



BROAD AGENCY ANNOUNCEMENT

(BAA) INTRODUCTION:

This publication constitutes a Broad Agency Announcement (BAA) as contemplated in Department of Defense Grant and Agreement Regulation (DODGARS) 22.315(a). A formal Request for Proposals (RFP), solicitation, and/or additional information regarding this announcement will not be issued. Request for same will be disregarded.

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 submitted in response to this announcement. The 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.

The ONR Basic Research Challenge Program (BRC) is sponsored by the Office of Naval Research (ONR).

Awards will take the form of grants. Therefore, proposals submitted as a result of this announcement will fall under the purview of the Department of Defense Grant and Agreement Regulations (DoDGARs).

I. GENERAL INFORMATION

1. Agency Name

Office of Naval Research
875 North Randolph Street - Suite 1425
Code 03R
Arlington, VA 22203-1995

2. Research Opportunity Title

Basic Research Challenge (BRC) Program

3. Program Name

Fiscal Year (FY) 2008 Office of Naval Research Basic Research Challenge (BRC) Program

4. Research Opportunity Number

BAA 08-007

5. Response Date

White Papers: Monday 07 April 2008

Full Proposals: Monday 07 May 2008

6. Research Opportunity Description

Synopsis

The BRC program supports basic science and/or engineering research within academia and industry. The program is focused on stimulating new, high-risk basic research projects.

The FY 2008 BRC competition is for the four (4) topics listed below. Detailed descriptions of the topics can be found in Section VIII of this BAA entitled, "Specific BRC Topics". The detailed descriptions are intended to provide the proposer a frame of reference and are not meant to be restrictive to the possible approaches to achieving the goals of the topic and the program. Innovative ideas addressing these research topics are highly encouraged.

White papers and full proposals addressing the following BRC topics are sought:

- (1) Quantum Information Sciences and the Future of Secure Computation
- (2) Autonomous Devices for Advanced Personnel Treatment (ADAPT)
- (3) Mobile Brain Imaging
- (4) Compressed Sensing for Networked Information Processing

Proposals will be accepted from a single investigator or from a team of university or industry investigators. Proposals from a team of university or industry investigators must name one Principal Investigator as the responsible technical point of contact. Similarly, one institution will be the primary awardee for the purpose of award execution. The relationship among

participating institutions and their respective roles, as well as the apportionment of funds including sub-awards, if any, must be described in both the proposal text and the budget.

7. Point(s) of Contact

One or more BRC Topic Chiefs are identified for each specific BRC Topic. Questions of a technical nature shall be directed to one of the BRC Topic Chiefs identified in Section VIII of this BAA.

Questions of a *policy or administrative nature* should be directed as specified below:

Primary

Dr. Bill Lukens
Code 03R, BRC Program Manager
Office of Naval Research
875 North Randolph Street – Suite 256A
Arlington, VA 22203-1995

E-mail Address: William.lukens1@navy.mil

Secondary

Ms. Paula Barden
Office of Naval Research
Code 03R, Contractor Support
875 North Randolph Street – Suite 256A
Arlington, VA 22203-1995

E-mail address: paula.barden.ctr@navy.mil

Questions of a *business nature* should be directed as specified below:

Primary

Lynn Christian
Contract Specialist
Contract and Grants Awards Management, Code ONR 0251
Office of Naval Research
875 North Randolph Street, Suite W1273
Arlington, VA 22203-1995
Telephone Number: (703) 696-1575

E-Mail: Lynn.Christian@navy.mil

Secondary

Vera M. Carroll
Acquisition Branch Head
Contract and Grants Awards Management, Code 0251
Office of Naval Research
875 North Randolph Street, Suite 1279
Arlington VA, 22203-1995
E-mail: Vera.Carroll@navy.mil

- ◆ All questions shall be submitted in writing by electronic mail (e-mail).
- ◆ Questions presented by telephone call, fax message, or other means will not be responded to.
- ◆ Questions regarding **white papers** should be submitted by **Monday 24 March 2008**. Questions received after this date may not be answered, and the due date for submission of the white papers may not be extended.
- ◆ Questions regarding **full proposals** should be submitted by **Wednesday 23 April 2008**. Questions after this date may not be answered, and the due date for submission of the proposals will not be extended.

8. Instrument Type(s)

All awards resulting from this announcement will be grants to universities and industry.

9. Catalog of Federal Domestic Assistance (CFDA) Numbers

CFDA Number: 12.300

10. Catalog of Federal Domestic Assistance (CFDA) Titles

CFDA Title: DoD Basic and Applied Scientific Research

II. AWARD INFORMATION

The awards will be made at funding levels commensurate with the proposed research and in response to agency missions. Each individual award will be for a four year period. The award will be incrementally funded.

