



ONR BROAD AGENCY ANNOUNCEMENT (BAA) for Electrically Actuated Submarine Control Surfaces

INTRODUCTION:

This publication constitutes a Broad Agency Announcement (BAA) as contemplated in Federal Acquisition Regulation (FAR) 6.102(d)(2). A formal Request for Proposals (RFP), other solicitation, 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 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.

Work funded under this 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 26 June 2008. 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. ATD is funded through Budget Activity 3. In conformance with the USD(AT&L) guidance and National Security Decision Directive 189, ONR will place no restriction on the conduct or reporting of unclassified fundamental research, except as otherwise required by statute, regulation or Executive Order. 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. Potential offerors should consult with the appropriate ONR Program

Officer to determine whether the proposed effort would constitute basic research, applied research or ATD.

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 –

Electrically Actuated Submarine Control Surfaces

3. Program Name –

ONR Enterprise Platform Enablers (EPE) Future Naval Capabilities (FNC) Program:
EPE-FY09-07 - Affordable Submarine Propulsion and Control Actuation

4. Research Opportunity Number -

ONR BAA 09-011

5. Response Date -

White Papers Due: 18 December 2008 by 2:00 pm (Eastern Time)
Full Proposals Due: 11 March 2009 by 2:00 pm (Eastern Time)

6. Research Opportunity Description -

6.1. Background

Acquisition and life cycle cost reduction is a Navy priority for future submarine platforms. Accordingly, ONR has established the Electric Actuation program under the EPE FNC to support low cost technology insertions to satisfy this need for submarine control surfaces. Current controls are hydraulic/mechanical, requiring piping and ancillary systems that contribute significantly to construction and maintenance costs.

This BAA seeks proposals for development of electrically actuated systems for future submarine platforms. Potential benefits include construction and in-service cost reduction through elimination of shipboard hydraulic systems and ancillary equipment. Systems will also support future condition based maintenance with integrated sensors and prognostics. Significant challenges include the achievement of a high torque/force density while maintaining stringent signature requirements, reliability, and shock tolerance. Additional challenges may result if portions of the system are external of the pressure hull.

The complete Actuator System is defined as all components required to convert distribution power into positioning of control surfaces for maneuvering of submarines. This includes the following:

- Power Conversion and Distribution: Includes ship system power interface, power conversion, and power distribution components.
- Energy Storage: For continued operation of the planes upon loss of the normal source of power. Sufficient energy storage to operate the control surfaces through a number of full cycles and return to a known safe position upon loss of the normal power supply.
- Control System: Includes power controllers, sensors, and quiet motor control systems.
- Prime Mover: Quiet motor topologies.
- Motion Conversion: Mechanical transmission components.

The diagram below illustrates the interaction between these components and the interface with the submarine controls system.

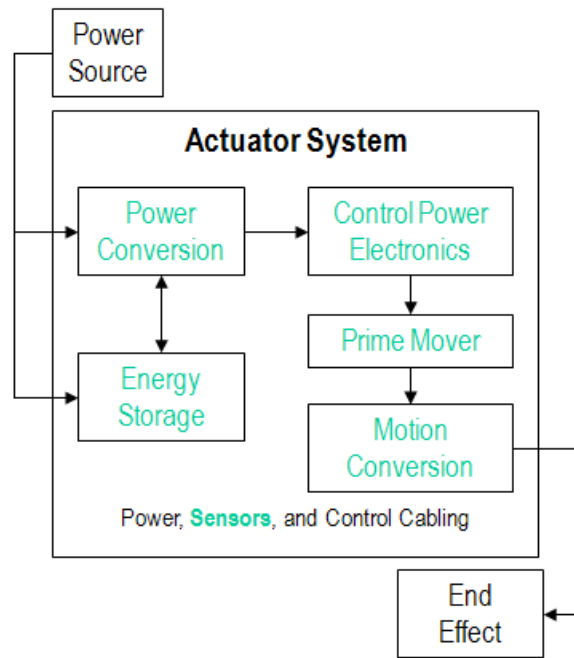


Figure 1 – System Components and Platform Interface

Legacy Actuator System

The present actuation system on submarines is costly both to construct and maintain. In addition to the high lifecycle costs associated with the hydraulic system, the method of transmitting force/torque to the control surfaces is costly due to the alignment-critical

nature of the linkages, bearings, guide tubes, pushrods, pressure-hull penetrations and hydraulic rams. Arrangement constraints make it difficult to have multiple actuator configurations that might otherwise be desired.

Figure 2 shows a typical arrangement of stern control surfaces for a submarine. Control surfaces are either all movable (i.e. no fixed surface), such as the bow planes, upper, and lower rudders, or flapped as in the case of the stern dive planes. The movable portions of the control surfaces are fixed to stocks that are rotated by virtue of a tiller arm connected to a mechanical push rod assembly. The push rod assembly is connected to and actuated by a hydraulic ram inside the pressure hull of the ship. In the case of the stern dive planes, the port and starboard inner portions rotate on a common stock while the port and starboard outer portions rotate on a separate but concentric stock. The purpose of splitting the dive planes is to achieve redundancy under loss of control of one set of planes. Using a common stock for control surfaces on opposite sides of the hull is done to reduce the number of actuators and simplify the arrangement.

