NRL BAA Announcement #N00173-18-S-BA01
Long Range Broad Agency Announcement (BAA) for Basic and Applied Scientific Research

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I. OVERVIEW OF THE RESEARCH OPPORTUNITY

This publication constitutes a Broad Agency Announcement (BAA) for awards by the NRL Contracting Division, Code 3200 (or otherwise approved by Code 3200) as contemplated in Federal Acquisition Regulation (FAR) 6.102(d)(2) and 35.016, the Department of Defense Grants and Agreements regulations (DoDGARS) 32 CFR 22.315(a) and DoD's Other Transaction Guide for Prototypes Projects, USD(AT&L), OT Guide, Jan 2017. A formal Request for Proposals (RFP), solicitation, and/or additional information regarding this announcement will not be issued.

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

This BAA is intended for proposals related to basic and applied research, and that part of development not related to the development of a specific system or hardware procurement. This Announcement is not for the acquisition of technical, engineering, and other types of support services.

Hyperlinks have been embedded within this document and appear as underlined, blue-colored words. The reader may "jump" to the linked section by clicking the hyperlink.

A. Required Overview Content

1. Federal Awarding Agency Name

Naval Research Laboratory
4555 Overlook Avenue, SW
Washington, DC 20375-5320

2. Funding Opportunity Title – NRL Long Range Broad Agency Announcement (BAA) for Basic and Applied Scientific Research

3. Announcement Type - Initial Announcement

4. Funding Opportunity Number - N00173-18-S-BA01

5. Catalog of Federal Domestic Assistance (CFDA) Numbers – 12.300

Department of Defense (DOD), Department of the Navy, Office of Chief of Naval Research, Basic and Applied Scientific Research

6. Key Dates (See also Section D.4)

This announcement will remain open for approximately one (1) year from the date of publication, or until replaced by a successor BAA. Proposals may be submitted at any time during this period. This announcement replaces N00173-17-S-BA01 dated 1 Mar 2017.

Submission of Late Proposals (Applicable to White Papers and Full Proposals) - The Government reserves the right to not review proposals submitted after 9 May 2019, or after a successor to this Long Range BAA is issued, whichever occurs first.

7. North American Industry Classification System (NAICS) code

The NAICS code for ***contracts*** under this announcement is 541715 with a small business size standard of 1,000 employees.

II. DETAILED INFORMATION ABOUT THE FUNDING OPPORTUNITY

A. Program Description

The Naval Research Laboratory (NRL) The Naval Research Laboratory (NRL) is the Navy's corporate laboratory. NRL conducts basic and applied research for the Navy in a variety of scientific and technical disciplines. The basic research program is driven by perceptions about future requirements of the Navy. NRL conducts most of its research program at its own facilities but also funds some related research such as anticipated by this announcement. More extensive research support opportunities are available from the Naval Research Laboratory (NRL). NRL announcements may be accessed via the Internet at https://www.nrl.navy.mil/doing-business/contracting-division/baa.

NRL is interested in receiving proposals for Long-Range Science and Technology (S&T) Projects which offer potential for advancement and improvement of Navy and Marine Corps operations. Readers should note that this is an announcement to declare NRL's broad role in competitive funding of meritorious research across a spectrum of science and engineering disciplines. A brief description of the NRL Program Codes and the science and technology thrusts that NRL is pursuing is provided below. Additional information can be found at the NRL website at https://www.nrl.navy.mil/research/directorates-divisions/.

This announcement is an expression of interest only and does not commit the Government to make any award or to pay for any proposal preparation costs. The cost of proposal preparation for response to a BAA is not considered an allowable direct charge to any resultant contract or any other contract; however, it may be an allowable expense to the normal bid and proposal indirect cost specified in FAR 31.205-18.

Interested parties should be alert for any BAA amendments that may be published at the Federal Business Opportunities (FedBizOpps) website.

B. Federal Award Information

1. Eligibility for Competition. Proposals for renewal or supplementation of existing projects are eligible to compete with applications for new Federal awards under this BAA.

2. Contracted Fundamental Research. With regard to any restrictions on the conduct or outcome of work funded under this BAA, NRL will follow the guidance on and definition of "contracted fundamental research" as provided in the Under Secretary of Defense (Acquisition, Technology and Logistics) Memorandum of 24 May 2010.

As defined therein the definition of "contracted fundamental research," in a DoD contractual context, includes research performed under grants and contracts that are (a) funded by Research, Development, Test and Evaluation Budget Activity 1 (Basic Research), whether performed by universities or industry or (b) funded by Budget Activity 2 (Applied Research) and performed on campus at a university. The research shall not be considered fundamental in those rare and exceptional circumstances where the applied research effort presents a high likelihood of disclosing performance characteristics of military systems or manufacturing technologies that

are unique and critical to defense, and where agreement on restrictions have been recorded in the contract or grant.

Pursuant to DoD policy, research performed under grants and contracts that are a) funded by Budget Activity 2 (Applied Research) and NOT performed on-campus at a university or b) funded by Budget Activity 3 (Advanced Technology Development) does not meet the definition of "contracted fundamental research." In conformance with the USD (AT&L) guidance and National Security Decision Directive 189, NRL will place no restriction on the conduct or reporting of unclassified "contracted fundamental research," except as otherwise required by statute, regulation or executive order. For certain research projects, it may be possible that although the research being performed by the prime contractor is restricted research, a subcontractor may be conducting "contracted fundamental research." In those cases, it is the prime contractor's responsibility in the proposal to identify and describe the subcontracted unclassified research and include a statement confirming that the work has been scoped, negotiated, and determined to be fundamental research according to the prime contractor and research performer.

Normally, fundamental research is awarded under grants with universities and under contracts with industry. Non-fundamental research is normally awarded under contracts and may require restrictions during the conduct of the research and DoD pre-publication review of such research results due to subject matter sensitivity. Potential offerors should consult with the appropriate NRL Technical POCs to determine whether the proposed effort would constitute basic research, applied research or advanced research.

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

3. <u>Funded Amount and Period of Performance</u> – The funded amount and period of performance of each proposal selected for award may vary depending on the research area and the technical approach to be pursued by the offeror selected.

4. <u>Instrument Type(s)</u> - Awards may take the form of contracts, grants, cooperative agreements, technology investment agreements, and other transaction agreements, as appropriate. The following provides brief descriptions of potential instrument types:

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

b. <u>Assistance Instruments.</u>

i. Grant: A legal instrument consistent with 31 U.S.C. 6304, is used to enter into a relationship:

- The principal purpose of which is to transfer a thing of value to the recipient to carry out a public purpose of support or stimulation authorized by a law or the United States, rather than to acquire property or services for the Federal Government's direct benefit or use.
- In which substantial involvement is not expected between the Federal Government and the recipient when carrying out the activity contemplated by the grant.
- No fee or profit is allowed

ii. Cooperative Agreement: A legal instrument which, consistent with 31 U.S.C 6305, is used to enter into the same kind of relationship as a grant, except that substantial involvement is expected between the Federal Government and the recipient when carrying out the activity contemplated by the cooperative agreement. No fee or profit is allowed. ***(For information on the substantial involvement NRL expects to have in cooperative agreements, prospective offerors should contact the Technical Point of Contact identified in the research area of interest.)***

iii. Technology Investment Agreement (TIA): Assistance Transaction other than a Grant or a Cooperative Agreement (see 32 CFR Part 37). A legal instrument, consistent with 10 U.S.C. 2371, which may be used when the use of a contract, grant, or cooperative agreement is not feasible or appropriate for basic, applied, and advanced research projects. The research covered under a TIA shall not be duplicative of research being conducted under an existing DoD program. To the maximum extent practicable, TIAs shall provide for a 50/50 cost share between the Government and the applicant. An applicant's cost share may take the form of cash, independent research and development (IR&D), foregone intellectual property rights, equipment, access to unique facilities, and/or other means. Due to the extent of cost share, and the fact that a TIA does not qualify as a "funding agreement" as defined at 37 CFR 401.2(a), the intellectual property provisions of a TIA can be negotiated to provide expanded protection to an applicant's intellectual property. No fee or profit is allowed on TIAs.

c. Other Transaction for Prototype (OTA): A legal instrument, consistent with 10 U.S.C. 2371b, which may be used when the use of a contract, grant, or cooperative agreement is not feasible or appropriate for prototype projects directly relevant to enhancing the mission effectiveness of military personnel and the supporting platforms, systems, components, or materials proposed to be acquired or developed by the Department of Defense, or for improvement of platforms, systems, components, or materials in use by the armed forces. The effort covered under an OTA shall not be duplicative of effort being conducted under an existing DoD program (please refer to the DoD "Other Transactions Guide for Prototype Projects" dated January 2017. This document along with other OTA resources may be accessed at the following link: http://www.acq.osd.mil/dpap/cpic/cp/10USC2371bOTs.html

5. Assistance Instruments - Any assistance instrument awarded under this announcement will be governed by the award terms and conditions that conform to DoD's implementation of OMB circulars applicable to financial assistance. Terms and conditions of new awards made after December 26, 2014, will include revisions to reflect DoD implementation of new OMB

guidance in 2 CFR Part 200, "Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards." The DoD Terms and Conditions are located at http://www.NRL.navy.mil/Contracts-Grants/submit-proposal/grants-proposal/grants-terms-conditions.aspx.

C. Eligibility Information

1. Eligible Applicants

a. All responsible sources from academia, industry and the research community 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 Small Business or other socio-economic participation. All businesses both small and large are encouraged to submit proposals and compete for funding consideration.

b. 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 Offerors are allowed so long as such arrangements are permitted under the sponsoring agreement between the Government and the specific FFRDC.

c. Navy laboratories, military universities and warfare centers as well as other Department of Defense and civilian agency laboratories are also not eligible to receive awards under this BAA and should not directly submit either white papers or full proposals in response to this BAA. If any such organization is interested in one or more of the programs described herein, the organization should contact an appropriate NRL Technical POC to discuss its area of interest.

The various scientific divisions of NRL are identified at https://www.nrl.navy.mil/research/directorates-divisions/. As with FFRDCs, these types of federal organizations may team with other eligible sources from academia and industry that are submitting proposals under this BAA.

d. University Affiliated Research Centers (UARCs) are eligible to submit proposals under this BAA unless precluded from doing so by their Department of Defense UARC contract.

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

2. Cost Sharing or Matching - Cost sharing is not expected and will not be used as a factor during the merit review of any proposal hereunder. However, the Government may consider voluntary cost sharing if proposed.

D. Application and Submission Information

1. Address to Request (Access) Application Package - This BAA may be accessed from the sites below. Amendments, if any, to this BAA will be posted to these websites when they occur. Interested parties are encouraged to periodically check these websites for updates and amendments.

a. Grants.gov (www.grants.gov)
b. FedBizOpps (www.fbo.gov)
c. NRL website https://www.nrl.navy.mil/doing-business/contracting-division/baa

2. Content and Form of Application Submission

a. General Information

Interested offerors must first submit a white paper (WP), which are continuously accepted prior to closing date of the announcement. The purpose of a WP is to preclude unwarranted effort on the part of an offeror whose proposed work is not of interest to NRL.

Offerors of those WPs found to be consistent with the intent of the BAA will be **invited** to submit a full proposal. An invitation does not assure an offeror of a subsequent contract award. If selected for a full proposal, additional guidance will be provided via email.

The selection for award of proposals submitted in response to the BAA will be primarily based on a scientific review. The major purpose of the review will be to determine the relative merit of the proposed technical approach and its relationship to areas of research interest stated in the BAA. Business and contractual aspects, including proposed cost and cost realism, will also be considered as part of the evaluation. Selection of proposals for award will be based on the potential benefits to the Government weighed against the cost of the proposals, in view of the availability of funds.

White Paper Evaluation/Notification: NRL evaluations of the white papers will be issued via email notification. Any Offeror whose white paper technology was deemed to be of no "particular value" to the Navy is ineligible to submit a full proposal under this BAA.

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

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

b. Submission of Unclassified and Classified Proposals

- White Papers and Full Proposals submitted under this BAA are expected to be

unclassified; however, classified proposals are permitted. If a classified proposal is submitted and selected for award, the resultant contract will be unclassified. An 'unclassified' Statement of Work (SOW) must accompany any classified proposal.

• Unclassified Proposal Instructions: Unclassified proposals shall be submitted in accordance with this Section.

• Special Instructions for Classified White Papers and Proposal: Contact nrlproposals@nrl.navy.mil for instructions on how to submit Classified white papers and Proposals.

- For both classified and unclassified proposals, a non-proprietary version of the Statement of Work must also be submitted. Do not put proprietary data or markings in or on the Statement of Work. For proposals containing data that the offeror does not want disclosed to the public for any purpose, or used by the Government except for evaluation purposes, the contractor shall mark the title page with the following legend:

"This proposal includes data that shall not be disclosed outside the Government and shall not be duplicated, used, or disclosed--in whole or in part--for any purpose other than to evaluate the proposal. If, however, a contract is awarded to this offeror as a result of--or in connection with--the submission of this data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the resulting contract. This restriction does not limit the Government's right to use information contained in this data if is obtained from another source without restriction. The data subject to this restriction are contained in (insert numbers or other identification of sheets)."

- Each sheet of data that the offeror wishes to restrict must be marked with the following legend:

"Use or disclosure of data contained on this sheet is subject to the restriction on the title page of this proposal."

c. White Paper Requirements.

ii. White Paper Format.

- Paper size – 8.5 x 11 inch paper
- Margins – 1 inch
- Spacing –single-spaced
- Font – Times New Roman, 12 point
- Page limit– 5 pages.

ii. White Paper Submission. The white paper must be a Microsoft Word 2010 compatible, or PDF format attachment to the email. There is an email size limit of 5MB per email.

iii. White Paper Content: White papers shall include the following:

FOR ALL WHITE PAPERS

Submit one original of each WP to Technical Point of Contact via the email address listed in the last paragraph of each topic summary. The subject of the email shall be "Subj: BAA number (i.e., N00173-18-S-BA01), Summary Topic # (i.e., 57-18-01) and Topic Title (i.e., High Frequency Radar)".

- Cover Page: The Cover Page shall be labeled "WHITE PAPER" and shall include the BAA Number N00173-18-S-BA01, summary topic 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.

FOR BASIC RESEARCH

- Future Naval Relevance (where applicable) – A description of potential Naval relevance and contributions of the effort to the agency's specific mission.

- Rough Order of Magnitude cost estimate

FOR APPLIED RESEARCH AND ADVANCED TECHNOLOGY DEVELOPMENT

- Operational Naval Concept (where applicable) – A description of the project objectives, the concept of operation for the new capabilities to be delivered, and the expected operational performance improvements.

- Operational Utility Assessment Plan (where applicable) – A plan for demonstrating and evaluating the operational effectiveness of the Offeror's proposed products or processes in field experiments and/or tests in a simulated (where applicable)
- Operational Utility Assessment Plan (where applicable) – A plan for demonstrating and evaluating the operational effectiveness of the Offeror's proposed products or processes in field experiments and/or tests in a simulated environment.

- Rough Order of Magnitude (ROM) cost estimate.

d. Full Proposals: (See Appendices 2 and 3 for instructions.)

i. Instructions for Grants, Cooperative Agreements, and TIA's. (See Appendix 2)

ii. Instructions for Contracts and Other Transaction Agreements. (See Appendix 3)

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

Unique Entity Identifier and System for Award Management (SAM) - All offerors submitting proposals or applications must:

a. Be registered in the SAM prior to submission;

b. Maintain an active SAM registration with current information at all times during which it has an active Federal award or an application under consideration by any agency; and

c. Provide its DUNS number in each application or proposal it submits to the agency.