Total amount of funding for four years for grants resulting from this BAA is estimated to be about \$24M, subject to the availability of out-year appropriations. It is anticipated that the maximum award will be \$1.5M per year. It is recommended that potential proposers communicate with the BRC Topic Chiefs regarding these issues before the submission of formal proposals.

There is no guarantee that any of the proposals submitted in response to a particular topic will be recommended for funding. On the other hand, more than one proposal may be recommended for funding for a particular topic.

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 topics described herein, the organization should contact the appropriate ONR BRC Topic Chief 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.

Teams are encouraged to submit proposals in any and all of the topic areas. However, Offerors must be willing to cooperate and exchange software, data and other information in an integrated program with other contractors.

IV. APPLICATION AND SUBMISSION INFORMATION

1. Application and Submission Process

The proposal submission process is in two stages. Prospective awardees are encouraged to submit white papers to minimize the labor and cost associated with the production of detailed full proposals that have little chance of being selected for funding. Based on an assessment of the white papers, the responsible BRC Topic Chief(s) will provide informal feedback notification to the prospective awardees which may help them to decide whether to submit full proposals.

Feedback may not be provided on white papers arriving after the deadline. However, full proposals may be submitted regardless whether a white paper was submitted and regardless whether a white paper was judged to be of "particular value" to the Navy.

Submission of White Papers:

White papers must be submitted directly to the BRC Topic Chief(s) specified in Section VIII entitled, "Specific BRC Topics" via one of the following methods:

1. Via e-mail submitted directly to the BRC Topic Chief(s);
2. Via the United States Postal Service (USPS),
3. Via a commercial carrier; or
4. Hand delivered to the attention of the responsible BRC Topic Chief(s) identified in Section VIII entitled, "Specific BRC Topics".

For white paper submissions including hand delivery, use the topic address information provided on pages 13 – 14.

2. Content and Format of White Papers

White papers submitted under this BAA are expected to address unclassified basic research. Proposers are expected to appropriately mark each page of their submission that contains proprietary information. Grants awarded under this announcement will be unclassified.

White paper format:

- Paper Size - 8.5 x 11 inch paper
- Margins - 1 inch
- Spacing - single
- Font - Times New Roman, 12 point
- Number of Pages - no more than four (4) single-sided pages (excluding cover letter, and curriculum vitae). White papers exceeding the page limit may not be evaluated.

White Paper content should be as follows:

- A one page cover letter (optional)
- A cover page, labeled "PROPOSAL WHITE PAPER," that includes the BAA number, proposal title, and proposer's technical point of contact, with telephone number, facsimile number, e-mail address, topic number, and topic title
- Identification of the research and issues
- Proposed technical approaches
- Potential impact on DoN capabilities
- Potential team and management plan
- Summary of estimated costs
- Curriculum vitae of key investigators

The white paper should provide sufficient information on the research being proposed (e.g., hypothesis, theories, concepts, approaches, data measurements and analysis) to allow for an assessment by a technical expert. It is not necessary for white papers to carry official institutional signatures.

White papers should be stapled in the upper left hand corner; plastic covers or binders should not be used. Separate attachments, such as individual brochures or reprints, will not be accepted.

Number of Copies – one (1) original and two (2) copies.

3. Content and Format of Full Proposals

Full proposals submitted under this BAA are expected to address unclassified basic research. The full proposal submissions will be protected from unauthorized disclosure in accordance with FAR 15.207, entitled, "Handling Proposals and Information", applicable law, and DoD regulations. Proposers are expected to appropriately mark each page of their submission that contains proprietary information. Grants awarded under this announcement will be unclassified.

NOTE: Full Proposals sent by fax or e-mail will not be considered.

Full proposals may be submitted electronically through grants.gov. A full proposal may also be submitted to the appropriate BRC Topic Chief(s) specified in Section VIII entitled, "Specific BRC Topics" via one of the following methods:

1. Via the United States Postal Service (USPS),
2. Via a commercial carrier; or
3. Hand delivered to the attention of the responsible BRC Topic Chief(s).

For hard copy submissions including hand delivery, use the addresses provided on pages 13-14.

A. Procedure for Submission of Full Proposals via Grants.gov

Registration Requirements for Grants.gov: There are several one-time actions you must complete in order to submit an application through Grants.gov (e.g., obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, register with the Central Contract Registry (CCR), register with the credential provider, and register with Grants.gov). See www.grants.gov/GetStarted to begin this process. Use the Grants.gov Organization Registration Checklist at www.grants.gov/assets/OrganizationRegCheck.doc to guide you through the process. Designating an E-Business Point of Contact (EBiz POC) and obtaining a special password called an MPIN are important steps in the CCR registration process. Applicants, who are not registered with CCR and Grants.gov, should allow at least 21 days to complete these requirements. It is suggested that the process be started as soon as possible.

