist in completing the documents. Also, both the Template and the Spreadsheet require completion of cost-related information – both documents must be fully completed to constitute a valid proposal.*

*All proposals must use ONR's Technical and Cost Proposal Template and Cost Proposal Spreadsheet. The Template can be found by following this link:*

*<http://www.onr.navy.mil/Contracts-Grants/submit-proposal/contracts-proposal/~media/Files/Contracts%20and%20Grants%20-%20Code%2002/Technical-Cost-Proposal-Template-2010final.ashx>. Please note that all the attachments listed in Section III.8 of the Template can be incorporated into the Template file for submission.*

The Cost Proposal Spreadsheet can be found by following this link:

<http://www.onr.navy.mil/Contracts-Grants/submit-proposal/contracts-proposal/cost-proposal.aspx>. Click on the “proposal spreadsheet” link and save a copy of the spreadsheet. Instructions for completion have been embedded into the spreadsheet. Any proposed options that are identified in the Technical and Cost Proposal Template, but are not fully priced out in the Cost Proposal Spreadsheet, will not be included in any resulting contract or other transaction. If proposing options, they **must** be separately priced and separate spreadsheets should be provided for the base period and each option period.

For proposed subcontracts or interorganizational transfers over \$150,000, Offerors must provide a separate fully completed Cost Proposal Spreadsheet in support of the proposed costs. This spreadsheet, along with supporting documentation, must be provided either in a sealed envelope with the prime's proposal or via email directly to both the Program Officer and the Business Point of Contact at the same time the prime proposal is submitted. The email should identify the proposal title, the prime Offeror and that the attached proposal is a subcontract, and should include a description of the effort to be performed by the subcontractor. Offerors should also familiarize themselves with the new subcontract reporting requirements set forth in Federal Acquisition Regulation (FAR) clause 52.204-10, Reporting Executive Compensation and First-Tier Subcontract Awards. From October 1, 2010 through February 28, 2011, any newly awarded subcontract must be reported if the prime contract award amount is \$550,000 or more. Starting March 1, 2011, any newly awarded subcontract must be reported if the prime contract award amount was \$25,000 or more. The pertinent requirements can be found in Section VII, Other Information, of this document.

Offerors should submit (1) original, 2 hard copies, and one electronic copy on a DVD (in Microsoft® Word or Excel 2007 compatible format).

### 3. Significant Dates and Times -

<b>Anticipated Schedule of Events *</b>		
<b>Event</b>	<b>Date (MM/DD/YEAR)</b>	<b>Time (Local Eastern Time)</b>
White Papers Due Date	<b>1/18/2011</b>	2:00 pm
Notification of Initial Navy Evaluations of White Papers*	<b>2/28/2011</b>	n/a
Full Proposals Due Date	<b>4/1/2011</b>	2:00 pm
Notification of Selection for Award *	<b>5/16/2011</b>	n/a
Contract Awards*	<b>10/17/2011</b>	n/a
Kickoff Meeting*	<b>10/31/2011</b>	n/a

**\*These dates are estimates as of the date of this announcement.**

**NOTE:** Due to changes in security procedures since September 11, 2001, the time required for hard-copy written materials to be received at the Office of Naval Research has increased. Materials submitted through the U.S. Postal Service, for example, may take seven days or more to be received, even when sent by Express Mail. Thus any hard-copy proposal should be submitted long enough before the deadline established in the solicitation so that it will not be received late and thus be ineligible for award consideration.

### 4. Submission of Late Proposals (Applicable to White Papers and Full Proposals)

Any proposal, modification, or revision, that is received at the designated Government office after the exact time specified for receipt of proposals is “late” and will not be considered unless it is received before award is made, the contracting officer determines that accepting the late proposal would not unduly delay the acquisition and

- (a) If it was transmitted through an electronic commerce method authorized by the announcement, it was received at the initial point of entry to the Government infrastructure not later than 5:00 p.m. one working day prior to the date specified for receipt of proposals; or
- (b) There is acceptable evidence to establish that it was received at the Government installation designated for receipt of proposals and was under the Government’s control prior to the time set for receipt of proposals; or
- (c) It was the only proposal received.

However, a late modification of an otherwise timely and successful proposal, that makes its terms more favorable to the Government will be considered at any time it is received and may be accepted.