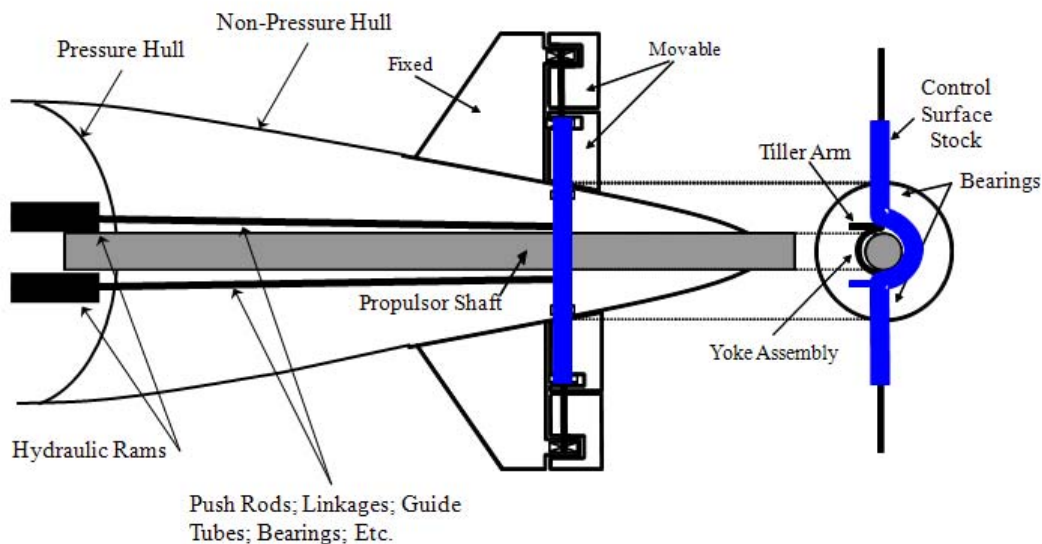


Figure 2 – Submarine Control Surface Arrangement

Key arrangement related issues include space, weight, and alignment difficulties associated with the multiple push-rod assemblies in the equipment-dense floodable portion of stern of the submarine. Figure 3 shows a comparison of control surfaces that are yoked on a common stock and independently actuated control surfaces (without common stocks). An independently actuated arrangement may be preferred if allowed for by the arrangement constraints and determined to be cost effective. Figure 4 shows a segmented flapped control surface that might have desired redundancy features but would be precluded from an actuation perspective using traditional methods.

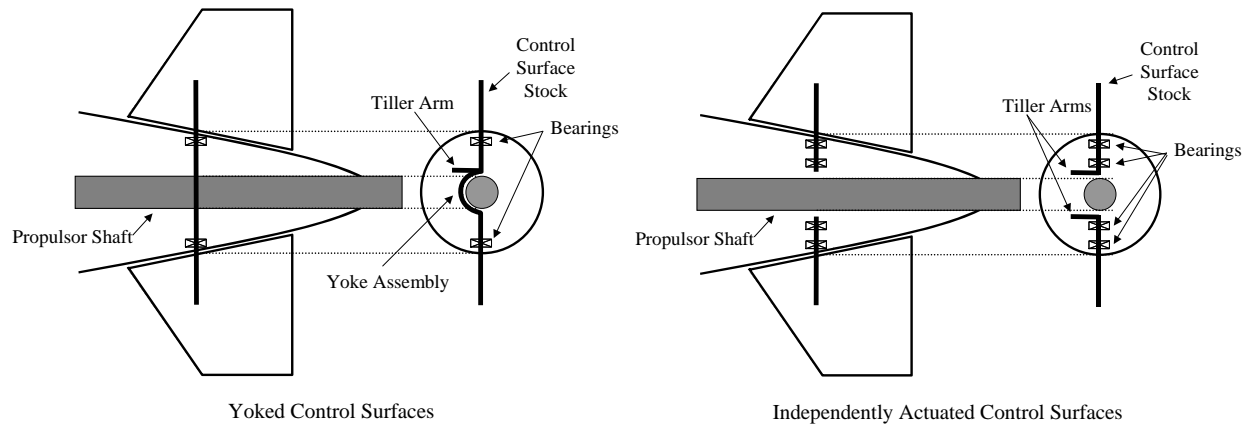


Figure 3 – Common Stock vs Independent Actuation

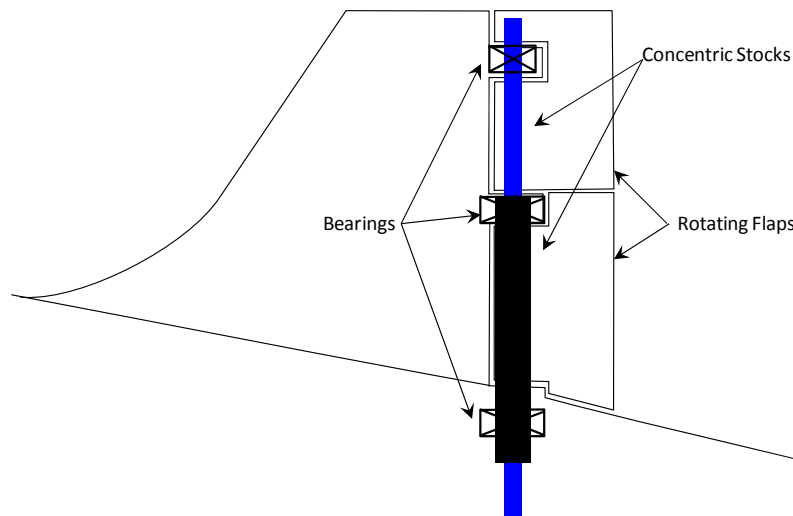


Figure 4 – Control Surface Redundancy

External vs. Internal

Offerors are encouraged to consider alternatives and tradeoffs associated with locating electric actuation system components either internal or external to the submarine’s pressure hull. It is apparent from Figure 2 that locating the prime mover and motion conversion portions of the actuation system to a location external to the pressure hull and in close proximity to the control surfaces may have distinct advantages. Reasons include removal of the alignment-critical elements of the pushrod system as well as possible

modular or integral construction of the control surfaces with actuation components for ease of construction and repair/replacement. However, locating actuation system components external to the pressure hull involves at least the following considerations:

- Components would be exposed to a marine environment including deep submergence depths, wave slap hydrodynamic and shockloading.
- The location precludes maintenance or repair except during highly infrequent periods (see Section 6.3).
- Meeting the stringent low-noise objectives would be more difficult due to direct contact of the components with water and limited room for sound isolation and mounting technologies.
- External space (to the pressure hull) must now accommodate size of the actuation components and other critical systems components (not shown in Figure 3).
- Placement of heavy components near the control surfaces may cause naval architectural difficulties in balancing the ship's weight and buoyancy (excessive weight aft).
- Electrical power delivery, cabling requires sufficient protection against environment, additional through hull penetrations may be required.