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

Download PureEdge Viewer: In order to download the application package, you will need to install PureEdge Viewer. This small, free program will allow you to access, complete, and submit applications electronically and securely. For a free version of the software, visit the following web site: www.grants.gov/DownloadViewer.

Application forms and instructions are available at Grants.gov. To access these materials, go to <http://www.grants.gov>, select "Apply for Grants", and then select "Download Application Package". Enter the CFDA for ONR as found on page four of this announcement) (ONR – 12.300) and the funding opportunity number, designated as "research opportunity number" on page two of this announcement (08-007). NOTE: You will not be able to download the Application Package unless you have installed PureEdge Viewer (See: <http://www.grants.gov/DownloadViewer>).

Content and Form of Application – SF 424 (R&R)

You must complete the mandatory forms and any applicable optional forms in accordance with the instructions on the forms and the additional instructions below. The mandatory form for this BAA is the SF 424 (R&R), the optional form for this BAA is the SF-LLL Disclosure of Lobbying Activities form.

Mandatory Form SF 424 (R&R)

Complete this mandatory form first to populate data in other forms. Complete all the required fields in accordance with the pop-up instructions on the form. To activate the instructions, turn on the "Help Mode" (icon with the pointer and question mark at the top of the form). The list of certifications and assurances referenced in Field 18 can be found on the ONR Home Page at Contracts and Grants. The certification package for grants is entitled, "Certifications for Grants and Agreements." The completion of most of the fields is self-explanatory except the following special instructions:

- a. Field 2: In the Applicant Identifier area, please list the appropriate Topic Chief(s) to receive the proposal.
- b. Field 4: In the Federal Identifier Field, (Field 4) designate "BRC", Department Code and name of the BRC Topic Chief. For example for Topic 1, Field 4 should read BRC-Code 311-Wachter.
- c. Field 7: Complete as indicated. Please note under "Other (Specify)" if your organization is a Minority Institution (MI).
- d. Field 18: The List of Certifications and Assurances referenced in Field 18 can be found on the ONR Home Page, (www.onr.navy.mil), select "BAAs", then select Representatives and Certifications". The certification package for Grants is entitled, "Certifications for Grants and Agreements".
- e. Field 20: "Pre-Application" Use Field 20 to attach the entire technical and cost proposal scanned into a single pdf file.

The following information should be included in the proposal package. The entire proposal package including the technical and cost proposal should be scanned into a single pdf file and attached to the SF 424 (R&R) Form at Field number 20 entitled "Pre-Application"

Proposal Narrative - The proposal narrative contains the cover, table of contents, executive summary, background, statement of work, management approach, list of references, assertion of data rights, qualifications and cost proposal. The entire proposal narrative must be contained in the single pdf file attached at Field 20 entitled, "Pre-Application".

Project Summary/Abstract

The project summary should be a single page that identifies the research problem, technical approaches, anticipated outcome of the research, if successful, and impact on DoN capabilities. It should identify the Principal Investigator, the university and other universities involved in the BRC team if any, the proposal title, the agency to which the proposal is submitted, the BRC topic number and the total funds requested from DoN for the four year period. The project summary must not exceed 1 page when printed using standard 8.5" by 11" paper with 1-inch margins (top, bottom, left and right) with font Times New Roman, 12 point.

The Following Formatting Rules Apply for the Proposal Narrative

- Paper size when printed - 8.5 x 11 inch paper
- Margins - 1 inch
- Spacing -single
- Font - Times New Roman, 12 point
- Number of pages - no more than twenty-five (25) single-sided pages.
The cover, table of contents, list of references, and curriculum vitae are excluded from the page limitations. Full proposals exceeding the page limit may not be evaluated.

Include the Following Information in the Proposal Narrative

The first page of your narrative must include the following information:

- Principal Investigator's name
- Phone number, fax number and e-mail address
- Institution, Department, Division
- Institution address
- Other universities and entities involved in the BRC team
- Current Department of Defense Contractor or Grantee? If yes, provide for each current agreement: Agency name, project title, period of performance, agreement value, agency point of contact and phone number
- Current Proposal title
- Institution proposal number
- BRC topic title

- Table of Contents: List project narrative sections and corresponding page numbers.