Acceptable evidence to establish the time or receipt at the Government installation includes the time/date stamp of that installation on the proposal wrapper, other documentary evidence of receipt maintained by the installation, or oral testimony or statements of Government personnel.

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

The contracting officer must promptly notify any offeror if its proposal, modifications, or revision was received late and must inform the offeror whether its proposal will be considered.

## **5. Address for the Submission of Full Proposals –**

For unclassified Full Proposal submissions, use the following address:

Office of Naval Research  
Attn: Dr. Amy Bolton,  
ONR Department Code 342  
875 North Randolph St.  
Arlington, VA 22203-1995

**NOTE: FULL PROPOSALS SENT BY FAX OR E-MAIL WILL NOT BE CONSIDERED.**

## **V. EVALUATION INFORMATION**

### **1. Evaluation Criteria –**

Award decisions will be based on a competitive selection of proposals resulting from a scientific and cost review. Evaluations will be conducted using the following evaluation criteria:

- 1) Overall scientific and technical merits of the proposal;
- 2) Potential Naval relevance and contributions of the effort to the agency's specific mission;
- 3) The offeror's capabilities, related experience, past performance, facilities, techniques or unique combinations of these which are integral factors for achieving the proposal objectives;
- 4) The qualifications, capabilities and experience of the proposed Principal Investigator (PI), team leader and key personnel who are critical in achieving the proposed objectives; and

5) The realism of the proposed costs and availability of funds.

Overall, the technical factors (1-4 above) are significantly more important than the cost factor (5), with the technical factors all being of equal value.

The degree of importance of cost will increase with the degree of equality of the proposals in relation to the other factors on which selection is to be based, or when the cost is so significantly high as to diminish the value of the proposal's technical superiority to the Government.

Commitment to Small Business:

The Office of Naval Research is strongly committed to providing meaningful subcontracting opportunities for small businesses, small disadvantaged businesses, women-owned small businesses, historically underutilized business zone (HUBZone) small businesses, veteran-owned small businesses, service disabled veteran-owned small businesses, historically black colleges and universities, and minority institutions, and other concerns subject to socioeconomic considerations through its awards.

For proposed awards to be made as contracts that exceed \$650K to other than small businesses, the offeror is required to submit a Small Business Subcontracting Plan in accordance with FAR 52.219-9. As such, Subcontracting Plans will be evaluated to ensure that submissions are compliant with FAR Subpart 19.7.

For proposed awards made as contracts to small businesses at any value or to other than small businesses that are less than \$650K, the statement of commitment to small business will be evaluated to ensure that it supports this policy.

Options:

The Government will evaluate options for award purposes by adding the total cost for all options to the total cost for the basic requirement. Evaluation of options will not obligate the Government to exercise the options during contract performance.

**2. Evaluation Panel -**

Technical and cost proposals submitted under this BAA will be protected from unauthorized disclosure in accordance with FAR 3.104-4 and 15.207. The cognizant Program Officer and other Government scientific experts will perform the evaluation of technical proposals. Restrictive notices notwithstanding, one or more support contractors may be utilized as subject-matter-expert technical consultants. Similarly, support contractors may be utilized to evaluate cost proposals. However, proposal selection and award decisions are solely the responsibility of Government personnel. Each support contractor's employee having access to technical and cost proposals submitted in response to this BAA will be required to sign a non-disclosure statement prior to receipt of any proposal submissions

## **VI. AWARD ADMINISTRATION INFORMATION**

### **1. Administrative Requirements –**

- The North American Industry Classification System (NAICS) code – The NAICS code for this announcement is 541712 with a small business size standard of 500 employees.
- Central Contractor Registration: All Offerors submitting proposals or applications must:
  - (a) be registered in the Central Contractor Registration (CCR) prior to submission;
  - (b) maintain an active CCR registration with current information at all times during which it has an active Federal award or an application under consideration by any agency; and
  - (c) provide its DUNS number in each application or proposal it submits to the agency.

Subcontracting Plans: Successful contract proposals that exceed \$650,000 shall submit a subcontracting plan; small business concerns are exempt from the requirement. Subcontracting Plans will be required prior to award in accordance with FAR 52.219-9.

**NOTE:** Central Contractor Registry (CCR), Subcontracting Plan requirements and Certification requirements are all set forth in the ONR Technical and Cost Proposal Template.