6.2. Program Plan

This effort shall deliver a complete electric actuation system through development of individual components and systems integration. The program shall span a 4 to 5 year period and is scheduled for completion by the end of FY13. Components will be matured through design, analysis, and model scale breadboard testing. The final system will be tested at full scale in a relevant environment to demonstrate a Technology Readiness Level (TRL) 6.

The program will consist of three phases. The first phase will have up to four performers. The purpose of the first phase is development of a preliminary design of a full scale electric actuator system for control surfaces of a notional submarine platform. The second phase will have up to three performers who will develop a detailed design and perform a model scale breadboard system demonstration of the electric actuator. The third phase will consist of only one performer who will fabricate a full scale prototype electric actuator system.

The technical content of each phase is described below.

Phase I – Preliminary System Design and System Integration Plan:

During Phase I, the Contractor shall perform preliminary design of a full scale electric actuator system for control surfaces of a notional submarine platform. ONR is seeking innovative solutions and therefore encourages performers to consider technologies as low as TRL 3. Design and performance requirements are specified in section 6.3. The period of performance for Phase I is approximately 12 months and may consist of multiple awards.

The Contractor under Phase I should also address integration of sensors to accommodate future condition based maintenance requirements, discussing the type of information necessary to perform predictive analysis.

In addition to achievement of the design and performance requirements, the Government will assess the merits of each design as an integrated submarine system given the following considerations:

- suitability for the marine environment
- system modularity
- required maintenance concept and cost
- life cycle operation and cost
- system safety
- system reliability
- estimated system acquisition cost
- interface requirements and necessary hull penetrations
- scalability of the concept with respect to variations in required torque/force
- shock and noise

The Government recommends teaming with a submarine platform integrator to ensure proper consideration of these full scale integration issues.

Deliverables for Phase I:

- Preliminary Design Report detailing system/component concept, design, drawings, and integration plan.
- Computational Models of system components suitable for integration into Government simulations and analysis. Compatible with ONR Virtual Test Bed (VTB). (Matlab/Simulink)
- Safety Program Plan in accordance with MIL-STD-882
- Monthly technical and financial status reports.
- Quarterly progress review presentation material and meeting records.
- Full Technical and Cost Proposals to Phase II and Phase III: SOW, schedule, and expenditure plan. Detailed (Classified) specifications for the system to be designed in Phase II will be provided by the 3rd quarterly review approximately 4 months prior to the proposal delivery due date.

Phase II – Detailed Design and Breadboard Testing

Based on the preliminary designs from Phase I the Government is expected to downselect among existing performers prior to execution of Phase II. The period of performance for Phase II is envisioned to span approximately 12 months. The Contractor shall develop a detailed design and perform a model scale breadboard system demonstration of the electric actuator. Detailed design shall produce drawings necessary for fabrication of a full scale system prototype and address manufacturing issues related to construction and integration of the full scale system on a submarine platform. The

Contractor shall also provide an estimate of the full scale system acquisition and life cycle costs. Remaining technical risks associated with meeting the design requirements shall be identified along with a proposed mitigation plan.

Several small scale demonstrations including component demonstrations may be necessary to validate performance of the proposed system. All of which will be the full responsibility of the individual Contractor. Exact scale and number of demonstrations are left to the Offeror's discretion with respect to performance validation.

Deliverables for Phase II include:

- Detailed Design Report - detailing final system design, prototype fabrication process, detailed fabrication drawings, and full scale manufacturing plan. Address submarine integration considerations outlined above and include risk mitigation plans where appropriate.
- Breadboard System Demonstration and Documentation - validating satisfaction of the design and performance requirements.
- Monthly Technical and Financial status reports.
- Quarterly progress review presentation material and meeting records.
- Full Technical and Cost Proposal for Phase III: Inclusive of SOW, schedule, and expenditure plan.

Phase III – Full Scale Prototype Fabrication and Land Based System Demonstration

Phase III is envisioned to span approximately 24 months. The selected performer shall procure long lead materials, fabricate a full scale prototype electric actuator system, and deliver it for testing at a Navy facility. It is anticipated that only one performer will be awarded this Phase. Final demonstration will be a Government lead effort with Contractor participation during installation and testing. Facility and test plan details will be provided.

The Government anticipates that the following minimum tests are needed to demonstrate that the system and/or components are in compliance with the Key Performance Parameters (defined in Section 6.3). Modifications to the test plan may occur depending on the topology of the particular system components. Additional testing may be required for highly innovative or high risk areas for which there is little or no performance knowledgebase.

- Operational and Performance Testing: This would include all operational modes (normal, emergency, reduced power, stored power, etc.) of the unit under all expected operating conditions, up to and including full load. This includes speed, duty cycle compliance, environmental operating temperature, saliferous environment, submergence pressure, etc.
- Power Factor and Consumption
- Weight and Volume
- Submarine High Impact Shock (including direct and mechanical shock)

- Vibration
- Structureborne Noise Testing
- Electromagnetic Interference (EMI)
- Electric and Magnetic Signatures Testing
- Accelerated Endurance Testing
- Overload Testing

Deliverables for Phase III:

- A complete electric actuator prototype system, including power converter, energy storage, controller, prime mover, and motion conversion components. (Delivery date: 15 months after placement of Delivery Order)
- Monthly Technical and Financial status reports.
- Quarterly progress review presentation material and meeting record.
- Final Report and Documentation of system tests.

6.3. Design and Performance Requirements

The following are full scale requirements for the electric actuator system. Presentation of any model test data shall be scaled up to full scale in order to validate achievement of these criteria. Detailed specifications and platform interface requirements relevant to the development in Phase II and Phase III will be provided upon receipt of the performers' security clearance documentation.