- Statement of Work: A Statement of Work (SOW) clearly detailing the scope and objectives of the effort. It is anticipated that the proposed SOW will be incorporated as an attachment to any resultant award instrument. To this end, this project narrative must include a severable self-standing SOW, without any proprietary restrictions, which can be attached to a grant award.
 - Technical Approach: Describe in detail the basic science and/or engineering research to be undertaken. State the objective and approach, including how data will be analyzed and interpreted. Discuss the relationship of the proposed research to the state-of-the-art knowledge in the field and to related efforts in programs elsewhere. Include appropriate literature citations/references. Discuss the nature of expected results. Discuss potential applications to defense missions and requirements.
 - Project Schedule, Milestones and Deliverables: A summary of the schedule of events, milestones, and a detailed description of the results and products to be delivered.
 - Management Approach: A discussion of the overall approach to the management of this effort, including brief discussions of: required facilities; relationships with any subawardees and with other organizations; availability of personnel; and planning, scheduling and control procedures.
 - (a) Describe the facilities available for the accomplishment of the proposed research objectives. Describe any capital equipment planned for acquisition under this program and its application to the proposed research. If possible, the budget for capital equipment should be allocated to the first budget period of the grant. Include a description of any government-furnished equipment/hardware/software/information, by version and/or configuration, that are required for the proposed effort.
 - (b) Describe in detail proposed subawards to other eligible universities or relevant collaborations (planned or in place) with government organizations,

industry, or other appropriate institutions. Particularly describe how collaborations are expected to facilitate the transition of research results to applications. Descriptions of industrial collaborations should explain how the proposed research will impact the company's research and/or product development activities. If subawards to other universities are proposed, make clear the division of research activities, to be supported by detailed budgets for the proposed subawards.

(c) Designate one individual as the Principal Investigator for the award, for the purpose of technical responsibility and to serve as the primary point of contact with ONR's relevant BRC Topic Chief. Briefly summarize the qualifications of the Principal Investigator and other key investigators to conduct the proposed research.

(d) Describe the research activities of the Principal Investigator and any co-investigators in on-going and pending research projects, whether or not acting as Principal Investigator in these other projects, the time charged to each of these projects, and their relationship to the proposed effort.

(e) If proposal includes a team, describe plans to manage the interactions among the members of the research team.

(f) 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) clause 252.227-7013, and -7014 and -7017. These clauses may be accessed at the following web address:

<http://farsite.hill.af.mil/VFDFARA.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.

(g) Identify other parties to whom the proposal has been, or will be sent, for possible funding, including agency contact information.

- List of References: List any publications cited in the above sections.
- Curriculum Vitae: Include curriculum vitae of the Principal Investigator and any key co-investigators.

Cost Proposal

Provide a detailed 4-year budget proposal showing a cost breakdown of all costs by cost category and by the funding periods described below.

The budget should adhere to the following guidelines:

Detailed breakdown of all costs, by cost category, by the calendar periods stated below. For budget purposes, use an award start date of 01 June 2008. The cost should be broken down to reflect funding increment periods of:

- (1) Four months (01 Jun 08 to 30 Sep 08),
- (2) Twelve months (01 Oct 08 to 30 Sep 09),

- (3) Twelve months (01 Oct 09 to 30 Sep 10),
- (4) Twelve months (01 Oct 10 to 30 Sep 11), and
- (5) Eight months (01 Oct 11 to 30 May 12).

Note that the budget for each of the calendar periods (e.g., 01 June 08 to 30 Sep 08) should include only those costs to be expended during that calendar period.

Annual budget should be driven by program requirements. Elements of the budget should include:

- Direct Labor - Individual labor category or person, with associated labor hours and unburdened direct labor rates.
- Indirect Costs - Fringe benefits, overhead, G&A, Cost of Money (COM), etc. (must show base amount and rate).
- Travel - Number of trips, destination, duration, etc.
- Subcontract - A cost proposal as detailed as the proposer's cost proposal will be required to be submitted by the subcontractor prior to grant award.
- Consultant - Provide consultant agreement or other document that verifies the proposed loaded daily/hourly rate.
- Materials - Specifically itemized with costs or estimated costs. An explanation of any estimating factors, including their derivation and application, shall be provided. Include a brief description of the proposer's procurement method to be used (competition, engineering estimate, market survey, etc.).
- Other Directs Costs - Particularly any proposed items of equipment or facilities. Equipment and facilities generally must be furnished by the contractor/recipient. Justifications must be provided when Government funding for such items is sought. Include a brief description of the proposer's procurement method to be used (competition, engineering estimate, market survey, etc.).
- Grant Specific Costs – Costs not normally associated with contracts, such as Graduate Assistant tuition, laboratory fees, report and publication costs

The above information should be included in the proposal package. The entire proposal package including the technical and cost proposal should be scanned into a single pdf file and attached to the SF 424 (R&R) Form at Field number 20 entitled "Pre-Application"

Proposal Receipt Notices

After a full proposal is submitted through Grants.gov, the Authorized Organization Representative (AOR) will receive a series of three e-mails. It is extremely important that the AOR watch for and save each of the e-mails. You will know that your proposal has reached ONR when the AOR receives e-mail Number 3. You will need the Submission Receipt Number (e-mail Number 1) to track a submission. The three e-mails are:

Number 1 – The applicant will receive a confirmation page upon completing the submission to Grants.gov. This confirmation page is a record of the time and date stamp for the submission.