## **VII. OTHER INFORMATION**

### **1. Government Property/Government Furnished Equipment (GFE) and Facilities**

Government research facilities and operational military units are available and should be considered as potential government-furnished equipment/facilities. These facilities and resources are of high value and some are in constant demand by multiple programs. It is unlikely that all facilities would be used for any one specific program. The use of these facilities and resources will be negotiated as the program unfolds. Offerors submitting proposals for contracts, cooperative agreements and Other Transaction Agreements should indicate in the Technical and Cost Proposal Template, Section II, Blocks 8 and 9, which of these facilities are critical for the project's success. Offerors submitting proposals for grants should address the need for government-furnished facilities in their technical proposal.

### **2. Security Classification**

In order to facilitate intra-program collaboration and technology transfer, the Government will attempt to enable technology developers to work at the unclassified level to the maximum extent possible. If access to classified material will be required at any point

during performance, the Offeror must clearly identify such need by completing Section II, Block 11, DD 254 – Security Classification Specification.

Normally, work done under a grant does not require access to classified material.

### **3. Use of Animals and Human Subjects in Research**

If animals are to be utilized in the research effort proposed, the Offeror must complete a DoD Animal Use Protocol with supporting documentation (copies of AAALAC accreditation and/or NIH assurance, IACUC approval, research literature database searches, and the two most recent USDA inspection reports) prior to award. For assistance with submission of animal research related documents, contact the ONR Animal Use Administrator at (703) 696-4046.

Similarly, for any proposal for research involving human subjects, the Offeror must submit or indicate an intention to submit prior to award: documentation of approval from an Institutional Review Board (IRB); IRB-approved research protocol; IRB-approved informed consent form; proof of completed human research training (e.g., training certificate or institutional verification of training); an application for a DoD-Navy Addendum to the Offeror's DHHS-issued Federal wide Assurance (FWA) or the Offeror's DoD-Navy Addendum. In the event that an exemption criterion under 32 CFR.219.101 (b) is claimed, provide documentation of the determination by the Institutional Review Board (IRB) Chair, IRB vice Chair, designated IRB administrator or official of the human research protection program including the category of exemption and short rationale statement. This documentation must be submitted to the ONR Human Research Protection Official (HRPO), by way of the ONR Program Officer. Information about assurance applications and forms can be obtained by contacting ONR\_343\_contact@navy.mil. If the research is determined by the IRB to be greater than minimal risk, the Offeror also must provide the name and contact information for the independent medical monitor. For assistance with submission of human subject research related documentation, contact the ONR Human Research Protection Official at (703) 696-4046.

For contracts and orders, the award and execution of the contract, order, or modification to an existing contract or order serves as notification from the Contracting Officer to the Contractor that the HRPO has approved the assurance as appropriate for the research under the Statement of Work and also that the HRPO has reviewed the protocol and accepted the IRB approval or exemption determination for compliance with the DoD Component policies. See, DFARS 252.235-7004.

### **4. RESERVED**

### **5. Department of Defense High Performance Computing Program**

The DoD High Performance Computing Program (HPCMP) furnishes the DoD S & T and DT & E communities with use-access to very powerful high performance computing systems. Awardees of ONR contracts, grants, and assistance instruments may be eligible

to use HPCMP assets in support of their funded activities if ONR Program Officer approval is obtained and if security/screening requirements are favorably completed. Additional information and an application may be found at <http://www.hpcmo.hpc.mil/>.

## **6. Organizational Conflicts of Interest**

All Offerors and proposed subcontractors must affirm whether they are providing scientific, engineering, and technical assistance (SETA) or similar support to any ONR technical office(s) through an active contract or subcontract. All affirmations must state which office(s) the offeror supports and identify the prime contract numbers. Affirmations shall be furnished at the time of proposal submission. All facts relevant to the existence or potential existence of organizational conflicts of interest (FAR 9.5) must be disclosed. The disclosure shall include a description of the action the offeror has taken or proposes to take to avoid, neutralize, or mitigate such conflict. In accordance with FAR 9.503 and without prior approval, a contractor cannot simultaneously be a SETA and a research and development performer. Proposals that fail to fully disclose potential conflicts of interests or do not have acceptable plans to mitigate identified conflicts will be rejected without technical evaluation and withdrawn from further consideration for award. If a prospective offeror believes that any conflict of interest exists or may exist (whether organizational or otherwise), the offeror should promptly raise the issue with ONR by sending his/her contact information and a summary of the potential conflict by e-mail to the Business Point of Contact in Section I, item 7 above, before time and effort are expended in preparing a proposal and mitigation plan. If, in the sole opinion of the Government after full consideration of the circumstances, any conflict situation cannot be effectively avoided or mitigated, the proposal may be rejected without technical evaluation and withdrawn from further consideration for award under this BAA.