Table 1 – Key Performance Parameters		
Parameter	Value(s)	Comments
Operating Torque Capacity	Threshold: 700,000 ft-lbs Objective: 1,000,000 ft-lbs	A submarine may have control surfaces of different sizes requiring different maximum operating torques (e.g., rudders versus stern planes). The proposed actuation approach must be scalable in concept to permit satisfying those control surface applications with low maximum operating torques of approximately 100,000 ft-lbs or the high maximum operating torques represented by the Threshold and Objective values. If the actuation is provided by a linear actuator, the tiller arm on the control surface may be estimated as approximately 2 ft for the 100,000 ft-lb torque or approximately 4 ft for the Threshold and Objective torque values.
Angular Displacement of Control Surfaces (Operational)	Threshold: ± 35 degrees Objective: ± 60 degrees	Flapped control surfaces are typically ± 25 degrees; angular displacements of ± 60 degrees are of interest for all-movable surfaces.

Table 1 – Key Performance Parameters		
Parameter	Value(s)	Comments
Rate of Angular Displacement of Control Surfaces	5±1 degrees/second	Application needs may range from 3 to 5 degrees/second average over the total deflection (not including a ramp-up/down from start-up, as the control surface approaches its maximum value or as the angular deflection reverses direction).
Actuator Output Position Accuracy	±.25 degrees	To be maintained for all output torque levels
Backlash	Minimum of 0.125 degrees	Nominally half of positional accuracy
Shock and Wave Slap Loads Generated by Control Surfaces; Back Drivability	Submarine High Impact Shock	Mechanical interface loads (forces, moments and torques) due to control surface and full ship motions under design level underwater shock and wave slap must not result in inoperability of the system. Back drivability features can be utilized if shown to be of benefit for shock and wave slap.
Direct Shock	Submarine High Impact Shock	Actuation system shall be designed to remain operational under a 250g static acceleration in each orthogonal direction.
Noise	TBD	The actuator system is noise-critical. Additional details are restricted to qualified offerors.
Ratio of Torque/Weight for Prime Mover and Motion Conversion	Threshold: 35 (ft-lbs/lbs) Objective: 100 (ft-lbs/lbs)	
Weight and Volume of System Components Other Than Prime Mover and Motion Conversion	Minimal weight and volume.	
Duty Cycle	See Below	See further discussion below. Additional details are restricted to qualified offerors.
Actuator Life	35 year operating life; 10 year overhaul requirement.	
Actuator Maintainability / Serviceability	Threshold: 6 years Objective: 12 years	This is the expected period between drydockings of the submarine.
Environment for Components External to Pressure Hull	Submerged in Sea Water -40 C to +75 C	
Environment for Components Internal to Pressure Hull	-20 C to +50 C	
System EMI Requirements	MIL-STD-461; DOD-STD-1399	Additional details are restricted to qualified offerors.
Redundancy	A single-point failure shall not result in loss of control surface actuation.	Examples include quad-redundant actuator position sensors and dual-redundant motor windings.
Hard Stops	2 degrees beyond the normal maximum deflection angles	As a minimum, actuator design must not preclude the use of mechanical hard stops that limit the control surface stock rotation to 2 degrees beyond the normal maximum operating deflection limit.

Table 1 – Key Performance Parameters		
Parameter	Value(s)	Comments
Over-Torque Limit	Torque generated by actuator output shall not exceed 150% of required operating torque	Current limiting is an acceptable design approach.
Ruggedness	Actuator shall retain full operational capability following inadvertent contact with hard stops that results in termination of rotation or stroke	Prior to contact with hard stops the actuator is operating at required operating rate and torque/force output.
Stored Energy	Sufficient to produce 150° of angular displacement at 4°/second with 400,000 ft-lbs torque (approximately 1.4x10 ⁶ Joules)	Work required is that delivered to the control surface and is needed to maintain depth/pitch control in the event of a loss of normal electrical power.
Manual Drive Capability	Maximum of 150 ft-lbs to support maintenance dockside	Desirable if achievable for inboard linear actuation approach.

Duty Cycle:

Figure 5 shows the time history of control surface motion and torque on a single control surface during a submarine maneuver that generates maximum (peak) torque. Note that there are portions of the torque time history where the hydrodynamic torque on the control surface will be either resisting or aiding the control surface angular motion, and there are times when there is time-varying torque on the control surface but the angular position is fixed.

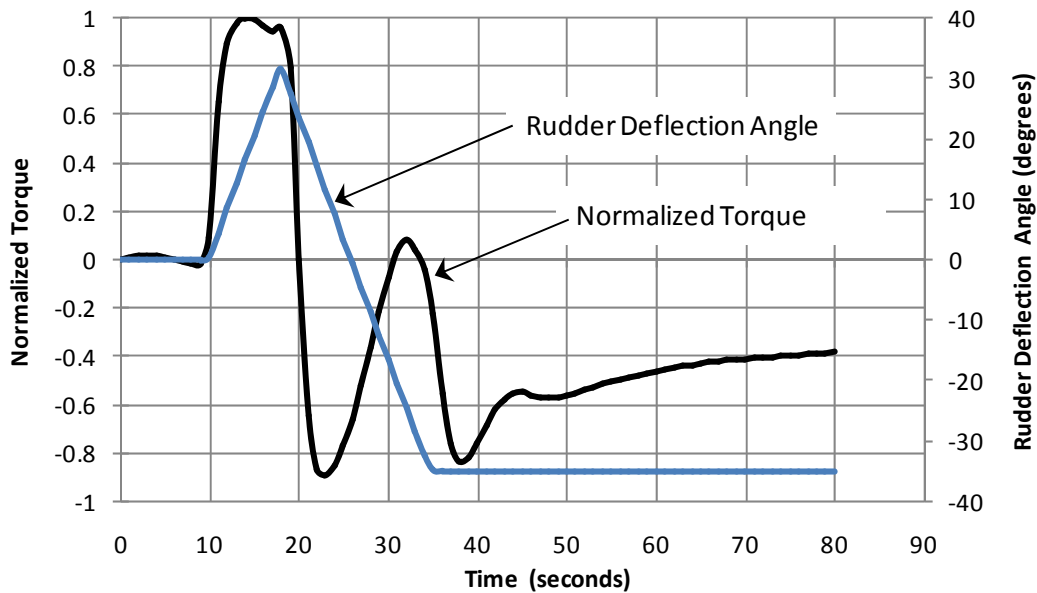


Figure 5 – Torque Time History Representative of Maneuvering Condition Producing Maximum Torque

Maneuvers that generate peak torques are infrequent but must be achievable by the actuation system. During sea trials a torque time history such as that shown in Figure 5 might be generated every 15 minutes. Holding a fixed angle on a control surface for 3 to 5 minutes at an average of approximately 40% of the maximum torque is feasible but will occur rarely.