Number 2 – The applicant will receive an e-mail indicating that the proposal has been validated by Grants.gov within a few hours of submission. (This means that all of the required fields have been completed.)

Number 3 – The third notice is an acknowledgment of receipt in e-mail form from the designated agency within ten days from the proposal due date. The e-mail is sent to the authorized representative for the institution. The e-mail for proposals notes that the proposal has been received and provides the assigned tracking number. Hard copy submissions will receive only e-mail number 3.

B. Procedures for Submission of Full Proposals

If submitting a full proposal by hard copy as opposed to formally through grants.gov, please complete the Grants.gov Form 424 (R&R) as described above, print the complete proposal package (including technical and cost proposals as described above) and submit it to the appropriate topic BRC Chief(s); identified in paragraph 6 below.

Full hard copy proposals should be stapled in the upper left hand corner; plastic covers or binders should not be used. Separate attachments, such as individual brochures, or reprints, will not be accepted.

Copies – one (1) original and five (5) hard copies.

4. Significant Dates and Times

Schedule of Events		
Event	Date	Time
White Papers Due	07 April 2008*	4:00 PM Eastern Daylight Time
Notification of Initial DoD Evaluations of White Papers	25 April 2008*	
Full Proposals Due	07 May 2008*	4:00 PM Eastern Daylight Time
Notification of Selection for Award	09 June 2008*	
Start Date of Grant	07 July 2008*	

* 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.

5. Submission of Late Proposals

Any proposal submitted through Grants.gov after the deadline for proposal submission will be late and will not be evaluated unless the Grants.gov website was not operational on the due date and was unable to receive the proposal submission. If this occurs, the time specified for the receipt of proposals through Grants.gov will be extended to the same time of the day specified in this BAA on the first workday on which the Grants.gov website is operational.

For hard copy full proposal submission, any proposal, modification, or revision that is received at ONR after the exact time specified for receipt of proposals is "late" and will not be considered unless it is received before the award is made, the contracting officer determines that accepting the late proposal would not unduly delay the acquisition, and:

- (a) there is acceptable evidence to establish that it was received at ONR and was under the Government's control prior to the time set for receipt of proposals; or
- (b) 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 of receipt at ONR includes the time/date stamp on the proposal wrapper, other documentary evidence of receipt maintained by ONR, 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 ONR 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.

6. Address for the Submission of White Papers and Hard Copy Full Proposals

For Topic (1), the address is:

Office of Naval Research
ATTN: Dr. Ralph Wachter, Code 311
875 North Randolph Street - Suite 1102B
Arlington, VA 22203-1995
703-696-4304
e-mail for white papers only: wachter@onr.navy.mil

For Topic (2) the address is:

Office of Naval Research
ATTN: Dr. Linda Chrisey, Code 341
875 North Randolph Street - Suite 1041
Arlington, VA 22203-1995
703-696-4504
e-mail for white papers only: Linda.chrisey@navy.mil

For Topic (3) the address is:

Office of Naval Research
ATTN: CDR Dylan Schmorow, Code 30
875 North Randolph Street - Suite 1448A
Arlington, VA 22203-1995
703-696-0360
e-mail for white papers only: Dylan.schmorow@navy.mil

For Topic (4) the address is:

Office of Naval Research
ATTN: Dr. Reza Malek-Madani, Code 311
875 North Randolph Street - Suite 1104
Arlington, VA 22203-1995
703-696-0195
e-mail for white papers only: reza.malekmadani@navy.mil

If for some reason hand or commercial delivery cannot be made to the specific BRC topic chief, delivery can be made to one of the other listed topic chiefs or to:

Dr. Bill Lukens
Code 03R, BRC Program Manager
Office of Naval Research
875 North Randolph Street – Suite 256A
Arlington, VA 22203-1995
703-696-4668

V. EVALUATION INFORMATION

1. Evaluation Criteria

White papers will be evaluated by the responsible BRC Topic Chief to assess whether the proposed research is likely to meet the objectives of the specific topic, and thus whether to encourage the submission of a full proposal. The assessment will focus on scientific and technical merit (criterion 1, below) and relevance and potential contribution to Department of the Navy (DoN) (criterion 2, below).

Full proposals responding to this BAA in each topic area will be evaluated using the following five criteria. The first two evaluation factors are of equal importance:

- (1) scientific and technical merits of the proposed basic science and/or

engineering research;

(2) relevance and potential contributions of the proposed research to the topical research area and to DoN missions.