SAM may be accessed at https://www.sam.gov/portal/public/SAM

4. Submission Dates and Times -

(See Section I, paragraph A.6, Key Dates, for information)

5. Intergovernmental Review – RESERVED.

6. Funding Restrictions – RESERVED.

7. Other Submission Requirements

a. Grant, Cooperative Agreement, and TIA Proposals shall be submitted through Grants.gov. (See Appendix 2.)

b. Submission of Full Proposals for Contracts and Other Transaction Agreements shall be submitted to nrlproposals@nrl.navy.mil upon invitation. (See Section (D)(2)(c) above)

E. Application Review Information

1. Criteria

Awards under this BAA will be made in accordance with FAR 35.016(e) or 2 C.F.R 200. The primary basis for selecting proposals for acceptance will be technical merit, importance to agency programs, and fund availability. To the extent appropriate, cost realism and reasonableness will also be considered when selecting proposals. NRL reserves the right to request and require any additional information and documentation after it makes the type of award instrument determination. NRL reserves the right to remove Offerors from award consideration when the parties fail to reach agreement on award terms, conditions, and cost/price within a reasonable time, or when the Offeror fails to timely provide requested or required additional information.

Offerors' proposals will be evaluated against the following criteria:

1) Overall scientific and technical merits of the proposal and responsiveness to the topic,

i.e., the degree of innovation, soundness of technical concept, Offeror's awareness of the state of the art and understanding of the scope of the problem, significance and originality of the technical approach and effort needed to address/solve the problem, and anticipated scientific impact within the field. The following areas will also be considered: (1) the Offeror's capabilities, related experience, facilities, techniques or unique combinations of these which are integral factors for achieving the proposal objectives, and (2) the qualifications, capabilities and experience of the proposed Principal Investigator (PI), team leader and key personnel who are critical to achieving the proposal objectives.

2) Potential Naval relevance and contribution to the NRL and Department of Navy mission.

3) The availability of funds. (*Not applicable to white papers*)

Criteria 1, 2, and 3 are equally important.

2. <u>Review and Selection Process</u>

a. Proposals will not be evaluated against each other since they are not submitted in accordance with a common work statement. NRL's intent is to review proposals as soon as possible after they arrive; however, proposals may be reviewed periodically for administrative reasons.

The ultimate recommendation for award of proposals is made by NRL's scientific/technical community. Recommended proposals will then be forwarded to the NRL Contracting Division. Any notification received from NRL that indicates that the Offeror's full proposal has been recommended does not ultimately guarantee an award will be made. This notice indicates that the proposal has been selected in accordance with the evaluation criteria stated above and has been sent to the Contracting Division to conduct cost analysis, determine the offeror's responsibility, to confirm whether funds are available, and to take other relevant steps necessary prior to commencing negotiations with the offeror.

b. Commitment to Small Business- (For Contract Awards Only)

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

Businesses unfamiliar with doing business with the government and that require assistance may contact the state-specific Department of Defense (DoD) Procurement Technical Assistance Center (PTAC). DoD PTACs serve as a resource for businesses pursuing and performing under contracts with DoD, other federal agencies, state and local governments and with government prime contractors. Assistance provided by the PTACs is usually free of charge.

PTAC support includes registration in systems such as SAM, identification of contract opportunities, understanding requirements and preparing and submitting proposals. The PTACs have a presence in each state, Puerto Rico and Guam.

To locate a local PTAC visit:
http://www.dla.mil/SmallBusiness/Pages/ProcurementTechnicalAssistanceCenters.aspx or http://www.aptac-us.org/new/ .

i. Subcontracting Plan - For proposed contract awards exceeding $700,000, large businesses and non-profits (including educational institutions) shall provide a Subcontracting Plan (hereafter known as 'the Plan') that contains all elements required by FAR 19.704, FAR 52.219-9 (DEVIATION 2016-O0009 ALT III) and as supplemented by DFARS 252.219-7003 (DEVIATION 2016-O0009).

NOTE: Small businesses are exempt from this requirement to submit a subcontracting plan.

The Plan must be submitted as an attachment to the "Proposal Checklist" and will not be included in the page count. If a company has a Master Subcontracting Plan, as described in FAR 19.701 or a Comprehensive Subcontracting Plan, as described in DFARS 219.702, a copy of the Plan shall also be submitted as an attachment to the "Proposal Checklist".

Plans will be reviewed for adequacy, ensuring that the required information, goals, and assurances are included. FAR 19.702 requires an apparent successful offeror to submit an acceptable Plan. If the apparent successful offeror fails to negotiate a Plan acceptable to the contracting officer within the time limit prescribed by the contracting officer, the offeror will be ineligible for award.

Offerors shall propose a plan that ensures small businesses (inclusive of SDBs, WOSBs, HUBZone, VOSBs and SDVOSBs) will have the maximum practicable opportunity to participate in contract performance consistent with efficient performance.

As a baseline, Offerors shall, to the best extent possible, propose realistic goals to ensure small business participation in accordance with the current or most recent fiscal year subcontracting goals found on the DoD Office of Small Business Program website at: http://business.defense.gov/. If proposed goals are below the statutory requirements, then the offeror shall include in the Plan a viable written explanation as to why small businesses are unable to be utilized and what attempts were taken to ensure that small business were given the opportunity to participate in the effort to the maximum extent practicable.

ii. Small Business Participation Statement

If subcontracting opportunities exist, all prime Offerors shall submit a Small Business Participation Statement regardless of size in accordance with DFARS 215.304 when receiving a contract for more than the simplified acquisition threshold (i.e., $150,000). All offerors shall provide a statement of the extent of the offeror's commitment in providing meaningful subcontracting opportunities for small businesses and other concerns subject to socioeconomic

considerations through its awards and must agree that small businesses, VOSBs, SDVOSBs, HUBZones, SDBs, and WOSBs concerns will have the maximum practicable opportunity to participate in contract performance consistent with efficient performance.

This assertion will be reviewed to ensure that it supports this policy by providing meaningful subcontracting opportunities. The statement should be submitted as an attachment to the "Proposal Checklist" and will not be included in the page count.

iii. Subcontracting Resources

Subcontracting to a prime contractor can be a good way to participate in the contracting process. The following is a list of potential resources that may assist in locating potential subcontracting partners/opportunities/resources:

*Companies Participating in DoD Subcontracting Program Report
*DAU Small Business Community of Practice (SB COP)
*DefenseLink ≥ $7.0 M Award Notices
*DoD OSBP Prime Contractors and Subcontractors with Subcontracting Plans
*Dynamic Small Business Search
*Electronic Subcontracting Reporting System (eSRS)
*Federal Business Opportunities (FEDBIZOPPS)
*Navy SBIR/STTR Search – Website or Brochure
*DoD Procurement Technical Assistance Centers (PTAC)
*Small Business Administration (SBA) Subcontracting Opportunities Directory
*SBA Subnet

For a description and associated websites visit the NRL Office of Small Business Programs webpage at: https://www.nrl.navy.mil/doing-business/small-business

In accordance with FAR 5.206, the following entities may transmit a notice to the Government-wide Point of Entry (GPE) at www.fedbizops.com to seek competition for subcontracts, to increase participation by qualified small businesses, VOSBs, SDVOSBs, HUBZones, SDBs, and WOSBs, and to meet established subcontracting plan goal as follows:

1) A contractor awarded a contract exceeding $150,000 that is likely to result in the award of any subcontracts;
2) A subcontractor or supplier, at any tier, under a contract exceeding $150,000, which has a subcontracting opportunity exceeding $15,000.

The notices must describe:

(a) The business opportunity;
(b) Any prequalification requirements; and
(c) Where to obtain technical data needed to respond to the requirement.

An example of a place in which prime contractors may post solicitations or sources

sought notices for small business is the SBA SUB-Net. The SUB-Net database provides a listing of subcontracting solicitations and opportunities posted by large prime contractors and other non-federal organizations.

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

d. 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 Government scientific experts will perform the evaluation of technical proposals. Restrictive notices notwithstanding, one or more support contractors may be utilized as subject-matter-expert technical consultants. 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 the NRL Non-Disclosure Agreement (NDA) for Contractor Support prior to receipt of any proposal submissions.

3. Recipient Qualifications

a. Applicable to Grants, Cooperative Agreements and TIAs (See Appendix 2.)

b. Applicable to Contracts and Other Transaction Agreements (See Appendix 3.)

F. Federal Award Administration Information

1. Federal Award Notices

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

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

The award document signed by the Contracting Officer or Grants Officer is the official and authorizing award instrument.

b. The Naval Research Laboratory (NRL) award/modification documents are only available via the Department of Defense (DoD) Electronic Document Access System (EDA) within the Wide Area WorkFlow e-Business Suite (https://wawf.eb.mil/).

EDA is a Web-based system that provides secure online access, storage and retrieval of awards and modifications to DoD employees and vendors.

NRL creates an award notification profile for every award.

For grants, the notification profile will use the email addresses from the Application for Federal Assistance, SF424, to notify the recipient of an award. ***NRL recommends that organizations provide a global business address for their entity in Field 5 (Application Information) of the SF424.*** NRL is using the following three email addresses entered by the grantee on the SF424 application to create the EDA notification profile:

i. Applicant Information (Field 5 - Email)
ii. Project Director / Principal Investigator (Field 14 - Email)
iii. Authorized Representative (Field 19 - Email)

For all other awards, the notification profile will use the email address from the Business Point of Contact to notify the recipient of an award.

***IMPORTANT*:** In some cases, EDA notifications are appearing in recipients' Junk Email folder. If you are experiencing issues receiving EDA notifications, please check your junk email. If found, please mark EDA notifications as "not junk."

If you do not currently have access to EDA, you may complete a self-registration request as a "Vendor" via https://wawf.eb.mil/ following the steps below:

1. Click "Accept"
2. Click "Register" (top right)
3. Click "Agree"
4. In the "What type of user are you?" drop down, select "Vendor"
5. Select the systems you would like to access (iRAPT at a minimum)
6. Complete the User Profile and follow the site instructions

Allow five business days for your registration to be processed. EDA will notify you by email when your account is approved.

To access awards after your registration has been approved, log into https://wawf.eb.mil/, select "EDA", select either EDA location, Select "Contracts", select your search preference, enter the Contract Number (or, if applicable, enter the Grant Number in the Contract Number field), and select "View".

Registration questions may be directed to the EDA help desk toll free at 866-618-5988, commercial at 801-605-7095, or via email at disa.ogden.esd.mbx.cscassig@mail.mil (Subject: EDA Assistance).

2. Administrative and National Policy Requirements

a. Applicable to All

i. Offerors should be aware of recent changes in export control laws. Offerors are responsible for ensuring compliance with all U.S. export control laws and regulations, including the International Traffic in Arms Regulation (ITAR)(22 CFR Parts 120 - 130) and Export Administration Regulation (EAR) (15 CFR Parts 730 – 774), as applicable. In some cases, developmental items funded by the Department of Defense are now included on the United States Munition List (USML) (22 CFR Part 121) and are therefore subject to ITAR jurisdiction. In other cases, items that were previously included on the USML have been moved to the EAR Commerce Control List (CCL). Offerors should address in their proposals whether ITAR or EAR restrictions apply to the work they are proposing to perform for NRL. The ITAR and EAR are available online at http://www.ecfr.gov/cgi-bin/ECFR?page=browse . Additional information regarding the President's Export Control Reform Initiative can be found at http://export.gov/ecr/index.asp.

Offerors must comply with all U.S. export control laws and regulations, including the ITAR and EAR, in the performance of any award or agreement resulting from this BAA. Offerors shall be responsible for obtaining any required licenses or other approvals, or license exemptions or exceptions if applicable, for exports of hardware, technical data, and software (including deemed exports), or for the provision of technical assistance.

ii. *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 in Section II, Block 11 of the Proposal Checklist. The Proposal Checklist can be found at https://www.NRL.navy.mil/Contracts-Grants/submit-proposal/contracts-proposal/cost-proposal .

If it is determined that access to classified information will be required during the performance of an award, a Department of Defense (DD) Form 254 will be attached to the contract, and FAR 52.204-2 - Security Requirements will be incorporated into the contract. The contractor must provide the name of their FSO, phone number, complete address and CAGE Code. The facility must have a current Secret facility clearance and personnel with final clearances at proposal submission.

Any contracts that require contractor personnel performing any function designated as a component of the Cyber Security Work Force (CSWF), and/or having privileged user access to NRL information systems and/or networks will require a completed NACLC with submitted Tier 5 (SSBI) background investigations as specified in SECNAV M-5510.30. Even for Secret access, the contract facility will require a current TS facility clearance to meet the investigation requirements. This requirement is also applicable to contractors who will be developing or modifying computer hardware and software as a deliverable to NRL in support of a contract.

Any unclassified contracts that will have foreign national participation, to include dual citizens, must be approved in advance in accordance with NRL’s facility access control procedures and

access will be restricted to public release information and systems only. Foreign nationals may not perform on NRL classified contracts.

NRL does not provide access to classified material under grants.

iii. *Requirements Concerning Live Organisms*:

(1) Use of Human Subjects in Research:

(a) You must protect the rights and welfare of individuals who participate as human subjects in research under this award and comply with the requirements of the Common Rule at 32 CFR part 219 and applicable provisions of DoD Instruction 3216.02, Protection of Human Subjects and Adherence to Ethical Standards in DoD-Supported Research (2011), the DON implementation of the human research protection program contained in SECNAVINST 3900.39E (or its replacement), 10 USC 980 "Limitation on Use of Humans as Experimental Subjects," and when applicable, Food and Drug Administration (FDA) and other federal and state law and regulations.

(b) For proposals containing activities that include or may include "research involving human subjects" as defined in DoDI 3216.02, prior to award, the Offeror must submit documentation of:

(i) Approval from an Institutional Review Board (IRB) (IRB-approved research protocol, IRB- approved informed consent document, and other material they considered); proof of completed human research training (e.g., training certificate or institutional verification of training for the principal investigator, co-investigators); and the Offeror's Department of Health and Human Services (DHHS)-issued Federal wide Assurance (FWA#),

(ii) Any claimed exemption under 32 CFR 219 101(b), including the category of exemption, supporting documentation considered by your institution in making the determination (e.g., protocol, data collection tools, advertisements, etc.). The documentation shall include a short rationale supporting the exemption determination. This documentation should be signed by the IRB Chair or IRB vice Chair, designated IRB administrator or official of the human research protection program.

(iii) Any determinations that the proposal does not contain activities that constitute research involving human subjects, including supporting documentation considered by your institution in making the determination. This documentation should be issued by the IRB Chair or IRB vice Chair, designated IRB administrator or official of the human research protection program.

(c) Documentation must be submitted to the NRL Human Research Protection Official (HRPO), by way of the NRL Program Officer. If the research is determined by the IRB to be greater than minimal risk, you also must provide the name and contact information for the independent research monitor and a written summary of the monitors' duties, authorities, and responsibilities as approved by the IRB. For assistance with submission of

human subject research related documentation, contact the NRL Human Research Protection Official (HRPO) at (202) 767-3864.

(d) Contracts, orders, or grant awards and any subawards or modifications will include a statement indicating successful completion of the HRPO review. Research involving human subjects must not be commenced under any contract award or modification or any subcontract or grant subaward or modification until awardee receives notification from the Contracting or Grants Officer that the HRPO has approved the assurance as appropriate for the research under the award or modification and that the HRPO has reviewed the protocol and accepted the IRB approval or determination for compliance with Federal, DoD and DON research protection requirements. See, DFARS 252.235-7004. Guidance: https://www.onr.navy.mil/About-ONR/compliance-protections/Research-Protections/Human-Subject-Research

iv. *Use of Recombinant DNA or Synthetic Nucleic Acid Molecules*: Proposals which call for experiments using recombinant or synthetic nucleic acid molecules must include documentation of compliance with NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules (NIH Guidelines), approval of the Institutional Biosafety Committee (IBC), and copies of the DHHS Approval of the IBC letter. Guidance: https://www.ONR.navy.mil/About-ONR/compliance-protections/Research-Protections/recombinant-or-synthetic-nucleic-acid-molecules

v. *Institutional Dual Use Research of Concern*: As of September 24, 2015, all institutions and United States Government (USG) funding agencies subject to the United States Government Policy for Institutional Oversight of Life Sciences Dual Use Research of Concern must comply with all the requirements listed therein. If your research proposal directly involves certain biological agents or toxins, contact the cognizant Technical Point of Contact. U.S. Government Science, Safety, Security (S3) guidance may be found at http://www.phe.gov/s3/dualuse.

vi. *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 NRL contracts, grants, and other assistance instruments may be eligible to use HPCMP assets in support of their funded activities if NRL Technical Point of Contact 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/.

vii. *Project Meetings and Reviews (if applicable)*: Individual program reviews between the NRL 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 NRL, Washington, DC and 60% at other locations such as the contractor/grantee's facility, other contractor' facility or government facilities. Interim meetings are likely, but these will be accomplished via video telephone conferences, telephone

conferences, or via web-based collaboration tools.

b. Applicable to Grants, Cooperative Agreements, and TIAs (Appendix 2).

c. Applicable to Contracts and Other Transaction Agreements (Appendix 3).