## **7. Project Meetings and Reviews**

Individual program reviews between the ONR sponsor and the performer may be held as necessary. Program status reviews may also be held to provide a forum for reviews of the latest results from experiments and any other incremental progress towards the major demonstrations. These meetings will be held at various sites throughout the country. For costing purposes, offerors should assume that 40% of these meetings will be at or near ONR, Arlington, VA and 60% at other contractor or government facilities. Interim meetings are likely, but these will be accomplished via video telephone conferences, telephone conferences, or via web-based collaboration tools.

## **8. Executive Compensation and First-Tier Subcontract Reporting**

Section 2(d) of the Federal Funding Accountability and Transparency Act of 2006 (Pub. L. No. 109-282), as amended by section 6202 of the Government Funding Transparency Act of 2008 (Pub. L. 110-252), requires the Contractor to report information on subcontract awards. The law requires all reported information be made public, therefore, the Contractor is responsible for notifying its subcontractors that the required information will be made public.

Unless otherwise directed by the Contracting Officer, by the end of the month following the month of award of a first-tier subcontract with a value of \$25,000 or more, (and any modifications to these subcontracts that change previously reported data), the Contractor shall report the following information at <http://www.fsrs.gov> for each first-tier subcontract:

- (a) Unique identifier (DUNS Number) for the subcontractor receiving the award and for the subcontractor's parent company, if the subcontractor has one.
- (b) Name of the subcontractor.
- (c) Amount of the subcontract award.
- (d) Date of the subcontract award.
- (e) A description of the products or services (including construction) being provided under the subcontract, including the overall purpose and expected outcomes or results of the subcontract.
- (f) Subcontract number (the subcontract number assigned by the Contractor).
- (g) Subcontractor's physical address including street address, city, state, and country. Also include the nine-digit zip code and congressional district.
- (h) Subcontractor's primary performance location including street address, city, state, and country. Also include the nine-digit zip code and congressional district.
- (i) The prime contract number, and order number if applicable.
- (j) Awarding agency name and code.
- (k) Funding agency name and code.
- (l) Government contracting office code.
- (m) Treasury account symbol (TAS) as reported in FPDS.
- (n) The applicable North American Industry Classification System (NAICS) code.

By the end of the month following the month of a contract award, and annually thereafter, the Contractor shall report the names and total compensation of each of the five most highly compensated executives for the Contractor's preceding completed fiscal year at <http://www.ccr.gov>, if –

- (a) In the Contractor's preceding fiscal year, the Contractor received –

(i) 80 percent or more of its annual gross revenues from Federal contracts (and subcontracts), loans, grants (and subgrants) and cooperative agreements; and

(ii) \$25,000,000 or more in annual gross revenues from Federal contracts (and subcontracts), loans, grants (and subgrants) and cooperative agreements; and

(b) The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at <http://www.sec.gov/answers/execomp.htm>.)

Unless otherwise directed by the Contracting Officer, by the end of the month following the month of a first-tier subcontract with a value of \$25,000 or more, and annually thereafter, the Contractor shall report the names and total compensation of each of the five most highly compensated executives for each first-tier subcontractor for the subcontractor's preceding completed fiscal year at <http://www.fsrs.gov>, if –

(a) In the subcontractor's preceding fiscal year, the subcontractor received –

(i) 80 percent or more of its annual gross revenues from Federal contracts (and subcontracts), loans, grants (and subgrants) and cooperative agreements; and

(ii) \$25,000,000 or more in annual gross revenues from Federal contracts (and subcontracts), loans, grants (and subgrants) and cooperative agreements; and

(b) The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at <http://www.sec.gov/answers/execomp.htm>.)

If the Contractor in the previous tax year had gross income, from all sources, under \$300,000, the Contractor is exempt from the requirement to report subcontractor awards. Likewise, if a subcontractor in the previous tax year had gross income from all sources under \$300,000, the Contractor does not need to report awards to that subcontractor.