7. Point(s) of Contact –

Questions of a technical nature should be submitted to:

Deborah Nalchajian, Program Officer
Office of Naval Research
Ships and Ship Systems Division, Code 331
One Liberty Center
875 N. Randolph Street
Arlington, VA 22203-1995
Email Address: Deborah.Nalchajian@navy.mil

Questions of a business nature should be submitted to:

Brenda Pickett, Contract Specialist
Office of Naval Research
Contracts and Grants Awards Management, Code 254
One Liberty Center
875 N. Randolph Street
Arlington, VA 22203-1995
Email Address: brenda.pickett@navy.mil

Questions of a security nature should be submitted to:

Derrick Shack
Information Security Specialist
Office of Naval Research
Security Department, Code 43
One Liberty Center
875 N. Randolph Street
Arlington, VA 22203-1995
Email Address: derrick.shack@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) or Security POC shall be sent via e-mail with a copy to the designated Business POC. Questions submitted within 2 weeks prior to a deadline may or may not receive a response. If one of the POCs is not available, then any questions must be forwarded to any backup provided in any “out of office” reply.

Any 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 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

8. Instrument Type(s) –

Awards shall take the form of contracts, specifically, cost-type Indefinite Delivery, Indefinite Quality (IDIQ) Contracts with Cost-Type Delivery Orders as a result of those IDIQ Contracts.

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

12.300

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

Basic and Applied Scientific Research (DoD)

11. Other Information -

This announcement is restricted to basic and applied research and that portion of advanced technology development not related to the development of a specific system or hardware procurement. Contracts made under this BAA are for scientific study and experimentation directed towards advancing the state of the art and increasing knowledge or understanding.

II. AWARD INFORMATION

The amount and period of performance of each selected proposal will vary depending on the research area and the technical approach to be pursued by the selected Offeror.

Anticipated award information is as follows:

Total amount of funding: Up to \$8M over 4 to 5 years with up to 3 to 4 IDIQ contracts.

Total amount of funding available for each Delivery Order:

- Phase I, Preliminary System Design and System Integration Plan: Up to \$500K to \$1000K per Delivery Order.
- Phase II, Detailed Design and Breadboard Testing: Up to \$1M to \$2M per Delivery Order.

- Phase III, Full Scale Prototype Fabrication and Land Based Full System Demonstration: Up to \$3M to 4M per Delivery Order

Anticipated number of awards:

- Phase I, Preliminary System Design and System Integration Plan: Up to 3 to 4 IDIQ Contracts each with at least one (1) or more associated Delivery Orders.
- Phase II, Detailed Design and Breadboard Testing: Two (2) or three (3) Delivery Orders.
- Phase III, Full Scale Prototype Fabrication and Land Based Full System Demonstration: It is anticipated that only a single award will be made for Phase III.

Anticipated period of performance*:

- Phase I: 12 months
- Phase II: 12 months
- Phase III: 24 months

*The months displayed above are the anticipated periods for the performance for each Phase. Phase III that includes the Government testing and evaluation periods. The performers shall be available to the Government for consultation during the test and evaluation period. Depending upon the perceived Navy needs, the periods of performance for Phases II and III may change.

The first Delivery Order will be the IDIQ minimum quantity with a period of performance shown above. Subsequent Delivery Orders will follow the criteria established in FAR 16.505 for multiple-award IDIQ Delivery Orders. Each successive Delivery Order will be competed among all of the Contractors awarded IDIQ contracts under this solicitation. Only contractors under contract will be included in future Delivery Order competition.

Although ONR expects the above described phasing plan to be executed, ONR reserves the right to make changes

The Government may incrementally fund any awards under this BAA.

However, lower and higher cost proposals will be considered. The Phase I proposal shall include cost estimates for the follow-on phases, Phase II and Phase III. Near the end of each period of performance expenditure plan updates for the remaining Phases will be required for evaluation prior to execution of the follow-on Phases (i.e., Delivery Orders).

III. ELIGIBILITY INFORMATION

The following types of entities are eligible as prime contractors under this solicitation:

1. U.S.-owned firms with a Defense Security Services (DSS) “Secret” level facility and DSS “Secret” level personnel clearances.
2. Foreign-owned firms with Special Security Agreements (SSAs) granted by DSS as well as a DSS “Secret” level facility and DSS “Secret” level personnel clearances.

All work requiring access to and use of classified information must be performed in the U.S.

Any subcontractor working with classified information must meet the following criteria:

1. U.S.-owned firms with DSS “Secret” level personnel clearances.
2. Foreign-owned firms with SSAs granted by DSS including DSS “Secret” level personnel clearances.

It is preferred that any subcontractor working with classified information have a DSS “Secret” level facility in which to conduct its work. If a proposed subcontractor working with classified information does not have a DSS “Secret” level facility, then the subcontractor must have a formal arrangement with the prime contractor for all work to be completed and stored in the prime contractor’s DSS “Secret” level facility. Any situation described above must be solidified in a written agreement, and that agreement shall be available for Government review.

If proposing the use of any subcontractors, the prime contractor must clearly delineate the following information within its proposal:

1. Whether the subcontractor will be working with classified or unclassified information;
2. Whether or not the entity is U.S.-owned;
3. Whether the firm has a DSS “Secret” level facility clearance in the U.S.; and
4. Whether the firm has DSS “Secret” personnel clearances in the U.S. For all personnel it proposes to use under this program.

It is the prime contractor’s responsibility to ensure proper protection and disbursement of classified information.

Only U.S. persons are permitted to work on this effort due to export control restrictions on the technologies involved in this BAA. The term “U.S. persons” is defined in the International Traffic in Arms Regulations (ITAR) - 22 CFR § 120.1 et seq.