3. <u>Reporting</u>: If the Federal share of any Federal award may include more than $500,000 over the period of performance, the post award reporting requirements, Award Term and Condition for Recipient Integrity and Performance Matters (2 CFR Part 200 Appendix XII), is applicable as follows:

A. Reporting of Matters Related to Recipient Integrity and Performance

1. General Reporting Requirement. If the total value of your currently active grants, cooperative agreements, and procurement contracts from all Federal awarding agencies exceeds $10,000,000 for any period of time during the period of performance of this Federal award, then you as the recipient during that period of time must maintain the currency of information reported to the System for Award Management (SAM) that is made available in the designated integrity and performance system (currently the Federal Awardee Performance and Integrity Information System (FAPIIS)) about civil, criminal, or administrative proceedings described in paragraph 2 of this award term and condition. This is a statutory requirement under section 41 U.S.C. 2313. All information posted in the designated integrity and performance system on or after April 15, 2011, except past performance reviews required for Federal procurement contracts, will be publicly available.

2. Proceedings About Which You Must Report. Submit the information required about each proceeding that:

a. Is in connection with the award or performance of a grant, cooperative agreement, or procurement contract from the Federal Government;

b. Reached its final disposition during the most recent five year period; and

c. Is one of the following:

(i) A criminal proceeding that resulted in a conviction, as defined in paragraph 5 of this award term and condition;

(ii) A civil proceeding that resulted in a finding of fault and liability and payment of a monetary fine, penalty, reimbursement, restitution, or damages of $5,000 or more;

(iii) An administrative proceeding, as defined in paragraph 5. of this award term and condition, that resulted in a finding of fault and liability and your payment of either a monetary fine or penalty of $5,000 or more or reimbursement, restitution, or damages in excess of $100,000; or

(iv) Any other criminal, civil, or administrative proceeding if:

(i) It could have led to an outcome described in paragraph 2.c. (1), (2), or (3) of this award term and condition;

(ii) It had a different disposition arrived at by consent or compromise with an acknowledgment of fault on your part; and

(iii) The requirement in this award term and condition to disclose information about the proceeding does not conflict with applicable laws and regulations.

3. Reporting Procedures. Enter in the SAM Entity Management area the information that SAM requires about each proceeding described in paragraph 2 of this award term and condition. You do not need to submit the information a second time under assistance awards that you received if you already provided the information through SAM because you were required to do so under Federal procurement contracts that you were awarded.

4. Reporting Frequency. During any period of time when you are subject to the requirement in paragraph 1 of this award term and condition, you must report proceedings information through SAM for the most recent five year period, either to report new information about any proceeding(s) that you have not reported previously or affirm that there is no new information to report. Recipients that have Federal contract, grant, and cooperative agreement awards with a cumulative total value greater than $10,000,000 must disclose semiannually any information about the criminal, civil, and administrative proceedings.

5. Definitions. For purposes of this award term and condition:

a. Administrative proceeding means a non-judicial process that is adjudicatory in nature in order to make a determination of fault or liability (e.g., Securities and Exchange Commission Administrative proceedings, Civilian Board of Contract Appeals proceedings, and Armed Services Board of Contract Appeals proceedings). This includes proceedings at the Federal and State level but only in connection with performance of a Federal contract or grant. It does not include audits, site visits, corrective plans, or inspection of deliverables.

b. Conviction, for purposes of this award term and condition, means a judgment or conviction of a criminal offense by any court of competent jurisdiction, whether entered upon a verdict or a plea, and includes a conviction entered upon a plea of nolo contendere.

c. Total value of currently active grants, cooperative agreements, and procurement contracts includes—

(i) Only the Federal share of the funding under any Federal award with a recipient cost share or match; and

(ii) The value of all expected funding increments under a Federal award and options, even if not yet exercised.

G. Federal Awarding Agency Contacts

1. Communications:

a. All UNCLASSIFIED communications shall be submitted via e-mail to the Technical Point of Contact (TPOC) at the e-mail address specified in the summary topic, unless otherwise specified.

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

c. Questions of a Technical nature should be submitted to the NRL TPOC whose program best matches the offeror's field of interest.

H. Other Information

The Government anticipates that any contract resulting from this BAA will be funded on an incremental basis as provided by FAR 52.232-22, "Limitation of Funds."

APPENDIX 1 – RESEARCH DESCRIPTION - SUMMARY TOPICS

II. Detailed information about the funding opportunity

The Naval Research Laboratory (NRL) is the Navy's corporate laboratory. NRL conducts basic and applied research for the Navy in a variety of scientific and technical disciplines. The basic research program is driven by perceptions about future requirements of the Navy.

The Navy's operational effectiveness depends on its ability to keep pace with rapidly developing technologies. NRL contributes to this requirement by conducting research in the following areas, organized into NRL'S three research directorates and Naval Center for Space Technology:

Systems Directorate Code 5000
Materials Science and Component Technology Directorate Code 6000
Ocean and Atmospheric Science and Technology Directorate Code 7000
Naval Center for Space Technology Code 8000

A. SYSTEMS DIRECTORATE - CODE 5000

53-18-01 - HIGH FREQUENCY RADAR

The Systems Section of the Advanced Radar Branch of the Naval Research Laboratory (NRL) conducts research and development in concepts and techniques for using high frequency (3 MHz to 30 MHz) radar to meet U.S. Navy mission requirements. Focus is on high frequency electromagnetic wave propagation and scattering (sky-wave and surface wave), radar system performance forecasting, radar system testing, radar data transfer, signal processing methodologies, spread Doppler clutter mitigation and use of the radar return to classify targets. Additional information on this new type of radar is available in the "Radar Handbook", 3rd edition, edited by M. I. Skolnik, pp. 20.1 – 20.83, McGraw-Hill, 2008 and in "Applications of high-frequency radar," Radio Science, Vol. 33, No. 4, Pages 1045-1054, July-August 1998.

Address White Papers (WP) to 5324BAA@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

53-18-01C - HIGH FREQUENCY RADAR (CLASSIFIED)

The Systems Section of the Advanced Radar Branch of the Naval Research Laboratory (NRL) conducts research and development in concepts and techniques for using high frequency (3 MHz to 30 MHz) radar to meet U.S. Navy mission requirements. Focus is on high frequency electromagnetic wave propagation and scattering (sky-wave and surface wave), radar system performance forecasting, radar system testing, radar data transfer, signal processing methodologies, spread Doppler clutter mitigation and use of the radar return to classify targets. Additional information on this new type of radar is available in Chapter 20 of the "Radar Handbook", edited by M. I. Skolnik, McGraw-Hill, 2008 and in "Applications of high-frequency radar," Radio Science, Vol. 33, No. 4, Pages 1045-1054, July-August 1998.

In order to provide a clear understanding of all aspects of the proposed program, classified proposals are acceptable. If the offeror is proposing to perform research in a classified area, indicate the level of classification of the organization, the Principal Investigator and all the proposed personnel, and the agency that issued the clearance; if a formal (classified) proposal is requested by NRL, an unclassified executive summary should accompany the proposal.

CLASSIFIED SUBMISSIONS

Contact nrlproposals@nrl.navy.mil for instructions on how to submit classified white papers and Proposals.

53-18-02 - LOW-COST WIDEBAND ANTENNA ARRAY TECHNOLOGIES

The RADAR Division of the Naval Research Laboratory (NRL) is interested in research which will help

reduce the cost of ultra-wide bandwidth multi-functional phased array antennas for communication and radar systems. To this end, NRL welcomes proposals that address the following areas:

1) New element design concepts, array architectures, feed components and construction processes that make it more affordable to manufacture large array apertures by a factor of 5 or more.

2) Techniques that reduce the number of radiating elements and/or feeding components while maintaining ultra-wide bandwidth, i.e. thinning, interleaving, or element scaling techniques.

3) Low-profile ultra-wide bandwidth array designs. This could include abstracted element types or apertures that are on the order of one-half a wavelength thick at the highest frequency of operation and/or can be printed on a single layer such as a thin substrate or potentially the (curved) surface of vehicle.

Proposals should address the value added by contrasting the proposed approach with conventional techniques and technology. This may be done by direct comparison or by a parametric analysis of sufficient depth to assess the benefits of the proposed approach.

Address White Papers (WP) to baa@radar.nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

53-18-03 - ADVANCED COMPUTATIONAL ELECTROMAGNETICS

The Radar Division of the Naval Research Laboratory (NRL) is interested in research that will lead to the accurate and timely analysis of CEM problems that are beyond the capability of the current state of the art computational methods to solve. The emphasis is on simulation of RADAR and antenna systems, but can be generalized to large electromagnetic structures that are multi-scale in nature – i.e. sub-wavelength features within systems that are many thousands of wavelengths in size. Proposals should address the following topics:

1) The ability to model with high-fidelity as well as visualize/manipulate electromagnetic objects having details on the order of fractions of a wavelength within composite systems that are several hundred to many thousands of wavelengths in size.

Emphasis on innovative techniques for high-fidelity simulations and visualizations of RF circuits, antennas, antenna arrays and large EMI/EMC sensitive systems.

2) Techniques/algorithms that reduce the condition number of very large systems of equations.

3) Methods to reduce the number of data points needed for full/accurate characterization of a system over broad frequency ranges or scan/incidence angles.

Address White Papers (WP) to baa@radar.nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

53-18-04 - RADIOFREQUENCY AND MILLIMETER-WAVE RADAR SYSTEMS, COMPONENTS, & TECHNOLOGIES

The Advanced Concepts Group of the Radar Division of the US Naval Research Laboratory (NRL) is developing systems, concepts, and techniques for advanced radar systems operating in the radiofrequency (0.3 to 30 GHz) and millimeter-wave (i.e., 30 to 300 GHz) ranges. Areas of specific interest include, but are not limited to innovative hardware, components, and supporting technologies applicable to radiofrequency and millimeter-wave radar systems, including integrated circuits, packaging and module techniques, advanced system/subsystem assembly techniques, innovative antennas and arrays, and wideband digital processors. Other areas of interest include novel signal processing algorithms and atmospheric propagation models applicable in the millimeter-wave range.

Address White Papers (WP) to 5307BAA@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

55-18-01 - INFORMATION MANAGEMENT AND DECISION ARCHITECTURES

The Information Management and Decision Architectures Branch of the Naval Research Laboratory (NRL) is seeking proposals for innovative research and development in information technology. Current and anticipated areas of research focus include:

1) Virtual simulations and mixed reality systems that support operational uses, situational awareness, and training, for both kinetic and non-kinetic missions. Current application areas include mobile augmented reality, virtual training environments, and interactive and automated dismounted infantry simulation and training. Research topics include information visualization techniques, adaptive user interfaces, interfaces for controlling one's avatar, multi-user distributed collaboration, system architecture and database designs, integration of novel hardware and software, training effectiveness evaluation, novel assessment techniques, adaptive training, and simulation fidelity. In all cases, NRL is interested in human factors evaluations, usability-based methodologies to quantify the costs and benefits of design choices, and understanding how system fidelity and training objectives interact and expressing results in terms of improvements in the field or live exercises.

2) Visual analytics systems to support multiple visual representations and multi- variate visualizations. Current work focuses on understanding of multiple data layers. Research topics include system architectures, large-scale displays (especially tiled display systems), multi-variate representations, statistical analysis techniques, and coordinated data views. In all cases, NRL is interested in human factors evaluations, new visualization metaphors, and measuring or assessing information overload.

3) Human Systems Integration research involving the following topics: real time physiological and behavioral measures of warfighter cognitive workload; new interfaces and interaction techniques for supervising unmanned systems; methods for training small unit decision making; new approaches for predicting and scheduling team member's tasking to enhance performance; evaluating different strategies for cross-culture trust generation.

4) Information management technologies that maximize the effectiveness of an enterprise (e.g., military operations) by improving its ability to act upon information that is produced and consumed within the enterprise and externally. Technologies that are of particular interest include: data management and exploitation technologies that apply emerging mathematics and information science to improve machine processing of large amounts of data, leading to a better understanding of information presented to decision makers; tools that reduce barriers to effective information use by providing intelligent notifications, mediation, access control, and persistence services; tools to assess information quality and suitability; tools that support automated management of information. Decision architecture research that supports understanding, modeling, prototyping and evaluating effective systems that discover, process, disseminate, visualize and present information in support of military decision making. Of particular interest is research into the following topics: identify and assess essential characteristics of decision making processes, and analyze the quality of these processes; identify and analyze the essential characteristics and parameters of decision making within application domains (e.g., C2, logistics, weather forecasting); and identify, study and specify notations, techniques, methods and tools that support understanding and improving these decision processes.

5) Application of multi agent research and related technologies for enhancing decision support capabilities in the Global Information Grid (GIG). Areas of interest may include, but are not limited to, new techniques for mixed-initiative interactions (e.g., human-agent collaboration) as well as the application of machine learning technologies and other artificial intelligence approaches to enable flexible multi- agent coordination and teamwork in open and dynamic environments. We are also interested in the application of game theory to model agent behaviors and interactions to gain an understanding of asymmetrical warfare environments. Additional areas of interest also include new techniques for building and maintaining ontologies, new approaches for utilizing such ontologies to support subsequent agent reasoning, and application of web services and semantic web services. Operational domains of interest include, but not limited to, improving human interaction with autonomous systems, threat detection within cyber-warfare, maritime domain awareness and Stabilization, Security, Transition and Reconstruction Operations (SSTRO). Research issues dealing with autonomous systems and cyber warfare involve new algorithms for anomaly detection and pattern recognition when handling very large datasets, and techniques to improve the ability of humans to process and understand the results from these algorithms. Within the domain of SSTRO, we are interested in improving information sharing between government and non-government organizations using web technologies.

6) Parallel and distributed simulation technology. The emphasis is on advanced Modeling and Simulation (M&S) architectures, particularly for distributed systems. The latter includes classical cluster and shared memory architectures, as well as geographically distributed large-scale simulations. Areas of current interest include the formal description of math and physics-based

models for building composable systems, natural environmental effects servers for M&S architectures, and web-based DoD technology.

Address White Papers (WP) to 5580baa@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

55-18-02 - MATHEMATICAL FOUNDATIONS OF HIGH ASSURANCE COMPUTING

(This may require a DD 254 at the TS level due to investigation requirements – depending on access required, duties and deliverables.)

The Formal Methods Section (Code 5543) of the Naval Research Laboratory's Center for High Assurance Computer Systems is seeking white papers for innovative research in the mathematics underlying security and high assurance computing.

Current and anticipated areas of research focus include:

A. Cryptographic Protocol Design and Analysis – We are interested in the analysis of security protocols for security and performance. Design of new protocols, together with their analysis, is also of interest. Analysis techniques may include formal methods, mathematical analysis, simulation, and experimental evaluation.

B. Information Hiding – We are interested in the mathematical, and in particular, information theoretic analysis of covert communication channels, steganography, watermarking, and related areas of information hiding and concealed knowledge. In addition, we are interested in the mathematics underlying pragmatic security solutions for possible collaborative research. Appropriate theoretical models from other areas, such as spike trains from the biosciences, are also of current research interest.