The following three evaluation criteria are each of lesser importance than either of the above two, but are equal to each other:

(3) the qualifications and availability of the Principal Investigator and any key co-investigators;

(4) the adequacy of current or planned facilities and equipment to accomplish the research objectives; and

(5) the realism and reasonableness of cost (cost sharing is not a factor in the evaluation).

2. Evaluation Panel

White papers will be reviewed either solely by the responsible BRC Topic Chiefs for the specific topic or by an evaluation panel chaired by the responsible BRC Topic Chiefs. An evaluation panel will consist of technical experts who are Government employees.

Full proposals will be evaluated by an evaluation panel chaired by the responsible BRC Topic Chiefs for the particular topic and will consist of technical experts who are Government employees. Evaluation panel members are required to sign "no conflict of interest" statements.

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

- CCR - Successful proposers not already registered in the Central Contractor Registry (CCR) will be required to register in CCR prior to award of any grant. Information on CCR registration is available at <http://www.onr.navy.mil/02/ccr.htm>.
- Certifications - The following certification applies to each grant applicant seeking federal funds exceeding \$100,000:

Certification Regarding Lobbying Activities

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

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

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

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

2. Reporting

In general, for each grant award, annual reports and a final report are required summarizing the technical progress and accomplishments during the performance period, as well as any other reports as requested by the BRC Topic Chief.

VII. OTHER INFORMATION

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

Each proposer must provide a specific description of any equipment/hardware that each participating institution needs to acquire to perform the work. 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 proposer'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 the BRC program. The use of these facilities and resources will be negotiated as the program unfolds. Proposers should explain which of these facilities they recommend.

2. 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 AALAC 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 documentation, contact the ONR Animal/Human Use Administrator at (703) 696-4046.

Similarly, for any proposal for research involving human subjects the Offeror must 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 Federalwide Assurance (FWA) or the Offeror's DoD Navy Addendum number. 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. 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. [Note: for research involving human subjects that is greater than minimal risk, administrative procedures to protect human subjects from medical expenses (not otherwise provided or reimbursed) that are the direct result of participation in a research project must be addressed. Additional supporting documentation may be requested. For additional information on this topic, email ONR_343_contact@navy.mil.] For assistance with submission of human subject research related documentation, contact the ONR Animal/Human Use Administrator at (703) 696-4046.

3. 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/>.

VIII. SPECIFIC BRC TOPICS

FY08 BRC Topic #1

Quantum Information Sciences and the Future of Secure Computation

Background: Quantum information has the potential to revolutionize both computation and communication. When quantum computers are eventually realized, the well-known algorithm by Shor on factorization will undermine the security to today's public key infrastructure. Quantum technologies offer an alternative, allowing two parties to establish a shared private key for securely communicating via encryption, known as quantum key distribution (QKD). Already commercial vendors are offering QKD devices for exactly this purpose.

The consequences for information technology of quantum technologies have been profound for computing and communications. Already, the properties of quantum information, derived from quantum mechanics like superposition, the inability to copy qubits in general, entanglement, and the fact that information gain implies disturbance, demand reconsidering today's classical foundations of information security. Quantum information science will likely yield new fundamental computational principles with consequences that will surprise.

Objective: Discover new laws of computation and communications in quantum information science that will have profound consequences on future naval technologies.

Research Concentration Areas: The research areas include, but are not limited to: (1) schemes for secure communication based on quantum information, especially those that are not key-based, including experimental realizations; (2) quantum information hiding especially quantum steganography; (3) unified approaches to classical and quantum information theory; (4) new semantic techniques for designing and expressing quantum algorithms and schemes for quantum communication (e.g. high-level languages); and (5) the effect on algorithmic complexity and communications bandwidth of engineering issues (e.g., de-coherence, relativistic considerations, hybrid classical-quantum architectures).

Impact: This basic research program will provide: (a) new communication schemes that are probably more secure than existing schemes in large part because they employ natural encryption in place of mathematical encryption; (b) high-level languages in which future Naval technologies for communication and computation based on quantum information can be efficiently designed and reliably analyzed; (c) unified views of classical and quantum information theory that allow for comparisons and understanding potential vulnerabilities; (d) assessment of the feasibility of such technologies, based on understanding how implementation issues will affect performance.

Basic Research Challenge Topic Chief: Dr. Ralph Wachter, ONR 311, (703) 696-4304, wachter@onr.navy.mil

Autonomous Devices for Advanced Personnel Treatment (ADAPT)

Background: The long-term goal of the ADAPT program is to develop autonomous, *in vivo* devices that can both detect-and-respond to an analyte indicative of a battlefield trauma or insult (e.g., hemorrhagic shock, infection). Currently, there are micro-fabricated *in vivo* biosensor devices available that can sample the plasma and or other tissue components, and provide a read-out of the measured analyte. Primarily these devices have been developed for clinical diseases such as diabetes, cancer, and hormonal monitoring, although some have focused on traumatic conditions such as shock. A variety of sensing mechanisms have been successfully miniaturized and utilized in these devices, including optical, electrochemical, antibody, enzymatic, and plasmon resonance. Nearly all of these devices have an external monitor to which the device is connected, and provides feedback to the patient or clinician. For the ADAPT device we envision the capability to sense and treat a condition, as well as identify the injured warfighter, his status, and his location to a distant hospital unit – in a fully *in vivo* device.