All responsible sources from academia and industry may submit proposals under this BAA so long as the above security requirements are met. Teams are encouraged to submit proposals in the areas outlined under this BAA.

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 Deborah Nalchajian, ONR Program Officer, Code 331, Email: Deborah.Nalchajian@navy.mil to discuss its area of interest. 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.

IV. APPLICATION AND SUBMISSION INFORMATION

1. Application and Submission Process -

White Paper Submission

White Papers are required prior to submitting a Full Proposal. The due date for receipt of White Papers is no later than 2:00 p.m. (Eastern Time) on 18 December 2008. Initial Government evaluations of the White Papers will be issued via e-mail notification on or about 28 January 2009. Detailed Technical and Cost proposals will be subsequently encouraged from those Offerors whose proposed technologies have been identified through the above referenced e-mail as being of “particular value” to the Government. However, any such encouragement does not assure a subsequent award. The Government may also suggest collaborations between Offerors if it believes a combination of concepts would present the “best value”. Technical and Cost Proposals may also be submitted by any Offeror whose White Paper was not identified as being of particular value to the Government. But the initial White Paper appraisal is intended to give companies a sense of whether their concepts are likely to be funded under this BAA.

Full Proposals will not be considered under this BAA unless a White Paper was received on or before the White Paper due date specified above.

Full Proposal Submission

The due date for receipt of Full Proposals is 2:00 p.m. (Eastern Time) on 11 March 2009. It is anticipated that final selections for the Phase I awards will be made by 13 April 2009. As soon as the final proposal evaluation process is completed, each Offeror will be notified via email or letter of its selection or non-selection for an award.

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. If a classified proposal is submitted, the resultant contract will be unclassified.

Unclassified Proposal Instructions:

Unclassified proposals shall be submitted directly to the Technical Point of Contract (TPOC).

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 North Randolph Street
Arlington, VA 22203-1995”

The inner wrapper of the classified proposal should be addressed to the attention of Deborah Nalchajian, ONR Code 331 and marked in the following manner:

INNER ENVELOPE (stamped with the overall classification of the material)

“Program: Electrically Actuated Submarine Control Surfaces
Office of Naval Research
Attn: Deborah Nalchajian
ONR Code 331
875 North Randolph Street
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. The proposal shall include a severable, self-standing Statement of Work, which contains only unclassified information and does not include any proprietary restrictions.

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.

The proposal format and content identified below are applicable to the submission of proposals for contracts.

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
- No more than 8 pages

- Copies – Electronic (email) submissions provided on or before the date and time outlined in the BAA are deemed acceptable. Email submissions in either Microsoft® Word or Excel compatible or .PDF format should be sent to the attention of Deborah Nalchajian at: Deborah.Nalchajian@navy.mil . One (1) original and two (2) hardcopies of the White Paper shall be submitted to the ONR Program Officer soon thereafter via express mail or regular mail.

White Paper Content

- **Cover Page**: The Cover Page shall be labeled “WHITE PAPER” and shall include the BAA number, proposed title, technical points of contact, telephone number, facsimile number, and e-mail address.
- **Technical Concept**: A description of the technology innovation and technical risk areas.
- **Additional Information**: A preliminary cost estimate and scale proposed for hardware demonstrations in Phase III.

b. FULL PROPOSALS

Full Proposal Format – Volume 1 - Technical and Volume 2 - Cost Proposal

- Paper Size – 8.5 x 11 inch paper
- Margins – 1 inch
- Spacing – single or double-spaced
- Font – Times New Roman, 12 point
- Page Limitation:
 - Volume I, Technical Proposal - 20 pages for Volume I (not including resumes).
 - Volume II, Cost Proposal - There are no page limitations to Volume 2.
- Copies – one (1) original, two (2) hard copies, and one (1) electronic copy on a DVD (in Microsoft® Word or Excel 97 compatible or .PDF format).

Full Proposal Content

VOLUME 1: Technical Proposal:

- **Cover Page**: This should include the words “Technical Proposal” and the following:
 - 1) BAA number;
 - 2) Title of Proposal;
 - 3) Identity of Prime Offeror and complete list of Subcontractors, if applicable;
 - 4) Technical contact (name, address, phone/fax, electronic mail address)
 - 5) Administrative/business contact (name, address, phone/fax, electronic mail address) and;
 - 6) Duration of effort
- **Table of Contents**: An alphabetical/numerical listing of the sections within the proposal, including corresponding page numbers.

- **Statement of Work:** A Statement of Work (SOW) clearly detailing the scope and objectives of the effort and the technical approach. It is anticipated that the proposed SOW will be incorporated as an attachment to the resultant award instrument. To this end, the proposal must include a severable, self-standing SOW; without any proprietary restrictions, which can be attached to the contract. Include a detailed listing of the technical tasks/subtasks organized by year.
- **Project Schedule and Milestones:** A summary of the schedule of events and milestones.
- **Assertion of Data Rights and/or Rights in Computer Software:** For a contract award an Offeror may provide with its proposal assertions to restrict use, release or disclosure of data and/or computer software that will be provided in the course of contract performance. The rules governing these assertions are prescribed in Defense Federal Acquisition Regulation Supplement (DFARS) clauses 252.227-7013, -7014 and -7017. These clauses may be accessed at the following web address:

<http://farsite.hill.af.mil/VDFDARA.HTM>

The Government may challenge assertions that are provided in improper format or that do not properly acknowledge earlier federal funding of related research by the Offeror.

- **Deliverables:** A detailed description of the results and products to be delivered inclusive of the timeframe in which it will be delivered.
- **Management Approach:** A discussion of the overall approach to the management of this effort, including brief discussions of the total organization; use of personnel; project/function/subcontractor relationships; government research interfaces; and planning, scheduling and control practice. Identify which personnel and Subcontractors (if any) will be involved. Include a description of the facilities that are required for the proposed effort with a description of any Government Furnished Equipment/Hardware/Software/Information required, by version and/or configuration.
- **Other Agencies:** Include the name(s) of any other agencies to which the proposal has also been submitted.