C. Anonymous Communication – We are interested in the design and analysis of traffic-security through anonymous and route-trusted communications. Emphasis will be placed on metrics and definitions for traffic security, cryptographic building blocks, network topology and structure, routing protocols, performance, usability, and secure distribution of network information. Techniques can be based on mathematical analysis, simulation and/or experimentation.

D. Mathematical and Logical Analysis of Distributed Systems – We are interested in mathematics and logics, which are integrated with design methodologies for producing secure distributed systems. Emphasis will be placed on hardware-software codesign, distributed architectures, and programming methodologies. The formal apparatus will include non-standard logics (modal, substructural, etc.), category theory, domain theory, Shannon information theory, and structures that relate these elements in an elegant and coherent manner.

Address White Papers (WP) to 5543info@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

55-18-03 - HIGH ASSURANCE ENGINEERING AND COMPUTING

(This may require a DD 254 at the TS level due to investigation requirements – depending on access required, duties and deliverables.)

The Center for High Assurance Computer Systems of the Naval Research Laboratory (NRL) is seeking white papers for innovative research, advanced system concepts and security architectures, and the development of prototypes, new analysis tools and techniques in the areas of information assurance (IA), cyber security, software engineering, mobile system security, and real-time systems. Current and anticipated areas of research focus include:

A. Communications Security (COMSEC) Systems

1. Advanced Cryptographic Technologies – We are interested in the research and development of advanced cryptographic technologies for the Cryptographic Modernization Initiative (CMI), that include but are not limited to, software-based cryptography, secure kernel development for embedded real-time environments supporting MILS and MLS, cryptographic interoperability specifications for modern cryptographic waveforms, software definable radio architectures, modernized/dispensable cryptographic devices for the tactical edge, and modeling and emulation of high speed secure cryptographic techniques.
2. Key Distribution Technologies – We are interested in the research and development of net-centric key distribution systems. Additionally, we are interested in secure key management architectures and advanced key management techniques, such as key net broadcast, group key concepts, quantum cryptography for COMSEC and secure key distribution, and integrated key/mission planning.
3. IA Enabling Technologies – We are interested in innovative solutions and developing IA enabling technologies in a broad spectrum of research areas that include, but are not limited to, network threat visualization mapping, secureBIOS/secure hardware platform/secure root of trust technologies, trusted execution flow and data filtering frameworks, and security enhanced/trusted operating system (OS) development (including, not limited to SELinux policy development).
4. Guarding Solutions – We are interested in the research and development of high assurance Cross Domain Solutions (CDS) to support assured information sharing, e.g., security policy management across disparate enclaves/domains. Likewise, we are interested in the research and development of secure gateway technology and new analysis tools and techniques for enabling remote monitoring/administration/configuration of such security devices.

B. Computer Security

1. Security Architecture – We are interested in the design and development of security architectures for enterprise systems. Federated identity management systems and access control solutions for data sharing are of particular interest. In addition, we are interested in data protection mechanisms and vulnerability assessments of systems.
2. Application Security – We are interested in innovative solutions and developing practical approaches that enhance and apply security to Service Oriented Architectures (SOA). Emphasis will be placed on security ontologies for machine-understandability, automated machine understandable security policies and tools, application-specific security monitoring,

and flexible run-time binding to enhance survivability. Techniques, tools, and solutions for automatic web service composition, as well as cross-domain web service discovery and invocation for multilevel secure SOA are also of interest.

3. High-assurance Software and Safe Execution Environments – We are interested in software engineering methods, processes, and tools that are required to build high-assurance software. Additionally, we are interested in creating a safe software execution environment by using virtualization techniques to prevent failure propagation.

C. Network Security

1. Computer Network Defense – We are interested in the research and development of high assurance network security architectures and solutions (e.g., components, toolkits, equipment, software, and systems). We are interested in the development of tools and solutions for security information, configuration management, and event management. Emphasis on providing a single, holistic view of network health and status, aggregating data feeds from diverse sources, and optimization of network monitoring processes is of particular interest. Additionally, we are interested in development of tools, techniques, and solutions for network intrusion detection, as well as visualization capabilities to dynamically and visually display network situational awareness.
2. Malicious Code Analysis – We are interested in developing methods, tools, solutions for malicious code analysis, reverse code engineering, and other anti-forensic/anti-reversing techniques. The customization and maintenance of malware analysis tools, the application of knowledge of malicious code trends and concepts, and diverse reporting capabilities, such as compilation of malware research findings and identification of unique malware characteristics are also of interest. Additionally, we are interested in scrutinization of coding techniques, language usage/proficiency, and file format properties to identify the level of code sophistication and potential origin are also of interest.

D. Modern Mobile and Wireless Communications Systems Security

1. Discovery and Vulnerability Analysis – We are interested in tools and techniques for wireless network discovery in support of computer network defense and for the visualization of wireless networks using Geographic Information Systems (GIS).
2. Wireless Security Protocols – We are interested in the research of next generation wireless communications and security-enabled protocols suitable for operation over heterogeneous networks. Novel analysis techniques to assess network and security performance of secure wireless protocols are also of particular interest.
3. Next Generation Wireless Networks & Components – We are interested in security engineering and research for next generation mobile ad hoc networks. This includes, but is not limited to emulation and simulation environments for next generation wireless networks; traffic analysis in support of anonymization of next generation wireless networks; cognitive radio technology; and security of cognitive and software defined radios.
4. Geo-location Technologies – We are interested geo-location techniques and technologies for wireless transmitters, including Time Difference of Arrival (TDoA), Angle of Arrival (AoA) and received signal strength-based techniques. Phased array antennas and smart antennas in support of mobile, dynamic communications and information operations systems are of particular interest.

E. Software Engineering

1. Software Development and Analysis – We are interested in the development of mathematically based methods, models, algorithms, and theories supporting both the construction as well as the analysis of software at different levels of abstraction from requirements through binary code. Techniques, tools, and solutions for fault-tolerant computing, real-time computing, hardware/software co-design, secure software construction & analysis, and binary analysis is also of interest.
2. Middleware for Secure and Dependable Distributed Systems – We are interested in the research and development of reconfigurable and secure middleware that includes, but is not limited to, transformational code development, multi-agent systems, agent-oriented software engineering, and the formal analysis of software engineering artifacts.

Address White Papers (WP) to 5540info@ccs.nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

55-18-04 - ADVANCED NAVAL NETWORK SOLUTIONS

(This may require a DD 254 at the TS level due to investigation requirements – depending on access required, duties and deliverables.)

The Networks and Communications Systems Branch of the Naval Research Laboratory (NRL) is seeking White Papers for innovative research and development in information technology; specifically, relatively mature technology (TRL 6 and higher) for Naval Network and Communications Solutions. Current areas of research focus include:

1) Software Reprogrammable Payload (SRP) Waveforms. Implementation of complex waveforms (such as TTNT, HNW, and unmanned platform Control Station Algorithms) hosted on CPCI cards, as part of a systems level, heterogeneous networking capability. Ensure linkage to ONR funded Enabling Capabilities (EC's) in Advanced Tactical Data Links (ATDLES) and SATCOM mitigation. Solutions may be IP or non-IP based.

2) Advanced Tactical Edge Solutions. Demonstrate candidate technologies for next generation Tactical Communications Links, integrated, systems level solutions to Ad-Hoc Naval Tactical Edge Mobile Area Networks and candidate protocol stacks/application layer toolkits, with connectivity of up to 30 nodes, including air, ground and sea platforms.

3) Spectrum Diversity. Identify integrated, wireless, heterogeneous solutions for network connectivity between afloat and airborne platforms (e.g., ships, aircraft, and UAV's), to include Line of Sight (LOS) solutions. Also, identify and implement advanced waveforms to maximize bandwidth at various ranges to achieve the best signal surpluses, and include in possible solutions improved antennae, maximized efficiency of legacy communications links, UAV communications relays, and wireless connectivity for tactical users. Optical as well as RF solutions at a variety of frequency bands are encouraged.

4) SATCOM Mitigation. Integrate technological solutions for overcoming the loss or over-subscription of SATCOM connectivity between (a) deployed units in an Expeditionary or Carrier Strike groups (ESG or CSG; respectively), and (b) connectivity reachback ashore from deployed ESG/CSG in any given geographic area of responsibility. Solutions must be exportable, scalable, and relevant in any geographic maritime environment in which an ESG or CSG might operate, and must include compatible, tactical edge connectivity and services. Particular interest exists in solutions that can be hosted on small- to medium-UAVs, and in other airborne relays.

5) PODs. Integrate candidate radio payloads (e.g., Sea Lancet, SRP, etc) into small airborne PODs, using currently available airframe modifications and POR technology, for both unmanned and manned platforms, conforming to NAVAIR standards and size, weight and power (SWAP) requirements. Include receivers, antennae, and payload.

Address White Papers to 5520baa@nrl.navy.mil. Allow one month before requesting confirmation of receipt of White Paper, if confirmation is desired. Substantive contact should not take place prior to evaluation of a White Paper by NRL. If necessary, NRL will initiate substantive contact.

55-18-05 - SOFTWARE ENGINEERING FOR HIGH ASSURANCE COMPUTER SYSTEMS

(This may require a DD 254 at the TS level due to investigation requirements – depending on access required, duties and deliverables.)

The Software Engineering Section of the Naval Research Laboratory's Center for High Assurance Computer Systems is seeking white papers for innovative research in methods, tools, and techniques for constructing and analyzing high assurance software systems. Applying such methods and tools is necessary in the development of software for systems such as autonomous systems, weapons systems, and security devices that must satisfy critical system properties, such as safety, timing, fault tolerance, and security.

Current and anticipated areas of research focus include:

1) Model-Based Software Development and Analysis – We are interested in the development of formal, mathematically based methods supporting model-based software development. Methods and tools for fault-tolerant computing, hardware and software co-design, and construction and analysis of secure software are of special interest. Further topics of interest include compositional techniques; model abstraction, refinement, and transformation; combining models from different modeling domains; verification techniques and tools, including decision procedures and theorem proving; relating assertions in source code to system properties; automatic test case generation; code analysis using static and/or dynamic techniques; code synthesis; source code optimization; combining high assurance techniques with adaptive agents and cognitive models; and achieving trust in autonomous systems.

2) Methods for Developing and Analyzing Software for Real-Time Systems – We are interested in research and development of different notations of time, construction and analysis of hybrid (continuous and discrete) timed models, methods for composing timed models, methods for representing the required system and software timing properties and translating these properties into constraints on the execution platform, and methods for analyzing system behavior to ensure that it satisfies the required timing properties.

Address White Papers (WP) to 5546info@ccs.nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

55-18-06 - FEDERATED, DISTRIBUTED COMPUTING/NETWORK INFRASTRUCTURE
(This may require a DD 254 at the TS level due to investigation requirements – depending on access required, duties and deliverables.)

The Center for Computational Science of the Naval Research Laboratory (NRL) is interested in receiving proposals in emerging scalable leading edge technologies relevant to high performance (HP) distributed supercomputing, wide area networking and visualization, and data collaboration technology for High End Computing (HEC). Research involves work in scaling single-image large memory supercomputer processing for scientific problems undertaken as part of the NRL, ONR and High Performance Computing Modernization Office programs; research is ongoing in the areas of exascale computing, infrastructure virtualization, collaboratory and conferencing environments; streaming multi-gigabit multimedia network technology while providing E2E QoS guarantees; federated, distributed technology for multi-petabyte scale file systems; prototype environments for the design of scalable, object oriented multimedia databases for near-realtime access, archival and retrieval; and stream and compression technology for transmission of progressive motion and/or high resolution imagery.

Recent advances in very high resolution sensors with collocated energy-efficient processors continue to mount challenges to various dynamic metrics of agile, adaptive and comprehensive processing of sensor data across C4ISR networks with embedded computing distributed across these networks: at the sensor, at the archives and near the end-user. Large scale data-analytic solutions in the areas multisource information fusion, persistent video analytics, content characterization and retrieval based on dynamic content features are now being recast from the perspective of near-real-time high performance computing networks. Algorithm development aimed at C4ISR networks using adaptively taskable sensors in size weight and power (SWAP) constrained computing environments are also of interest. Innovative sensing inside latency- and bandwidth-challenged degraded, actively contested and/or urban environments requires new approaches. Video analytics that extract content dynamics, situation awareness, 3D structure of rich scenes, and exploit geospatial information including 3D point clouds, terrain maps, muliti-sensor motion imagery, etc. are of interest.

The research objective is to investigate and develop innovative approaches and techniques that have the potential to create superior revolutionary rather than evolutionary advances in computing, communications, display and information infrastructures and tools. In addition to software and emerging hardware advances, NRL seeks new methodologies for interconnecting energy-efficient heterogeneous

systems through high speed network technologies that over time have the potential to scale to terabit flows; all-optical amplified wavelength division networking and optical burst switching technology; high performance stream access to remote assets over commercial networks; leading edge flow routing architectures capable of end-to-end streams with QoS guarantees; and information assurance and encryption technologies and tools for the above. Alternatives to von Neumann architectures are of interest.

Address White Papers (WP) to baa@cmf.nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

56-18-01 - OPTICAL SCIENCES R&D

Optical Science Division of the Naval Research Laboratory (NRL) is seeking proposals for innovative research supporting ongoing programs within the Optical Sciences Division related to a wide variety of topics in the following areas:

1) The development of countermeasures against laser guided or laser aided threats, such as laser beamrider missiles, laser designators, and laser rangefinders. Of these, laser beamriders are the highest priority threat. Innovative new techniques which support laser countermeasures are desired.

2) The development of countermeasure technology and countermeasure techniques against advanced anti-air and anti-ship imaging infrared seekers. NRL is interested in organizations with a strong knowledge of imaging tracker design and processing to conduct the countermeasure research. Offerors must also have background in the use of modeling and simulation tools for imaging seekers to conduct countermeasure research.

3) Fabrication of optical fibers that transmit infrared (IR) radiation, especially chalcogenide and heavy-metal oxide glass fibers; processing techniques for making IR fibers; purification of glass starting materials; novel crucible fiber drawing techniques; specialty fibers for chemical sensor applications and techniques for making chemical sensors. Development of ruggedized, vibration-resistant and athermal cables and connectors for middle wavelength IR (MWIR) fibers for use with high power mid-IR lasers. New technologies for making IR fiber switches to work with mid-IR lasers as well as technology for fabrication of IR fiber couplers, filters and splitters.

4) Fabrication of domes, aspherical optics and large (≥ 20 inch) diameter windows with high transmission across UV-Visible and infrared wavelengths. Technologies are sought that utilize environmentally rugged materials (glasses, ceramics or poly/single crystals) and produce defect-free optics with wide band anti-reflection coatings.

5) New and advanced technology for making highly-efficient, thin film photovoltaic devices. Areas of interest include new absorber materials, earth-abundant materials, and technologies enabling thin film based multi-junction devices. In addition, innovative techniques to form flexible devices by depositing these films on flexible polymer or metal substrates are required.

6) Fiber optic sensors for detecting acoustic, magnetic and electric fields, rotation rate, strain, temperature, pressure, chemical, and other parameters. Novel interrogation, multiplexing, demultiplexing and modulation/demodulation techniques using frequency, wavelength and time division, or other techniques to increase sensor count per fiber, decrease electronic demodulation power requirements, and provide all-optical signal processing, and lower total system cost are desired. In addition methods are sought for improving fiber sensor performance, packaging, deployment, and survivability of these systems in a variety of environments. Low phase noise laser sources that feature very good isolation from ambient effects to improve overall optical system performance are desired. Low power, high bandwidth, signal-processing components with automatic signal detection to fill current technology gaps for autonomous sensors are of interest. Robust, agile, advanced automation tools that are able to detect, classify and track selected targets of interest acoustically, using data from fixed and mobile arrays and generate automated contact reports are desired to reduce manpower requirements associated with sonar operator tasks.