Biomarkers are a key component of *in vivo* biosensors, and have been under study for the battlefield injuries/conditions of interest, for the past several years. However, robust and reliable biomarkers are not available and will require further study, particularly if their use will ultimately guide *in vivo* treatment. New strategies such as metabolomics and genomics, coupled to enzymatic or biomolecular “logic gates” may be required to increase fidelity of diagnosis by these devices.

In vivo biosensors have taken advantage of advances in microfabrication that enable integration of the sensing elements (functionalized nanowires or optical fibers, nanoparticles, enzymatically modified hydrogels, antibodies) with the necessary electronic and power components. For example, radiofrequency identification devices (RFID) that continually monitor animal physiological status (e.g., pH, pressure, temperature in cattle stomachs) are in use today, and set the stage for future human devices such as those envisioned by ADAPT. *In vivo* devices for controlled drug delivery are also rapidly advancing, and utilize a variety of approaches, including biodegradable polymeric nanoparticles, micromachined microfluidic systems and microneedles; however these are generally controlled by an external device. With the advent of organic electronic and photonic polymers as well as manufacturing approaches to make use of these materials, and emerging research on ‘smart’ polymer/biomolecular interfaces, biomedical devices are poised to transform clinical medicine. This research topic seeks to capitalize on these advances to initiate the ADAPT program, which will leverage continuing developments in hardware components (e.g., biosensor, drug delivery system, wireless communications, batteries) and focus on optimizing biomarkers and sensor/host interfaces as described below.

Objective: ADAPT will require embedded or implanted devices that can detect a physiological change indicative of a specific battlefield insult (such as hemorrhagic shock) that is severe enough to render the injured individual incapable of performing self-aid. Following detection, the device would then initiate a life-prolonging or performance-enhancing treatment response. Considering this long-range goal, the objectives of this fundamental research program are to: (1) identify robust biomarkers for battlefield injuries/stressors as well as reliable approaches for their detection, and (2) to develop interfaces between the sensor(s) and device control systems that increase fidelity of the diagnosis.

Research Concentration Areas: To initiate the ADAPT program, we desire projects that will aid with:

- **Identification of plasma biomarkers for battlefield injuries/conditions** – as noted above, although research into the identity of robust and specific biomarkers for certain combat-related injuries [e.g., hemorrhagic shock] has been ongoing, these studies have been largely limited to protein-search strategies. Those biomarkers that have been identified are suggestive but not definitive for the conditions of interest. Therefore, more robust biomarkers, as well as the means to detect them with high fidelity are needed.
- **Use of enzyme or biomolecule-polymer hybrids as “logic gates” for sensor fidelity and control-** Organic electric or photonic polymers may offer unique opportunities for interfacing with biomolecular ‘logic’ control strategies. Enzyme-based logic gates may prove useful in increasing fidelity, classifying analytes, and providing feedback control. Interfacing these to functional organic polymers may yield new sense-and-control strategies for micro-scaled devices. Consideration should be given to the environment in which these devices are expected to operate (in body fluids or tissues)

Impact: The knowledge gained from the proposed research will enable the development of future battlefield medical devices for the warfighter. The Navy’s forward medical strategy has evolved from reliance on a medic to administer initial aid, to a “buddy” system and finally to a “self-aid” approach where an injured warfighter could initiate self-treatment. The device to be enabled by this research could automatically, or via remote control, enable the initiation of life-saving or performance-enhancing treatment. This topic specifically addresses the Navy’s S&T Strategy’s Naval Warfighter Performance and Protection Focus Area’s Casualty Care and Prevention Objective.

Basic Research Challenge Topic Chief: Dr. Linda A. Chrisey, Code 342,
linda.chrisey@navy.mil. (703) 696-4504.