VOLUME 2: Cost Proposal:

The Cost Proposal shall consist of a cover page and two parts; Part 1 will provide a detailed cost breakdown of all costs by cost category by calendar or Government fiscal year, and Part 2 will provide a cost breakdown by task/sub-task corresponding to the task numbers in the proposed Statement of Work.

The Government requires cost proposals for all three phases of this solicitation. It is anticipated that the minimum IDIQ amounts will equate to the cost of Phase I, the first Delivery Order. A detailed cost proposal is required now for the Phase I award. The detailed cost proposal for Phase II will be required as one of the deliverables of Phase I. The detailed cost proposal for Phase III will be required as one of the deliverables of Phase II.

The cost estimates for Phases II and III at this time are expected to be only rough estimates. Only the Phase I proposal need now provide the costs data as outlined below.

Although not required and provided for informational purposes only, detailed instructions, entitled “Instructions for Preparing Cost Proposals for Contracts and Agreements”, including a sample template for preparing costs proposals for contracts and agreements, may be found at ONR’s website listed under the ‘Acquisition Department – Contracts & Grants Submitting a Proposal’ link at:

http://www.onr.navy.mil/02/how_to.asp

Cover Page: The use of the SF 1411 is optional. The words “Cost Proposal” should appear on the cover page in addition to the following information:

- BAA number
- Title of Proposal
- Identity of Prime Offeror and complete list of Subcontractors, if applicable
- Technical contact (name, address, phone/fax, electronic mail address)
- Administrative/business contact (name, address, phone/fax, electronic mail address) and
- Duration of effort (separately identify basic effort and any proposed options)

Part 1 – Contract Costs: Detailed breakdown of all costs by cost category by calendar or Government fiscal year:

- Direct Labor – Individual labor categories or persons, with associated labor hours and unburdened direct labor rates. Provide escalation rates for out years;
- Indirect Costs – Fringe Benefits, Overhead, G&A, COM, etc. and their applicable allocation bases. If composite rates are used, provide the calculations used in deriving the composite rates.
- Travel – Provide a breakout of travel costs including the purpose and number of trips, origin and destinations(s), duration, travelers per trip, and the airfare, hotel, per diem, car rental costs, etc. for each trip.
- Subcontracts – A cost proposal as detailed as the Offeror’s cost proposal will be required to be submitted by the subcontractor. The subcontractor’s cost proposal can be provided in a sealed envelope with the Offeror’s cost proposal or may be sent directly to the Government. Subcontractor proposals must be received and reviewed prior to contract award. The prime contractor should perform and provide a cost/price analysis of each subcontractor’s cost proposal.*

***Note:** DoD Federal Acquisition Regulation provision 252.215-7003 (48 CFR §252.215-7003) is incorporated into this solicitation by reference. The offeror is to exclude excessive pass-through charges from subcontractors. The offeror must identify in its proposal the percentage of effort it intends to perform and the percentage to be performed by each of its proposed subcontractors. If more than 70 percent of the total effort

will be formed through subcontractors, the offeror must include the additional information required by the above-cited clause.

- Consultants – Provide a breakdown of the consultant’s hours, the hourly rate proposed, any other proposed consultant costs, a copy of the signed Consulting Agreement or other documentation supporting the proposed consultant cost, and a copy of the consultant’s proposed statement of work if it is not already separately identified in the prime contractor’s proposal.
- Materials & Supplies – Provide an itemized list of all proposed materials and supplies including quantities, unit prices, proposed vendors (if known), and the basis for the estimate (e.g., quotes, prior purchases, catalog price lists).
- Contractor Acquired Equipment or Facilities – Equipment and/or facilities are normally furnished by the Contractor. If acquisition of equipment and/or facilities is proposed, a justification for the purchase of the items must be provided. Provide an itemized list of all equipment and/or facilities costs and the basis for the estimate (e.g., quotes, prior purchases, catalog price lists).
- Other Direct Costs – Provide an itemized list of all other proposed other direct costs and the basis for the estimate (e.g., quotes, prior purchases, catalog price lists).
- Fee/Profit (Contract Proposals Only) – Profit or fee is not allowed on direct costs for facilities or in cost-sharing contracts.

Note: Indicate if you have an approved Purchasing/Estimating System and/or describe the process used to determine the basis of reasonableness (e.g., competition, market research, best value analysis) for subcontractors, consultants, materials, supplies, equipment/facilities, and other direct costs.

Part 2: Cost breakdown by task/sub-task corresponding to the same task breakdown in the proposed Statement of Work.

3. Significant Dates and Times –

Anticipated Schedule of Events		
EVENT	DATE	TIME (EASTERN TIME)
White Papers Due Date	18 December 2009	2:00 pm
Notification of Initial Navy Evaluations of White Papers*	28 January 2009	N.A.
Full Proposal Due Date	11 March 2009	2:00 pm
Notification of Selection for Award*	13 April 2009	N.A.
IDIQ Contract Award(s) and 1 st Delivery Order*	13 July 2009	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. Thus, it is recommended that any hard-copy proposal be mailed several days before the deadline established in the solicitation so that it will not be received late and thus be ineligible for award consideration.

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

4. Submission of Late 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:

- 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
- 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
- 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. Addresses for the Submission of White Papers and Full Proposals.

White papers should be emailed to: Deborah.Nalchajian@navy.mil. Full proposals for contracts should be sent via USPS to the Office of Naval Research at the following address:

Office of Naval Research
Attn: Deborah Nalchajian
ONR Department Code: 331
875 North Randolph Street
Arlington, VA 22203-1995

V. EVALUATION INFORMATION

1. Evaluation Criteria –

The following evaluation criteria apply to the Full Proposals. Proposals will be selected through a technical/scientific/cost decision process. Criteria are listed in descending order of priority. Any sub-criteria listed are of equal importance to each other.