7) High frequency data transfer networks using fiber optics; signal processing in fiber optic links; optical-microwave delay lines for gigahertz signal transmission, high frequency directly modulated diodes and external modulators, and high speed detectors (particularly any aforementioned device that reduces delay line loss). Fiber devices such as amplifiers, fiber lasers, super-luminescent fibers, and phase shifters; laser diodes that meet military specifications and can operate in the multigigabit/s range; harmonic generation and mixing using laser diodes; nonlinear effects that impact fiber optic links such as soliton propagation, Brillouin scattering, and four-wave mixing. Integrated optical devices for sensors, optical-microwave delay lines, signal processing, networks, digital or analog communication links.

8) Glass and processing techniques for nanochannel glass technology and holey fibers; specialty glasses and fibers for sensor applications and nuclear radiation hardness; glass and processing techniques for microwire glass technology; optical fibers with high mechanical strength, survivable coatings, and low bending loss. Novel nonlinear optical materials for optical limiters and switches to protect eyes and sensors against intense laser radiation; photonic band-gap materials; optical properties of materials and coatings; narrow band gap superlattices; quantum wells, wires and dots; bioconjugated quantum dots to probe cellular and environmental behavior; novel nanostructures; the interaction of light with single microdroplets; development of real-time in-situ optical instrumentation to detect bioaerosols, including single particles on-the-fly; development of type II “W” mid-IR lasers and quantum cascade lasers; other MWIR laser and amplifier devices that increase brightness and power; organic light emitting sources and optoelectronics; slow light studies; nonlinear optical probes such as Fast CARS; and development of condition based sensors for oil debris monitoring.

9) Electro-optical, visible, infrared, multi spectral and hyperspectral technologies used in systems for reconnaissance and surveillance of air, ocean, and ground targets, from space, air, surface and subsurface platforms; high-speed digital optical/RF communications in a tactical environment, including architectural issues; algorithmic development, including digital image and signal processing algorithms for target detection and tracking; the measurement and theory of optical

signatures of air and ocean targets; the acquisition, and characterization and simulation of large-area background imagery; atmospheric propagation effects relevant to missile warning, laser countermeasures, and imaging; electro-optical sensor technology including efficient high-speed photo-detectors, focal plane arrays and signal processing; electro-optical components; digital holography and electronic shutters; signal processing and data compression for multi color electro-optical and infrared sensors; mult-int sensor/data fusion and exploitation; neural network processing and electronics particularly applicable to electro-optical sensors; advanced data compression techniques and electronics for very large area visible, infrared, and multi spectral; pulsed solid state blue-green lasers.

Address White Papers (WP) to OptSciNRL_BAA@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

57-18-01 - INNOVATIVE ANTI-SHIP MISSILE - ELECTRONIC WARFARE SIMULATION TECHNOLOGY

The Integrated EW Simulation (IEWS) Branch of the Naval Research Laboratory (NRL) conducts research and development in the simulation of anti-ship cruise missile (ASCM) threats that address priority requirements to meet the anti-ship missile defense EW mission.

The IEWS Branch has an ongoing requirement for proposals that address the research and development of innovative new technologies, components, and systems to support the next generation of EW simulation programs. Investigations focus on the basic areas of research into technologies relating to hardware/software simulation of future advanced missile threats to the surface fleet and EW techniques to defend against the advanced threats, as well as methodology to validate the simulators. The ultimate goal of the research is to enable future development of a combination of EW simulation, modeling, and analysis capabilities to meet the Anti-Ship Missile Defense EW mission. Of particular interest are research into innovative simulator architectures capable of multi-signal emissions, reception, signal processing and displays, and signal analysis tools for use in understanding and countering advanced anti-ship, RF guided (active radar, anti-radiation, and LPI) missile threats.

NRL will consider proposals offering short term studies (6-8 man-months) which can be used to decide if the research deserves investments or longer range studies.

Address White Papers (WP) to 5760BAA@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place before evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

57-18-02 - ELECTROMAGNETIC TECHNIQUES AND TECHNOLOGY RESEARCH AND DEVELOPMENT

The U.S. Navy is interested in exploring the use of High Power Electromagnetic techniques and technologies for purposes including anti-ship missile defense (ASMD), engine stopping, counter

improvised explosive devices, and command and control warfare (C2W). Proposals that incorporate NRL capabilities are encouraged. Proposals for research and development into High Power Electromagnetic techniques and technologies may include, but are not be limited to:

1) Wideband (narrow-pulse) HPM sources. The sources of interest range from compact, lightweight devices that may be conventionally or explosively driven to larger, higher power devices that are suitable for shipboard installation.

2) Narrowband HPM sources. The sources of interest are generally high duty, relatively long pulse transmitters. Very high peak power, high average power, and high efficiency are all desirable.

3) Innovative conventional and non-conventional HPM based electronic attack (EA) techniques and systems including anti-missile defense applications, special operations, engine stopping, counter improvised explosive devices, command applications and C2W applications.

4) The use of RF transmission and backscatter to identify, determine properties, and/or locate potential threat devices.

5) Interactions of lasers with materials and electronics. Particular interest in femtosecond laser technology and atmospheric propagation.

6) Methods and technology for defending Naval systems from high power Electromagnetic attack.

7) RF countermeasure techniques and technologies for anti-ship missile defense.

8) Modeling and simulation ranging from device level simulation to campaign models that explore the utility of high power electromagnetic weapons.

9) Nearfield effects, sources, and antennas.

10) Ultrashort pulse laser technologies.

NRL more favorably will consider proposals offering initial increments comprised of short term studies (6-8 man-months) which then can be used to decide if the research deserves further investment.

Address White Papers (WP) to BAAHPEM5745@nrl.navy.mil. Any specific security questions should be addressed in advance of proposal submission via separate discussion. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

57-18-03 - OFFBOARD COUNTERMEASURE TECHNIQUES AND TECHNOLOGY RESEARCH AND DEVELOPMENT

The U.S. Navy is interested in exploring the use of Offboard Countermeasure techniques and technologies for purposes of Naval Electromagnetic (EM) Spectrum Dominance and EM Maneuver

Warfare (EMMW). Proposals that incorporate NRL capabilities are encouraged. Proposals may include, but are not limited to:.

1) Wideband, highly linear RF (primarily C, X, Ku, K, Ka, and W bands) technologies and concepts for Size, Weight, and Power (SWaP) constrained applications:
   a. Isolation technologies and concepts;
   b. Antennas and antenna feed structures and technologies;
   c. High speed receiver technologies and concepts (detection, classification, etc.);
   d. Signal processing technologies, techniques, and concepts;
   e. Transmitter technologies and concepts;
2) Integrated, multi-platform (all onboard, all offboard, or combination on and offboard) EW techniques and concepts;
3) Extreme temperature materials for decoy towlines;
4) Highly efficient power generation;
5) Size, Weight, and Power (SWaP) constrained, highly efficient cooling technologies;
6) Novel and innovative IR and visible obscurant materials for use in offboard decoys;
7) Concepts and technologies supporting low cost, expendable/semi-expendable unmanned vehicles; and
8) Field experiments to evaluate and quantify the performance of:
   a. Single offboard EW systems;
   b. Multiple offboard EW systems operating for a common goal;
   c. Integrated on and offboard EW.

NRL is interested in proposals offering initial increments comprised of short term studies (6-8 man-months) which can then be used to decide if the research deserves further investment.

Address White Papers (WP) to 5710Proposals@nrl.navy.mil . Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

57-18-04 - AIRBORNE ELECTRONIC WARFARE

The Aerospace Electronic Warfare Branch (AEWS) of the Naval Research Laboratory (NRL) conducts research and development into electronic warfare (EW) technologies, particularly in electronic attack (EA), that support future Navy/Marine aviation concepts and needs. The Branch researches and experiments with technologies that counter the threat kill chain from broad area surveillance to terminal defense. Countermeasure application areas include the suppression of enemy air defenses (SEAD) mission, command and control links, satellite navigation systems, passive coherent location (PCL) systems, non-cooperative target recognition radars (SAR, ISAR, IFSAR, HRR, Noise…), adaptive active/passive electronically steerable array acquisition and targeting radars, broad area surveillance radars including high frequency (HF) over-the-horizon and surface wave radars, millimeter wave, and multi-spectral threats.

The Airborne EW Systems Branch is interested in receiving proposals for research and development that support its mission. Specific areas of interest include, but are not limited to:

1) Very wideband electronic countermeasures (ECM) technologies, including amplifiers (tubes, solid state, and hybrids), power combiners, filters, circulators, isolators, and other discrete components;
2) Wideband, efficient, high power millimeter wave transmitter concepts and technologies;
3) Innovative and compact antenna designs for efficient transmission or reception of electromagnetic EM energy at long wavelengths;
4) Wideband, multifunction, or other special requirement antenna designs and technology;
5) Innovative conventional and non-conventional ECM techniques and systems for application in all phases of naval aviation activity including both the strike mission support and air-to-air engagements;
6) Innovative methods for the generation of cognitive adaptive optimized EA and Electronic Support (ES) techniques;;
7) Concepts and technologies to efficiently cue an EA exciter to select/generate appropriate EA techniques in a dense signal environment, especially with respect to the constrained payloads available to tactical airborne platforms including unmanned air vehicles (UAVs);
8) Concepts and technologies to support EA and ES from UAVs;
9) Network-centric approaches to the command and control of multiple UAVs performing an EA mission;
10) Innovative approaches to machine learning, signal identification, and signal classification;
11) Innovative and effective methods and technologies to enhance satellite navigation protection for blue forces or to counter satellite navigation by hostile forces;
12) Practical and accurate methods for determining in real time or near real time the effectiveness of EA techniques generated from airborne platforms.
13) Wideband transmitter and receiver hardware with high dynamic range and algorithms to increase the dynamic range of existing systems; and
14) Processing architectures that allow for implementation of massively parallel algorithms, especially those that are realizable in small size, weight, and power.

The foregoing description should be interpreted within the following guidelines which apply to all BAA topics but are stated here for emphasis: (1) NRL is not interested in concepts that have already been developed or proven (even if they have never been sold before), (2) NRL seeks proposals for scientific study and experimentation directed toward advancing the state-of-the-art or increasing knowledge or understanding and (3) deliverables should demonstrate the results of scientific study and experimentation rather than focus on a specific system or hardware solution. Proposals for portions or subsets of the above listed efforts are encouraged.

Address White Papers (WP) to Code5730@nrl.navy.mil. Allow one month before requesting confirmation of receipt of Initial Proposal, if confirmation is desired. Substantive contact should not take place prior to evaluation of an Initial Proposal by NRL. If necessary, NRL will initiate substantive contact.

57-18-05 - SHIPBOARD ELECTRONIC WARFARE

The Surface Electronic Warfare Systems Branch (SEWS) of the Naval Research Laboratory (NRL) conducts research and development of Electronic Warfare (EW) systems directed toward the protection

of Navy ships. The Branch mission includes the development of EW system and subsystem requirements; development, analysis and evaluation of shipboard ECM systems, subsystems with and components; threat assessments; and development of EW operational tactics and concepts.

The Surface EW Systems Branch is interested in receiving proposals for research and development into all of its mission areas. Specific areas of interest include, but are not limited to:

1) Signal Detection and Processing

The trend in threat emitter characteristics is toward lower power emitters with highly agile parameters, including pulse to pulse frequency variation and random or semi random pulse repetition frequency (PRF). These emitter characteristics may include parameter variations using identifiable sequences or random parameter variations. EW systems must be able to detect, de-interleave, sort, and measure intra-pulse and pulse-train parameters to classify and associate EA techniques with these agile emitters in a dense electromagnetic (EM) environment. Key research areas include:

- Detection and direction finding of LPI signals in a complex EM environment, including associated microwave receiver, antenna component, and system technologies that provide wide bandwidth and high sensitivity.
- Sorting and deinterleaving of frequency and PRI agile emitters in a complex EM environment.
- Pulse-to-pulse feature extraction for real time signal processing.
- Pulse and emitter measurements and derived pulse train measurements that provide parameters to improve emitter classification with minimal ambiguities.

2) Electronic Attack (EA) Technique Generation

Countering advanced threat systems will require innovative conventional and non-conventional ECM techniques and EA technique generators for application in all phases of the battle timeline including surveillance, targeting, acquisition, and terminal phases. In addition countering advanced threats requires a coherent technique generation which includes the ability to capture, store, and process threat pulses received in a complex EM environment. Key research areas include:

- Broadband, high dynamic range Digital Radio Frequency Memories (DRFMs).
- Finite Impulse Response (FIR) Filters.
- ECM techniques against Low Probability of Intercept (LPI) radars.
- Counter-targeting ECM techniques systems for battle force defense.

3) Advanced ECM transmitters

Increased threat capability and increasing threat density will require the development of new transmitter technology with expanded frequency coverage and multiple threat handling capability. Key research areas include:

- Millimeter-wave EW transmitter concepts and technologies.
- Broadband, multiple-simultaneous-beam antenna technology.
- Multifunction aperture designs and technology.
- Very wideband electronic countermeasures (ECM) technologies and components, including amplifiers (tubes, solid state, and hybrids), power combiners, filters, and other discrete devices.

4) Sensor Integration

Future EW systems will need to operate in a distributed, networked environment in order to provide effective capability against advanced threats in complex EM environment. Key research areas include:

- Shipboard sensor fusion techniques;
- Intra-ship information fusion/association techniques;
- Timely/near real-time EW effectiveness measurement technology.
- Distributed, networked battle force concepts, techniques and systems.

5) System Concept & Embarkable Prototype development and demonstration

The effective transition from research to operational use requires the demonstration of advanced technology in an operationally relevant environment in a manner that is consistent with how it would be deployed. The Surface EW Systems Branch has developed a standard interface that can rapidly and easily support the demonstration of advanced EW capability in a relevant shipboard environment. It allows for the integration and demonstration of signal detection and process technologies, EA Technique Generation technologies, Advanced ECM transmitter technologies, and Sensor Integration technologies into a field demonstrable (i.e. Embarkable Prototype) system. Key research areas include:

- Analysis tools for developing and assessing EW Concepts
- Methodologies/tools for assessing and quantifying countermeasure capability/effectiveness against current and projected threats.
- Technologies that facilitate rapid deployment, upgrade, and support of Advanced EW capability on Naval combatants.

NRL more favorably will consider proposals offering initial increments comprised of short-term studies (6-8man-months) which then can be used to decide if the research deserves further investment.

Address White Papers (WP) to Code5740Proposal@nrl.navy.mil. Allow one month before requesting confirmation of receipt of Initial Proposal, if confirmation is desired. Substantive contact should not take place prior to evaluation of an Initial Proposal by NRL. If necessary, NRL will initiate substantive contact.

B. MATERIALS SCIENCE AND COMPONENT TECHNOLOGY DIRECTORATE CODE 6000

60-18-01 - HIGH PERFORMANCE COMPUTING ON MASSIVELY PARALLEL ARCHITECTURES

The Laboratories for Computational Physics and Fluid Dynamics (LCP&FD) of the Naval Research Laboratory (NRL) conduct research and development supporting the national initiative in high performance computing. Advanced algorithms, codes and licensable software are developed for commodity systems and for the newest massively parallel architectures. Research is pursued in the fields of compressible and incompressible fluid dynamics, reactive flows, fluid/structure interaction including submarine and aerospace applications, atmospheric and solar geophysics, magneto-plasma

dynamics, fire modeling, engine modeling and molecular dynamics. We are interested in receiving proposals for basic scientific research and development directed toward increasing knowledge or understanding pertaining to our on-going programs in the following topics:

1) Novel modeling and simulation of complex combustion systems involving multi-phase fuel (including alternate and synthetic fuels) injection such as droplets, sprays and particulate matter in a gaseous background. Also innovative development, integration and maintenance of an environment for efficient approaches to the massively parallel processing of detailed chemical kinetics mechanisms and the development of simplified chemistry models (for conventional and alternate fuels) for inclusion in multidimensional simulations of flames, fire and detonations.