Mobile Brain Imaging

Background: Current human studies of functional brain areas have relied upon positron emission technology (PET), magnetoencephalography (MEG), functional magnetic resonance imaging (fMRI), and electroencephalographic (EEG) technologies, and as such have been restricted to recording in highly constrained seated or prone positions. This limitation has been due to sensor size and immobility (PET, MEG, fMRI), and problems with electrical noise created by muscle movement and by movement of electrodes relative to other electromagnetic influences (as in the case with EEG). While significant advances have been made within the cognitive neurosciences, current knowledge of brain system dynamics has been obtained within the rather artificial static setting as described above. There is no clear understanding of how brain systems interact while a person is moving more naturally through space with goals, intent, and associated motor activity. Current technology has also limited the research community's ability to understand real-time markers of learning and expertise for motor skills. Current systems designed to capture EEG signals during motion are very simplistic (e.g., capture only specific frequency bands, with little or no spatial resolution and relation to the environment). A straightforward analogy is that humans are designed to be highly mobile, observe the environment, recognize objects of interest, and attempt to obtain or avoid them. To date our understanding of the brain has used methods wherein participants are shown pictures of the environment and objects of interest and asked to make rather simple decisions. Advancing our understanding of brain systems and their interactions within more naturalistic settings represents a logical next step for the cognitive neurosciences, and presents new opportunities for both basic and applied sciences.

Objective: EEG recording and signal processing techniques, and perhaps other sensor types, might now be capable of providing data that can be analyzed and modeled to build a new discipline in the area of Mobile Brain Imaging. These techniques will require careful parsing of electrical (or other) signals resulting from brain, muscle, eye, and other sources, with sufficient spatial resolution to enable mapping of activity within the brain over time. This has been challenging in the past, due to the inability to parse these various signal sources, particularly when study participants were moving. Thus, the initial goal of this project is to demonstrate reliable methods that enable spatial mapping of brain centers in a temporally dynamic manner, while participants conduct tasks within a mobile laboratory environment. The extent to which brain signals can be recorded during motion will need to be specified. The manner in which brain activity for tasks changes as a function of bodily motion and intended actions can be determined. New sensor technologies may need to be developed.

Research Concentration Areas: This program of study will need to draw upon expertise in the neurosciences, signal processing and electrical engineering, mathematical modeling, and experimental psychology. However, there may be other disciplines that are necessary for different approaches.

Impact: The Navy has a long history of funding both basic and applied research in the neurosciences. Understanding the fundamental ways that the brain works is central to the more applied areas of medical science (e.g., detection of disease states, monitoring and accelerating rehabilitation) and augmented cognition technologies (e.g., integrating humans and machines to

create a more symbiotic and productive system). The development of mobile brain imaging technologies and methods could have tremendous impact on the basic science of cognitive neuroscience, and on these medical and tactical areas, and thus provide significant benefit to various Navy and DoD communities.

Basic Research Challenge Topic Chief: Dylan Schmorow, ONR Code 30,
dylan.schmorow@navy.mil, 703-696-0360

Compressed Sensing for Networked Information Processing

Background: Compressed sensing, whose theoretical underpinnings have been developed in the past few years, is a new area in signal processing with promising Navy and DoD applications.

Objective: The goal of this initiative is to provide new analytical and computational tools to allow for practical implementation of compressed sensing and, eventually, to aid with the design of sensors capable of carrying out direct measurements motivated by the established theoretical bounds.

Research Concentration Areas: Potential areas of interest include, but are not limited to, the following.

- Within the probabilistic framework, find new classes of sensing matrices -- beyond those that are known such as matrices whose entries are random binary and Gaussian variables -- that satisfy the Uniform Uncertainty Principle (UUP) and have the reconstruction property for sparse and/or compressible signals.
- Find classes of deterministic sensing matrices that satisfy the UUP and reconstruction property for sparse and/or compressible signals. What can one say about the geometry of this set of deterministic matrices as a subset of the set consisting of all matrices of a given size? For instance, is it a subvariety of some dimension? If so, can we stratify this subvariety so that its subvarieties, in turn, correspond to the number of columns being used in testing the UUP? In other words, the degree of failure of UUP among the column vectors should be reflected in the dimensions of these stratified subvarieties.
- In many applications, we want to have mobile sensors. In this case, the sensing matrices are parameterized by the spatial parameters. Can one establish similar results in this context?
- Currently, L_1 minimization is the tool of choice for signal reconstruction. Faster optimization algorithms for this problem are desired. Algorithms that take advantage of the sparsity of the solution; algorithms that are stable and robust with respect to noisy or imprecise measurements; algorithms that are capable of warm starts as new information becomes available; algorithms capable of handling additional constraints imposed on the problem; algorithms capable of distributed computation are needed.
- Alternative approaches to L_1 minimization should be considered. In particular, approaches that require fewer measurements are desirable. Along these lines, techniques for selecting a "best" set of measurements to compressively sense signal from a given subset of the signal space are needed.

Basic Research Challenge Topic Chiefs: Reza Malek-Madani, ONR 311, malekmr@onr.navy.mil, 703-696-0195; Donald Wagner, ONR311, wagnerd@onr.navy.mil, 703-696-4313; Tristan Nguyen, ONR 311, nguyent@onr.navy.mil, 703-588-2360