A. Overall scientific and technical merits of the proposal.

1. The soundness of technical concept with regard to meeting the requirements detailed in *Section 6.3. Design and Performance Requirements*
2. Approach and Plan outlined for developing the technology to meet these requirements.
3. The Offeror's awareness of the state of the art, understanding of scope of the problem, and the Government's objectives for this program.
4. The proposed schedule and costs are reasonable and realistic for the technical and management approach offered. This will be principally measured by cost per labor-hour and number of labor-hours proposed. Cost reduction approaches that will be received favorably include innovative management concepts that maximize direct funding for the prototype and limit diversion of funds into overhead.

B. Team Qualifications (Offeror and Subcontractors)

1. Capability to manufacture a full scale electric actuator system/components prototype.
2. Technical capabilities in the area of electric actuator modeling, simulation, design, and analysis.
3. Facilities, software tools, and other resources that will contribute to the Offerors' ability to conduct tradeoff studies and validate the merits of their design
4. Related experience and/or past performance in development of electric actuators.

Socio-Economic Merits - For proposed awards to be made as contracts to all but small business concerns, the socio-economic merits of each proposal will be evaluated based on the extent of the Offeror's commitment in providing meaningful subcontracting opportunities for small businesses, small disadvantaged businesses, woman-owned small

businesses, HUBZone small businesses, veteran-owned small businesses, service disabled veteran-owned small businesses, historically black colleges and universities, and minority institutions.

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. Cost proposals will be evaluated by Government business professionals. 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 North American Industry Classification System (NAICS) code for this announcement is “541712” with a small business size standard of “500 employees”.
- Central Contractor Registry (CCR) - Successful Offerors not already registered in the CCR will be required to register in CCR prior to award of any contract. Information on CCR registration is available at <http://www.onr.navy.mil/02/ccr.htm>.
- Subcontracting Plans - Successful contract proposals that exceed \$550,000, submitted by all but small business concerns, will be required to submit prior to award a Small Business Subcontracting Plan in accordance with FAR 52.219-9.

Contracts:

For contracts, in accordance with FAR 4.1201, prospective contractors shall complete and submit electronic annual representations and certifications at <http://orca.bpn.gov>. In addition to completing the Online Representations and Certifications Application (ORCA), proposals must be accompanied with a completed DFARS and contract specific representations and certifications. These "DFARS and Contract Specific Representations and Certifications", i.e., Section K, may be accessed under the Contracts and Grants Section of the ONR Home Page at http://www.onr.navy.mil/02/rep_cert.asp.

2. Reporting and Deliverables -

Specific deliverables should be proposed by the Offeror and will be finalized with the Technical Program Officer and the Contract Specialist. Reports and hardware deliverables that the Government anticipates for the proposed program are as follows:

Administrative

- Detailed schedule and expenditure plan delivered at the beginning of each **Delivery Order**. A monthly granularity is required.
- Monthly technical and financial status reports.
- Quarterly progress review presentation material and record of meetings.

Phase I – Preliminary System Design and System Integration Plan:

- Preliminary Design Report detailing system/component concept, design, drawings, and integration plan. The design report should include the design procedure used and performance predictions.
- Computational Models of system components suitable for integration into government simulations and analysis. (Matlab/Simulink)
- Any revisions to the Phase II and/or Phase III SOW, schedule, and/or expenditure plan.

Phase II – Detailed Design and Breadboard Testing:

- Detailed Design Report detailing final system design, prototype fabrication process, detailed fabrication drawings, full scale manufacturing plan, and interface requirements.
- Breadboard System Demonstration and Documentation validating satisfaction of the design and performance requirements.

Phase III – Full Scale Prototype Fabrication and Land Based System Demonstration

- Full scale control surface electric actuator system installation plan.
- Full scale control surface electric actuator system hardware.
- Final Report and Documentation of system tests.

VII. OTHER INFORMATION

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

Each proposer must provide a very specific description of any equipment/hardware that it needs to acquire to perform the work. This description should indicate whether or not each particular piece of equipment/hardware will be included as part of a deliverable item under the resulting award. Also, this description should identify the component, nomenclature, and configuration of the equipment/hardware that it proposes to purchase

for this effort. The purchase on a direct reimbursement basis of special test equipment or other equipment that is not included in a deliverable item will be evaluated for allowability on a case-by-case basis. Maximum use of Government integration, test, and experiment facilities is encouraged in each of the Offeror's proposals.

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 should explain as part of their proposals which of these facilities are critical for the project's success.

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 prominently in its proposal.

3. Department of Defense High Performance Computing Program

The DoD High Performance Computing Program (HPCMP) furnishes the DoD S&T and RDT&E communities with use-access to very powerful high performance computing systems. Awardees of ONR contracts 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/>.

4. Protection of Proprietary and Sensitive Information

The parties acknowledge that, during performance of the contract resulting from this BAA, the recipient may require access to certain proprietary and confidential information (whether in its original or derived form) submitted to or produced by the Government. Such information includes, but is not limited to, business practices, proposals, designs, mission or operation concepts, sketches, management policies, cost and operating expense, technical data and trade secrets, proposed Navy budgetary information, and acquisition planning or acquisition actions, obtained either directly or indirectly as a result of the effort performed on behalf of ONR. The recipient shall take appropriate steps not only to safeguard such information, but also to prevent disclosure of such information to any party other than the Government. The recipient agrees to indoctrinate company personnel who will have access to or custody of the information concerning the nature of the confidential terms under which the Government received such information and shall stress that the information shall not be disclosed to any other party or to recipient personnel who do not need to know the contents thereof for the performance of the contract. Recipient personnel shall also be informed that they shall not engage in any

other action, venture, or employment wherein this information will be used for any purpose by any other party.

5. 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.

6. Submission of Questions

Any questions regarding this solicitation must be provided to the Science and Technology Point of Contact and/or Business Point of Contact listed in this solicitation. All questions shall be submitted in writing by electronic mail.

Questions regarding White Papers must be submitted by 2:00 P.M. Eastern Time on 11 December 2008. Questions after this date and time may not be answered, and the due date for submission of the white papers will not be extended.

Questions regarding Full Proposals must be submitted by 2:00 P.M. Eastern Time on 04 March 2009. Questions after this date and time may not be answered, and the due date for submission of the proposals will not be extended.