2) Innovative characterization of sound generation and investigation of methods to increase fuel-air mixing, reduce noise and pollution from jet engines burning current and future alternate fuels (including bio-derived and synthetic fuels) using direct and large eddy simulation techniques and supporting data for validation.

3) Novel numerical modeling for large scale studies with general boundary conditions, modeling of local phenomena in multidimensional magnetofluids, innovative many-body simulation models for plasma phenomena.

4) New radiation transport and equation of state models for inclusion in highly parallelized and vectorized hydrodynamic simulation codes which address astrophysical and laboratory plasmas, in which the effects of radiation transport and non-ideal equations of state are relevant.

5) Novel techniques for structured and unstructured grid-based unsteady flow solvers for complex, three-dimensional flows. This research would also address parallel load balancing and adaptive refinement and re-meshing for unsteady flows. CAD interfaces with grid generators and unsteady flow solvers for multiple moving surfaces and bodies in relative motion, bodies in and near a free surface, and bodies in turbulent separating flows are also sought.

6) Development and application of efficient Flux Corrected Transport (FCT) methods for Graphical Processing Units and other computational coprocessors.

7) Development, validation and application of techniques for complex multi-phase flows and development of innovative techniques for the simulation of low Reynolds number flows through complex geometries.

8) Innovative modeling of elastic-plastic flows and flow interactions with solid deformable boundaries. This includes shock loading in sand and/or explosive effects on deformable bodies.

9) Development of innovative and efficient numerical techniques, analysis and experiments for the simulation and validation of the performance and operation of continuous and pulsed detonation engines.

10) Development, application, validation, and accreditation of numerical simulation models needed to support decisions in protection of buildings, facilities, cities and/or military platforms from the

threat of chemical/biological incidents and blasts.

11) Development and application of scalable methodologies for urban geometry and feature extraction from LIDAR and remote sensing data.

12) Development and application of numerical simulation models, including visualization techniques, to investigate complex unsteady viscous flows associated with bio-fluidic systems and devices as well as artificial bio-mimetic vehicles and systems.

Address White Papers (WP) to Code 6040, by email to 6040whitepapers@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

61-18-01 - POWER/ENERGY SOURCE MATERIALS AND SYSTEMS

The Alternative Energy Section (Code 6113) of the Chemical Dynamics and Diagnostics Branch of the Naval Research Laboratory (NRL) is interested in receiving proposals for the improvement of power/energy sources for U.S. military missions, with a focus on electrochemical power systems such as batteries and fuel cells. Proposals will be considered for characterization tools for fuel cell and battery materials and approaches to improve the effectiveness of cell electrodes. Systems, systems analysis, or systems components for improving the weight and/or volume of a power/energy system are of interest, particularly for complete fuel cell systems. Advanced fueling solutions and storage concepts for hydrogen and oxygen will be considered when applicable.

Address White Papers (WP) to PowerEnergyBAA@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

61-18-02 - CORROSION PROCESSES, CONTROL, MITIGATION, AND TECHNOLOGY

The Naval Research Laboratory (NRL) is interested in receiving proposals for research and development in materials performance, environmental effects, corrosion processes, corrosion control and marine coatings technology. These efforts may include studies from basic corrosion mechanistic studies through applied technology and corrosion control initiatives. The areas of research and development activities of interest to NRL include, but are not limited to the following:

1) Develop computational modeling techniques for the development of predictive equations of state for materials, mechanistic prediction and prognostics, which could greatly reduce costs, techniques, methodology and processes for developing new materials with improved corrosion resistance and structural performance attributes. These may include fundamental composition modification, forming processes, treatments, processing and augmentation that permit optimization of properties, including corrosion resistance, cathodic protection requirements, reduction in localized effects, stress corrosion cracking resistance, reduced hydrogen

embrittlement, etc.

2) Improved properties of materials, inhibitors, surface modification and passivation, property enhancement related to materials physical property improvements, improved galvanic compatibility, minimize microbial influenced corrosion (MIC), electrochemical enhancement, plating, hardening, carburization and low temperature carburization, surface coatings, welding techniques, annealing, reduced susceptibility to stress corrosion cracking and hydrogen effects, novel methods for metal extraction, ionic liquids, rapid prototyping methods, oxidation/reduction effects. Materials efforts may contribute toward Navy vessels and may include but are not limited to: steels, HSLA steels, stainless steels, nickel alloys, aluminum alloys, titanium, copper/bronze, magnesium alloys, composites, polymers, anode materials, and novel materials, such as nano-based, amorphous, implanted, flame/plasma spray, novel microstructure and unique technology.

3) Design of marine coatings technology that contribute to improved corrosion performance, new resin/formulation properties, coatings durability, reduced total life cycle cost, dual-use, improved inspection capability, reduced/marginal surface preparation requirements, advanced application technology, rapid cure/single coat cure, self-inspecting, radar adsorption, acoustic damping, improved special hull treatment/mold in place, antifoulant technology, cavitation/erosion resistance, reduced maintenance and condition based maintenance (CBM). These efforts may pertain to all ship and submarine platform technologies and includes applications for aircraft, remotely operated vehicles, autonomous vehicles, Marine Corps vehicles, component parts and developing technology.

4) Development of: sensor technology, corrosion control systems, cathodic protection technology, electrochemical techniques, integrated components, biological materials, novel electronic circuits, smart materials and structures, dual-use systems, control algorithms, computational techniques, physical scale modeling, devices, components, bioremediation techniques, chlorination/dechlorination methods/equipment, descaling/fouling removal applications, electrical isolation, improved grounding, power systems, fuel cell technology, catalysts, membrane technology, materials extraction, novel manufacturing processes – including interstitial hardening and other surface modification processes that improve the corrosion resistance of materials, diamond materials, surface enhancements/detection methods, improved concrete processes/durability, and diver safety technology.

5) Development of materials, coatings, devices, components, product and systems that address crucial Naval and DoD requirements for corrosion prevention, control, remediation, maintenance, life-cycle extension, cost reduction, platform sustainment, sea basing, technical insertion, advanced ship design, propulsion systems, equipment design/specification, system engineering and unique naval applications.

Address White Papers (WP) to 6130BAA@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

61-18-03 - DEVELOPMENT OF MICROSENSORS AND MICROSYSTEMS FOR PHYSICAL, CHEMICAL, AND BIOCHEMICAL APPLICATIONS

The Naval Research Laboratory (NRL) is interested in receiving proposals for research and development of new microsensors and microsystems to detect a variety of physical phenomena and chemical and biochemical species. The Surface Nanoscience and Sensor Technology Section of the Chemistry Division addresses a variety of DoD problems, from drug analysis to chemical and biological threat agent detection. NRL is interested in receiving proposals related to the development of new microsensors and microsystems for the following applications: (1) measuring physical phenomena such as magnetic and electric fields, pressure, electromagnetic radiation, temperature, humidity, and other meteorological parameters; (2) detecting chemical species with high sensitivity and specificity; and (3) detecting biochemical species with high sensitivity and specificity.

Address White Papers to 6170BAA@nrl.navy.mil. Allow one month before requesting confirmation of receipt of White Paper, if confirmation is desired. Substantive contact should not take place prior to evaluation of a White Paper by NRL. If necessary, NRL will initiate substantive contact.

61-18-04 - APPLICATIONS OF MOLECULAR BIOLOGY, BIOCHEMISTRY, ANALYTICAL CHEMISTRY AND ADVANCED LASER TECHNIQUES

The Naval Research Laboratory (NRL) Chemistry Division conducts research in a number of areas related to detection of biological, chemical and other hazardous materials or conditions. In addition, the Division conducts research in developing tools and methods to transfer, preserve and characterize and optimize the performance of chemical and biological based materials.
Areas of primary interest include:

1) Characterization of environmental processes and their application to remediation and restoration technologies;
2) Detection, sampling and characterization of chemical and biological agents, toxic metal ions and explosives;
3) Unique analytical chemistry tools for more efficient and cost effective sample processing;
4) Genetic- and molecular biological-based tools; (4a) techniques for the preservation and characterization of cells, tissue and biomaterials; (4b) methods for printing environmental biological and chemical material;
5) Improved and alternative fuel sources that include hydrogen fuel cells, solid oxide fuel cells and microbial fuel cells;
6) Atmospheric propagation of femptosecond pulses;
7) Electromagnetic induction sensors and analysis for detection and classification of unexploded ordinance;
8) Advanced laser and optical techniques, including novel plasmonic systems, optical diagnostics, remote sensing, and materials-based optical signatures;
9) Microfluidic structures with application to microchip separations, sampling, detection and pumping;
10) Chemometrics;
11) Volume sensing through image analysis and machine vision; 12) Reactive multi-functional coatings;

12) High throughput culturing of unculturable and/or environmentally derived microorganisms;
13) Lithium ion battery safety diagnostics; and
14) Advanced power system analysis and optimization

Key words describing these research interests include, but are not limited to: chemical sensors, biosensors, biosurfactants, gene probe technology, biofilms, freeze-drying, lyophilization, cryopreservation, contaminated sediments, corrosion and biofouling, remote sensing, methane hydrates, carbon cycling, laser pressure, optical techniques, biocollector, MTADS, capillary electrophoresis, microchip, laboratory-on-a-chip microfabrication, microfluidics, video-based detection, machine vision, workspace monitoring, damage control, multivariate analysis, mobility fuels, thermal stability, antioxidants, and metal catalysis. NRL is interested in receiving proposals which address innovative technologies or fundamental approaches related to these research areas.

Address White Papers to code6110@nrl.navy.mil. Allow one month before requesting confirmation of receipt of White Paper, if confirmation is desired. Substantive contact should not take place prior to evaluation of a White Paper by NRL. If necessary, NRL will initiate substantive contact.

61-18-05 - DEVELOPMENT OF DISTINGUISHING MARKS ON FLEXIBLE SUBSTRATES

The Naval Research Laboratory (NRL) is seeking Research and Development of advanced technologies capable of creating distinguishing marks, optical signatures or patterns on flexible substrates. Applicable substrates include plastics, natural and synthetic fibers, and cloth made from fiber combinations. Technology areas of interest may include but are not limited to:

1) Nanomaterials (optical, electromagnetic, nanoparticles, nanofibers, conductive materials)
2) Responsive materials where change is initiated by exposure to electromagnetic radiation, thermal change, chemical change or electricity to yield an identifiable response detectable by human sense such as tactile, shape change or visual change
3) Materials that produce both linear and non-linear optical effects
4) Metamaterials
5) Magnetic materials including diamagnetic, paramagnetic and ferromagnetic
6) Nanophotonic materials (plasmonic, phononic, excitonic)
7) Additive manufacturing technologies
8) Micro/nanolithography technologies

Address White Papers (WP) to FlexMarks@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

61-18-06 - MULTIECHELON DIAGNOSTICS (MEDx) TECHNOLOGY DEVELOPMENT AND TIERED EVALUATION

Recent advances in diagnostic technologies are blurring the standard definitions of Echelons of Care *[see below for definitions]*. As smaller, faster, more sensitive, and easier to perform become superlatives of emerging technologies, those technologies may now be applicable to more than one Echelon of Care.

For example, complex genomic analysis for alleles, SNPs, or other unique genomic markers may have started out as an Echelon 4 activity, but can now be performed on a portable thermocycler device that has the operational characteristics to be successfully deployed at Echelons 1 or 2. Therefore, the community has never been more empowered to introduce new technologies across the battlespace, specifically the same technology with multiple concepts of operation.

The Naval Research Laboratory (NRL) is seeking Research & Development partners to advance technology developed for *in vitro* diagnostic devices that are amenable to military hardening and integration with communication capabilities to support the medical diagnostic and epidemiological detection and biosurveillance needs of the US military across multiple Echelons of Care and specifically for field deployment at Echelons 1 or 2.

Desired Design and Performance Capabilities
The Government is interested in proposals offering innovative, high functioning approaches for *in vitro* diagnostic devices that can operate at Echelon 1; however, superlative diagnostic technologies that operate at Echelon 2 will be considered. Offered technologies must be mature enough to enter into the Tiered Evaluation Model described in a later section of this call.
Proposals for both genomic and immuno-analysis technologies are sought. Desired performance capabilities for the two use cases are:

Genomic Analysis Platforms: Devices capable of detecting specific nucleic acid targets and/or examining molecular sequences at clinically relevant concentrations in complex clinical sample matrices, to include whole blood, serum/plasma, urine, and nasal swabs. An integrated or very simple method to nucleic acid sample preparation/purification is needed to operate without any complex external sample manipulation. Specifically DNA and/or RNA pathogen genomic signatures and/or host response biomarker targets must be measured, to provide positive identification of the causative agent of illness on a hand-held or man portable diagnostics system. Analysis should be multiplexed (minimum of four; preferred more than 5, including internal positive controls. Sample adequacy/processing controls and negative template controls are also encouraged) to provide a syndromic approach to disease identification; including sub-typing for diseases as appropriate (*e.g.*, dengue virus serotypes 1, 2, 3, and 4, phylogenetic differentiation of Ebola strains, et cetera).

High Performance Non-Nucleic Acid Analysis Platforms: Devices capable of identification of affinity ligand binding antigen capture (*e.g.*, immunoassay target platforms that promote identification of the causative agent of illness. Analysis should be multiplexed (minimum of three, preferred more than 4) to provide a syndromic approach to disease identification; including sub-classification for diseases as appropriate. Assays for immunological targets that indicate acute infections are preferred, particularly for deployment in endemic areas.

In either use case, the Device and Assay must have the following characteristics: The device must be a low-complexity diagnostic device usable by personnel following minimal training. A total sample to answer timeframe of one hour or less is preferred. The final technology package should be for use in field forward, often austere environments with limited resources. Important assumptions for these environments include that they have no surgical and limited patient holding capability, are manned by a Physician, Physician Assistant (PA), or Medic, with the mission of providing triage, and treatment to return military personnel to duty, or stabilizing them for evacuation to the next level care facility. The

device must have communications ability or can be easily integrated with a communication capability. The base requirement is that the communication of the resulting analytical data is possible via electronic means (*e.g.*, text message, email, image, PDF, et cetera). The device should have battery capability that assures no disruption in assay completion should field conditions change abruptly. Full battery operation with periodic battery charging is preferred. It is not required that the device is handheld, but the physical parameters of weight and footprint will be evaluated.

Devices should demonstrate sufficient analytical sensitivity, specificity and total (positive and negative) predictive value for infectious disease diagnostic applications. The Devices and Assays should be designed to diagnosis diseases whose origin is an infectious agent, pathogen, or toxin (organized as panels by syndromic presentation or pathogen class), and/or biomarkers of exposure to said agents. Analytes of interest include both pathogen and host-related exposure class-differential diagnostic markers. The ability to differentiate between pathogens that cause non-specific febrile systemic disease that needs to be differentially ruled in (and preferably ruled out) such as Malaria (specifically *P. falciparum*), Arboviral diseases (e.g. dengue, chikungunya, etc.), Typhoid, Arenaviral diseases, Rickettsial diseases, Viral hemorrhagic fevers (specifically Lassa fever and Ebola), Plague, Tularemia (*Francisella tularensis*), and melioidosis (*Burkholderia pseudomallei*) is desirable. The government is also highly interested in capabilities for the rapid analysis of Antimicrobial/Multi-drug resistance (AMR/MDR) sensitivity. Detection should be possible out of the appropriate sample matrix (*e.g.*, whole blood, serum, urine, saliva) with sample collection occurring at similar environmental conditions to the device operation. Sample preparation should be minimal or preferably automated. It is not a requirement that the device technology fulfilling the requirements outlined above be specifically designed for these pathogens/diseases, but the technology must be easily adaptable to such pathogens/diseases. A full use scenario from sample collection, through sample preparation, to answer must be offered with preference given to fully automated and user-friendly solutions.

NRL will work cooperatively with the Offeror to test and verify performance of the devices and to assist in the integration of the diagnostic devices with communication and device hardening for Echelon 1 application. The offeror must demonstrate manufacturing capability, or partnerships for manufacturing, that assure prototype Devices and Assays will be available for field deployment and testing at the end of the performance period.

Any potential International Traffic in Arms Regulations (ITAR) restrictions, including any anticipated restrictions likely to be generated by the proposed work plan, must be listed.

Tiered evaluation model

It is anticipated that the MEDx program will provide up to two years of funding for research and development through competitive prototyping. The timeline will be divided into three Tiers. The first Tier will be no more than 5 months and include time for NRL to independently benchmark the performance of the offerors technology with the current assay that best matches the stated diagnostic needs; note that not every need must be met by the technology at the time of proposal, but a clear path towards meeting those needs within the overall span of the program options must be described. Technologies of sufficient merit will be advanced to an optional second Tier that engages the offeror in research and development of the technology to meet all needs outlined with a performance period up to 12 months. Following the performance period, the developed technology will be again be independently

benchmarked by NRL. Finally, an optional third Tier of 3-9 months can be activated for the field deployment of the developed technology. The offeror will need to manufacture enough devices to supply the field study. Exact number of devices will depend on the offered technology, but anticipated requirements are for 500-5000 devices. These three Tiers include device development, testing and demonstration, evaluation, reporting, and selection activities. Selection of device candidates to be advanced into Tier 2 and Tier 3 will be based on specific parameters and metrics being successfully met in demonstration exercises. The government shall provide technical data and support for demonstrations, as well as facilitate interaction with relevant DoD and Interagency stakeholders.

Address White Papers (WP) to medx@nrl.navy.mil . Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a White Paper by NRL. If necessary, NRL will initiate substantive contact.

Appendix A: Echelons of Care Definitions. Information taken from:
Cubano, M.A,; Lenhart, M.K. *Emergency War Surgery*; US Army, Office of the Surgeon General; eBook; 2014; pp 410; ISBN: 016092197X.

Chapter 2

Levels of Medical Care

Military doctrine supports an integrated health services support system to triage, treat, evacuate, and return soldiers to duty in the most time efficient manner. It begins with the soldier on the battlefield and ends in hospitals located within the continental United States (CONUS). Care begins with first aid (self-aid/buddy aid, and combat lifesaver), rapidly progresses through emergency medical care (EMT) and advanced trauma management (ATM) to stabilizing surgery, and is followed by critical care transport to a level where more sophisticated treatment can be rendered.

There are **five levels of care (also known as "roles")**, previously referred to as echelons by NATO and ABCA (USA, Britain, Canada, Australia) countries. Levels should **not to be confused with American College of Surgeons use of the term in US trauma centers**. Different levels denote differences in capability, rather than the quality of care. Each level has the capability of the level forward of it and expands on that capability. Soldiers with minor injuries can be returned to duty after simple treatments at forward locations, all others are prepared for evacuation with medical care while en route to a higher level.

Level I

- Immediate first aid delivered at the scene.
  - First aid and immediate life-saving measures provided by self-aid, buddy aid, or a **combat lifesaver** (nonmedical team/squad member trained in enhanced first aid).
  - Care by the trauma specialist (91W) (**combat medic**), assigned to the medical platoon, trained as an Emergency Medical Technician-Basic (EMT-B). Some other primary

care providers, with various levels of training, include the Special Forces Medical Sergeant 18D, Special Operations Combat Medic 91W, SEAL Independent Duty Corpsman, Special Boat Corpsman, Pararescueman, and Special Operations Medical Technician.
  - Initial treatment of nuclear, biological, and chemical casualties, treatment of toxic industrial material casualties, primary disease prevention, combat stress control measures, and nonbattle injury prevention.
- Level I medical treatment facility (MTF) (commonly referred to as the Battalion Aid Station [BAS]).
  - Provides triage, treatment, and evacuation.
  - Physician, Physician Assistant (PA), and medics.
  - Return to duty, or stabilize and evacuate to the next level.
  - Can be chem/bio protected.
  - No surgical or patient holding capability.
- US Marine Corps (USMC): Shock Trauma Platoon (STP).
  - Small forward unit supports the Marine Expeditionary Force (MEF).
  - Stabilization and collecting/clearing companies.
  - 2 physicians.
  - No surgical capability.
  - Patient holding time limited to 3 hours.

Level II

- Increased medical capability and limited inpatient bed space.
- Includes basic primary care, optometry, combat operational stress control and mental health, dental, laboratory, surgical (when augmented) and X-ray capability.
- 100% mobile.
- Each service has a slightly different unit at this level.

- **Army.**
  - **Level II MTFs** operated by the treatment platoon of divisional/nondivisional medical companies/troops.
    - Basic/emergency treatment is continued.
    - Packed RBCs (Type 0, Rh positive and negative), limited X-ray, laboratory, and dental.
    - 20–40 cots with 72-hour holding.

- Can be chem/bio protected.
- No surgical capability.

- **Forward Surgical Team (FST).**
  - Continuous operations for up to 72 hours.
  - Life-saving resuscitative surgery, including general, orthopedic, and limited neurosurgical procedures.
  - 20-person team with 1 orthopedic and 3 general surgeons, 2 nurse anesthetists, critical care nurses and technicians.
  - The supporting medical company must provide logistical support and security. (Doctrinally, the FST is collocated with a Medical Company.)
  - ~1,000 sq ft surgical area.
  - Can be chem/bio protected.
  - Operational within 1 hour of arrival at the supported company.
  - May be transported by ground, fixed wing, or helicopter; some fleet surgical teams (FSTs) are airborne deployable.
  - 2 operating tables for a maximum of 10 cases per day and for a total of 30 operations within 72 hours.
  - Post-op intensive care for up to 8 patients for up to 6 hours.
  - X-ray, laboratory, and patient administrative support provided by the supporting medical company.
  - Requires additional electricity, water, and fuel from the supporting medical company.
  - The FST is not designed, staffed, or equipped for stand alone operations or conducting sick-call operations. Augmentation requirements are discussed in FM 4-02.25.

- **Air Force.**
  - **Mobile Field Surgical Team (MFST).**
    - 5-person team (general surgeon, orthopedist, anesthetist, emergency medicine physician, and OR nurse/tech).
    - 10 life/limb saving procedures in 24–48 hours from five backpacks (350 lb total gear).
    - Designed to augment an aid station or flight line clinic.
    - Not stand alone, requires water, shelter of opportunity, communications, among other things.

- Integral to remainder of Air Force (AF) Theater Hospital System.

- **Small Portable Expeditionary Aeromedical Rapid Response (SPEARR) team.**
  - 10-person team: 5-person MFST, 3-person CCATT (see Chapter 4, Aeromedical Evacuation) and a 2-person preventive medicine (PM) team (flight surgeon, public health officer).
  - Stand alone capable for 7 days, 600 sq ft tent.
  - 10 life/limb saving procedures in 24–48 hours.
  - Designed to provide surgical support, basic primary care, post-op critical care, and PM for early phase of deployment.
  - Highly mobile unit, with all equipment fitting in a one-pallet–sized trailer.
- **Expeditionary Medical Support (EMEDS) Basic.**
  - Medical and surgical support for an airbase, providing 24-hour sick call capability, resuscitative surgery, dental care, limited laboratory and X-ray capability.
  - 25 member staff includes SPEARR team.
  - 4 holding beds, 1 OR table, 3 climate controlled tents, and 3 pallets.
  - 10 life/limb saving procedures in 24–48 hours.
  - ~2,000 sq ft.
- **EMEDS + 10.**
  - Adds 6 beds to EMEDS Basic, for total of 10.
  - No additional surgical capability.
  - 56-person staff.
  - 6 tents, 14 pallets.
  - Can be chemically hardened.

- **Navy.**
  - **Casualty Receiving & Treatment Ships (CRTS).** CRTSs are part of an Amphibious Ready Group (ARG) and usually comprise one landing helicopter assault or amphibious (LHA) Tarawa-class or landing helicopter deck (LHD) Wasp-class ship, which are Marine amphibious

assault helicopter carriers that function as casualty receiving platforms. An ARG includes up to 6 ships with surgical capability only on the CRTS.

- 47-48 beds, 4-6 ORs, 17 ICU beds.
- 300 additional medical care beds may be available once Marines disembark.
- Fleet Surgical Teams (FSTs): 3-4 physicians, 1 surgeon, 1 CRNA or anesthesiologist and support staff.
- Usually 2 general surgeons and 2 orthopedic surgeons. OMFS (oral maxillofacial surgery) support available through the dental department. Can be substantially augmented.
- Laboratory, X-ray.
- Excellent casualty flow capability (large helicopter flight deck and landing craft units [LCU] well deck).
- Mass casualty (MASCAL) capability with triage area for 50 casualties.
- Doctrinally, holding capability is limited to 3 days.

- **Aircraft Carrier (CVN) Battle Group.**
  - 1 OR, 40–60 beds, 3 ICU beds.
  - 1 surgeon, 5 other medical officers.
  - Up to 9 ships, but usually only the CVN has physicians. Medical assets aboard aircraft carriers are intended for use by the aircraft carrier and its task force. Aircraft carriers are NOT casualty receiving ships and are not figured into medical assets for support to ground forces.
- **USMC.**
  - **Surgical Company**.
    - Provides surgical care for a MEF (Marine Expeditionary Force). Basis of allocation is 1 per infantry regiment.
    - 3 ORs, 60-bed capability.
    - Patient holding time up to 72 hours.
    - Stabilizing surgical procedures.
  - **Forward Resuscitative Surgical System (FRSS)**.
    - Embedded organically as part of the TO&E of the surgical company, if employed reduces the capability of its parent surgical company.

- Rapid assembly, highly mobile.
- Resuscitative surgery for 18 patients within 48 hours without resupply.
- 1 OR, 2 surgeons.
- No holding capability.
- No intrinsic evacuation capability.
- Chem/bio protected.
- Stand alone capable.

Level III

Represents the highest level of medical care available within the combat zone with the bulk of inpatient beds. Most deployable hospitals are modular, allowing the commander to tailor the medical response to expected or actual demand.

- **Army.**
  - Two different Corps-level Combat Support Hospital (CSH) designs.
    - Medical Force 2000 (MF2K) CSH.
    - Medical Reengineering Initiative (MRI) CSH will replace the MF2K.
  - **Combat Support Hospital.**
    - **MF2K CSH.**
      - Resuscitation, initial surgery, post-op care, and either return to duty or stabilize for further evacuation.
      - Up to 296 patients, typically divided into 8 ICUs (96 ICU beds), and 7 Intermediate Care Wards (ICWs) (140 beds), 1 neuropsychiatric (NP) ward (20 beds), and 2 minimal care wards (40 beds).
      - 175 officers, 429 enlisted; specialty attachments may increase numbers.
      - Up to 8 OR tables for a maximum of 144 operating hours per day.
      - General, orthopedic, urologic, neurosurgical, dental and oromaxillofacial surgery.
      - Blood bank, laboratory, X-ray/computer tomography (CT); nutrition, physical therapy and NP capabilities.
      - Dependent on a number of Corps support elements for personnel, finance, mortuary, legal, laundry,

security, and enemy prisoners of war (EPW) management, support.

- ◊ Transportation support required for both incoming and outgoing patient evacuation, and to transport the hospital.
- ◊ Transported via semitrailer, railcar, air cargo, or ship.
- ◊ Fully deployed CSH (including motor pool, billeting, heliport, and other life support activities) covers 30.3 acres.
- ◊ Divided into modules, deployed as a single unit or separately as the mission dictates. The main modules are the Hospital Unit-Base (HUB) and the Hospital Unit-Surgical (HUS).
  - ▪ HUB is the infrastructure of the CSH.
    - ▫ Up to 236 patients, divided into 36 ICU, 140 intermediate, 40 minimal, and 20 NP beds.
    - ▫ Two operating modules with specialty surgical care capability.
    - ▫ HQ, administrative, personnel, chaplain, laboratory, pharmacy, X-ray, and blood bank services.
    - ▫ Part of the HUB can be chem/bio protected (FM 4-02.7).
  - ▪ HUS capabilities.
    - ▫ 60 ICU patients, 2 OR modules, X-ray.
    - ▫ Dependent on the HUB for all logistical support.
    - ▫ Can be deployed forward, separate from the HUB, for brief periods as the mission dictates.

- **MRI CSH (Corps).**
  - o Provides hospitalization and outpatient services for all classes of patients in the theater, either returned to duty or stabilized for further evacuation.
  - o Headquarters/headquarters detachment: 15 officers and 44 enlisted.
  - o Up to 248 patients, typically divided into an 84-bed hospital company and a 164-bed hospital company, with split base operations capability.

2.7

- **84-bed hospital company.**
  - 24 ICU beds.
  - Up to 2 OR tables, maximum of 36 operating hours per day.
  - 3 ICWs (total 60 beds, including NP patients).
  - 56 officers and 112 enlisted personnel.
    - Some patient care areas can be chem/bio protected.
- **164-bed hospital company.**
  - 24 ICU beds.
  - Up to 4 OR tables, maximum of 60 operating hours per day.
  - 7 ICWs (total 140 beds, including NP patients).
  - 84 officers and 169 enlisted personnel.
    - Some patient care areas can be chem/bio protected.
- **Applicable to 84-, 164-, and 248-bed (see CSH [Echelon of Care, EAC] below) hospital companies.**
  - General, orthopedic, urologic, thoracic, OB/GYN, neurosurgical, dental and oromaxillofacial surgery.
  - Blood bank, laboratory, X-ray, nutrition, and physical therapy.
  - Dependent on EAC support elements for personnel, finance, mortuary, legal, laundry services, security and EPW support.
  - Parts can be chem/bio protected.
  - Transportation support required for both incoming and outgoing patient evacuation, and to transport the hospital.
  - Transported by semi-trailer, railcar, air cargo, or ship.
  - Fully deployed, covers 5.7 acres.
  - Minimal care wards are provided by an attached minimum care detachment.

- **Air Force.**
  - **EMEDS +25.**
    - 25-bed version of EMEDS Basic.
    - 84 personnel, 2 OR tables, 9 x 600 sq ft tents, and 20 pallets.
    - 20 operations in 48 hours.
    - Can be chemically hardened.

- Additional specialty modules can be added, including vascular/cardiothoracic, neurosurgery, OB/GYN, ear, nose and throat (ENT), ophthalmology teams; each comes with own personnel and equipment.

- **Navy.**
  - **Fleet Hospital.**
    - 500-bed hospitals, 80 ICU beds, and 6 ORs.
    - 1,000 personnel.
    - Stand alone; full ancillary services.
    - 8–10 days to be operational.
    - Large footprint — 28 acres, 450 isolation (ISO) shelters.
    - No limit on holding capability.
  - **Hospital Ships (TAH) — USNS Mercy and USNS Comfort.**
    - 1,000 beds, 100-bed ICU capability, and 12 ORs.
    - 1,000 staff, over 50 physicians.
    - Extensive laboratory and X-ray capabilities.
    - Patient holding is doctrinally limited to 5 days.

Level IV

- Definitive medical and surgical care outside the combat zone, yet within the communication zone/EAC of the theater of operations (TO).
- Patients requiring more intensive rehabilitation or special needs.
- Traditionally includes the MF2K Field Hospital (FH) and General Hospital (GH).
- In some situations, the MF2K CSH or a fixed hospital may act as a Level IV facility (eg, Landstuhl Army Regional Medical Center, Germany).
  - **Field Hospital.**
    - Semipermanent hospital that provides primarily convalescent care.
    - At least 2 OR tables for 24 OR hours per day.
    - General, orthopedics, OB/GYN, urologic, oral surgery, and dental services.
    - Up to 504 patients, with 2 ICUs (24 patients), 7 ICWs (140 patients), 1 NP ward (20 patients), 2 minimum care wards (40 patients), and 7 patient support sections (280 patients).

- **General Hospital.**
  - Usually a permanent or semipermanent facility.
  - At least 8 OR tables for 144 OR hours per day.
  - General, orthopedic, gynecologic, urologic, and oral surgery.
  - Dental and optometry services.
  - Outpatient specialty and primary care services.
  - Up to 476 patients, with 8 ICUs (96 patients), 16 ICWs (320 patients), 1 NP ward (20 patients), and 2 minimum care wards (40 patients).

The MRI CSH Echelon Above Corps (EAC) will replace the FH and GH.

- **CSH (EAC).**
  - Headquarters/headquarters detachment: 17 officers and 33 enlisted.
  - Cannot operate in a split-based mode like the CSH (Corps).
  - 248-bed hospital company.
    - 4 ICUs (total 48 ICU beds), and 10 ICWs (total 200 beds, including NP patients). A specialty clinic section that can treat NP patients. Minimal care wards are provided by attached minimum care detachments.
    - 140 officers, 244 enlisted personnel.
    - Up to 6 OR tables for 96 operating hours per day.
    - Fully deployed (including motor pool, troop billeting, heliport, and other life support activities), covers 9.3 acres.
    - See other general characteristics under MRI CSH (Corps).

Level V

This level of care is provided in the CONUS. Hospitals in the CONUS sustaining base will provide the ultimate treatment capability for patients generated within the theater. Department of Defense (DoD) hospitals (military hospitals for the tri-services) and Department of Veterans Affairs (DVA) hospitals will be specifically designated to provide the soldier with maximum return to function through a combination of medical, surgical, rehabilitative, and convalescent care. Under the

National Disaster Medical System, patients overflowing DoD and DVA hospitals will be cared for in designated civilian hospitals.

63-18-01 - MATERIALS PERFORMANCE, PROCESSING, AND MODELING

The Materials Science & Technology Division (MSTD) of the Naval Research Laboratory (NRL) is interested in receiving proposals for research and development in materials, their joining, and their processing, including modeling of materials performance and joining and forming processes to achieve cost- effectiveness. The areas of research and development activities of interest to NRL include, but are not limited to the following:

1) Modeling - Microstructural/continuum modeling for the development of predictive equations of state for materials which could greatly reduce costs of developing new alloys and forming processes as well as permit optimization of properties and plant weldable aluminum and iron alloys of high strength, toughness, stress corrosion cracking resistance, reduced hydrogen embrittlement, etc.

2) Forming/Machining - Forming and machining of hard-to-form and/or machine alloys by the application of high fields. This may include the application, singly or in combination, of electric, magnetic, ultrasonic, and microwave fields and address the casting and/or forming to near-net-shape by rolling, drawing, or forging and the machining by point cutting or grinding of any low ductility materials such as tungsten alloys, aluminides, etc.

3) Processes for Lower Life Cycle Costs/Simulations - Design of manufacturing processes that achieve desired product attributes at lowest total life cycle cost. This may include the integration of several unit forming processes and the simulation of such processes to account for geometric effects and the effects of evolving material microstructure and temperature and stress fields. Total life cycle spans issues from the initial material synthesis to the final disposition of components including all costs of acquisition and ownership.

4) Smart Materials - Demonstrate the application of "smart materials and structures" (SM&S), in military and dual-use systems. Generically, SM&S should have the capability to sense environmental stimuli, process the acquired data, and actively respond in a controlled manner to achieve a desired goal. This includes a wide range of materials (e.g., shape memory alloys, electrostrictive ceramics, ionic/conductive polymers, and polymer fibers and films, etc.), control algorithms and signal processors, and their assembly into devices that can be made to perform battle-related actions robotically (e.g., swim, fly, walk, etc.).

5) Superconductivity - Development of superconducting materials, devices, components, and systems that address crucial Naval and DoD requirements. Although the principal area of interest is in superconductors with transition temperatures above 30K, unusually sound proposals for research and development devices, components, and circuits fabricated from materials with superconducting transition temperatures below 30K will be considered if deemed suitable for potential Naval applications.

Address White Papers (WP) to Code 6300, by email to mstdbaa@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

<u>67-18-01</u> - BASIC AND APPLIED RESEARCH IN HIGH TEMPERATURE PLASMAS

The Naval Research Laboratory (NRL) is interested in receiving proposals that address basic and applied experimental, theoretical and computational research to advance fundamental knowledge in high temperature plasmas.

Specific areas of interest include:

1) Theoretical and experimental studies of krypton-fluoride laser systems, both single pulse and repetitively pulsed, includes pulsed power, optics and electron beam generation, propagation and transport. Study of laser-matter interactions and strongly-coupled plasmas for conditions relevant to direct drive laser fusion. Theory and experimental studies of laser-plasma instability at high intensity that are relevant to laser fusion.

2) High energy pulsed power systems employing capacitive and inductive energy storage. Production of pulsed plasma and intense high-power, charged particle beams including single pulse and high average (rep-rated) power systems. Modeling and simulation of pulsed power devices and applications. Pulsed-power-driven radiation and acoustic shock generation sources. Primary energy storage and thermal management for pulsed power systems.

3) Theoretical and large-scale computational modeling of ionospheric, magnetospheric, solar and space plasmas.

4) Theoretical studies and computer simulations of nonlinear dynamic phenomena and novel nonlinear algorithms for use in applications such as nonlinear time series analysis, analysis of complex data sets, study of adaptive networks, analysis and control of coupled systems, and emergent structures in stochastic dynamics.

5) Theoretical and experimental research in the areas of coherent radiation sources, systems, and propagation, including microwave and millimeter-wave sources, high energy lasers, ultrashort pulse lasers, and free-electron lasers. Theoretical and experimental research in beam transport, intense laser-plasma interactions, laser-plasma accelerators, and intense laser-electron beam interactions.

6) Diagnostic and data handling/analysis techniques applicable to pulsed or dc measurements for remote sensing and laser-matter interactions, including real time diagnostics and post-interaction analysis.

7) Theoretical and experimental research into the production of plasmas in neutral gas backgrounds using RF excitation, plasma discharges, beam ionization, or other techniques. Development, testing, and analysis of advanced plasma diagnostics for partially ionized gas distributions. Investigations of the interaction of plasmas with gas distributions, surfaces, or coatings on surfaces. Development or utilization of specialized diagnostics to analyze plasma effects. Analysis of experimental results and comparison with theoretical predictions.

8) Theoretical and experimental research on microwave, millimeter-wave, or pulsed electron beam processing or synthesis of materials, including ceramics, metals, liquids, or gas mixtures.

9) Experimental research in high-velocity electromagnetic launchers. Design of launcher barrels and armatures. Diagnostics of launcher performance. Pulsed power systems for electromagnetic launch. Novel applications of electromagnetic launchers, including laboratory studies of shock generation in materials.

10) Theoretical and experimental research on high-energy-density plasma (HEDP) physics, including atomic processes and advanced plasma diagnostics. Physics and simulation of high-energy-density plasmas produced by electron beams, lasers, or Z-pinches. Computational tools to understand the coupling of ionization, radiation transport, and plasma dynamics in HEDP environments.

11) Development of novel and robust detection systems suitable for high-power pulsed environments, consisting of temporally-, spatially-, and/or spectrally-resolved detectors for x-ray, high-energy gamma, or neutron (both fast and thermal) emissions and mode-differentiating data acquisition electronics.

12) Theoretical and experimental research on the generation and diagnosis of space plasmas. Developmental research of advanced plasma diagnostics for space plasmas using ground-based simulation chambers or space-based platforms. Integration of advanced diagnostics into space platforms. Interfacing of experimental hardware with space craft. Acquisition of data, analysis, and comparison with theoretical models or other data.

Address White Papers (WP) to nrl6701@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

68-18-01 – RF VACUUM ELECTRONICS

The Electromagnetics Technology Branch of the Naval Research Laboratory (NRL) is seeking proposals for innovative technology base development in the broad area of vacuum electronics. Areas of interest include, but are not limited to: (1) advanced high power microwave and millimeter-wave amplifiers and oscillators suitable for applications in radar, electronic warfare, high data rate communications, imaging, remote sensing, and directed energy warfare; (2) microwave or millimeter-wave power modules (MPM) consisting of a solid-state driver, a vacuum electronics power booster, and integrated power conditioning; (3) manufacturing technologies and techniques to enable the high yield fabrication of precision vacuum electronic components and assemblies suitable for operation above 20 GHz while reducing life cycle costs and improving overall device reliability; (4) theory and design tool development to support an advanced computational environment for the computer-aided design of vacuum electronic devices operating from microwave to terahertz frequencies; (5) supporting technology to advance RF vacuum electronics; (6) advanced emitter technology; and (7) amplifiers or oscillators driven by spatially-distributed electron beams . Each area is briefly described below:

1) High power microwave, millimeter-wave, and sub-millimeter-wave amplifiers and oscillators. The overall goal of this program area is to develop the technology base required for advanced high performance microwave, millimeter-wave, and sub-millimeter-wave amplifiers suitable for radar, communications, electronic warfare, imaging, remote sensing applications, and directed energy warfare. Proposals are encouraged detailing device concepts relating to the development of compact, efficient vacuum electronic amplifiers operating in the microwave (1-30 GHz), millimeter-wave (30-300 GHz) and sub-millimeter-wave (300 GHz – 1 THz) bands, with peak power levels ranging from milliwatts to megawatts, and average power levels of milliwatts to tens of kilowatts or higher, depending on the operating frequency and application. Amplifiers should be capable of operation with instantaneous fractional bandwidths of 1% to 20% or higher. Topics of interest include, but are not limited to innovative high power device concepts using both slow-wave and fast-wave approaches and advanced high-power electron optics and component technology.

2) Microwave and millimeter-wave power modules, consisting of a solid-state driver, a vacuum electronics power booster, and integrated power conditioning, will find applications in many military and civil systems, including electronic decoys, phased arrays, and high-data-rate communications. Proposals are encouraged under this solicitation that address topics such as (a) improved magnetics to provide high-quality high-perveance electron beams within module cross-section and weight constraints; (b) improved beam-wave interactions and depressed-collector designs to enhance power booster efficiencies; (c) innovative waste heat removal designs for a dimensionally-constrained MPM; (d) improved solid-state amplifier performance at high junction temperatures; (e) novel power conditioning schemes to provide spectral purity for radar applications; (f) development of low-loss passive components and devices to minimize overall system losses; (g) improved power conditioning components such as high voltage diodes and capacitors suitable for high-density power conversion; (h) three-dimensional fully-electromagnetic computer modeling; (i) innovative approaches to developing MPM architectures leading to low unit acquisition costs; and (j) innovative power extraction schemes capable of providing small cross-sectional power modules for m x n array applications.

3) The advanced manufacturing technology program area includes but is not limited to the development of innovative fabrication techniques such as microfabrication, 3D printing, and other additive manufacturing concepts that can improve the performance and fabrication yield of vacuum electronic devices, particularly in the millimeter-wave to sub-millimeter-wave operating regimes. This program area also seeks innovative concepts for fabrication in which critical design elements are identified and novel solutions are offered in order to minimize cost, supported with manufacturing analysis as evidence. DoD microwave power tube procurements have traditionally been low volume runs of limited duration; production of power tubes for certain high-volume applications, such as decoys, is currently too costly. Proposals detailing concepts consistent with these area objectives that are aimed at decoupling unit cost from production volume are encouraged under this solicitation.

4) The physics-based computer-aided design (CAD) program area is focused on the development of advanced theory, design, and simulation capabilities related to vacuum electronic devices. This task seeks the development of accurate physics-based models that can be implemented in computationally-efficient algorithms and integrated into state-of-the-art computational design

codes. The numerical tools should address electromagnetic, electron beam–electromagnetic wave interaction, and thermal and mechanical issues associated with vacuum electronic devices. The development of both general electromagnetic and device-specific vacuum electronic computational tools is sought. The design tools can use steady state or time-dependent models focusing on one-dimensional, two-dimensional or three-dimensional aspects of the problem. In concert, within the design methodology framework, the design tools should be capable of optimizing the performance of the device by maximizing, for example, the efficiency, gain, linearity, and bandwidth and minimizing the noise. Code validation through comparison with experiment and/or the predictions of other computational tools is desired. Theory and computational tools to study the propagation of electromagnetic waves in free space and to investigate the interaction of electromagnetic fields with other materials and/or three-dimensional structures are also of interest.

5) The supporting technology program area encompasses the development of materials and technologies that can potentially benefit broad classes of vacuum power amplifiers and oscillators. Proposals that detail innovations and breakthroughs in any one of a variety of technical areas in this context are encouraged. Technical areas include, but are not limited to: (a) innovative cooling techniques for both vacuum and solid state devices; (b) innovative materials research for vacuum power devices, including mechanical and electromagnetic characterization, modeling, and development of materials, such as high thermal conductivity insulators, BeO replacement materials, and materials with tailored electromagnetic losses; (c) metamaterials; (d) passive components such as filters, combiners, quasi-optical components, isolators, circulators, and control components such as phase shifters; (e) novel compact sources to provide power and power conditioning for vacuum electronic devices; and (f) mass- and volume-efficient magnetic materials and magnetic structures to support compact, fieldable systems.

6) The advanced emitter technology program area covers both established and evolving electron sources relevant to RF vacuum electronic devices. In most cases high current density, long lifetime, and superior robustness are desired. In specific situations cathodes compatible with insertion into meso-scale and micro-scale electron devices are required. Cathodes suitable for multiple beam and sheet beam devices are of particular interest. Proposals include but are not limited to the following areas: (a) thermionic sources including improved work function-reducing mechanisms allowing longer lifetime and improved uniformity; (b) field emitter arrays including means of regulating the emission at individual sites, means of scaling the total emission current with area, and having moderate to high current density; (c) explosive emission cathodes; (d) plasma cathodes and beam-plasma interaction; (e) semiconductor materials having properties suitable for creating sources requiring low or negative electron affinity; (f) materials and systems required for photoemitters; (g) cathodes and secondary emitter materials; (h) improved collector design and materials, including methods to suppress secondary electron emission; and (i) related theory and computational modeling. Proposals that detail breakthroughs and innovations in the materials development and/or cathode design in any of the above areas are encouraged.

7) Amplifiers driven by spatially-distributed electron beams. The overall goal of this activity is to develop the technology base required for spatially-distributed electron beam high-performance amplifiers suitable for DON/DoD applications. Proposals detailing device concepts relating to

the development of compact, lightweight, low noise, efficient vacuum electronic amplifiers operating in the range of frequencies from 1 GHz to 1 terahertz at peak power levels from milliwatts to hundreds of kilowatts, and average power levels of milliwatts to tens of kilowatts. Devices should be capable of operation with fractional instantaneous bandwidths of 1% to 20% or higher. Topics of interest include, but are not limited to, (a) innovative high power device concepts; (b) advanced high-power electron optics for the electron guns and/or multistage depressed collectors; (c) innovative high current density cathodes for long life; (d) design methodology for low manufacturing cost; (e) multi-stage depressed collector design; and (f) novel concepts for electron beam confinement and transport.

Address White Papers (WP) to VE_NRL_BAA@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

68-18-02 - RADIATION EFFECTS RESEARCH

The Solid State Devices Branch of the Electronics Science and Technology Division of the Naval Research Laboratory (NRL) is interested in receiving proposals to investigate the effects of radiation on advanced solid state devices, developing methods to mitigate these effects, and detecting radiation. The radiation of interest includes the natural radiation environment of space (trapped particles, cosmic ray ions, solar protons, etc.) and non-natural sources (gamma rays, neutrons, pulses of energy, etc.). The effects include total dose and displacement damage and single event effects including upset, latchup, gate rupture, etc. The devices of interest include, but are not limited to, advanced technology memory devices, gate arrays, microprocessors, imagers, solar arrays and energy storage devices such as batteries. Mitigation effects include hardening by processing or design or shielding techniques especially using novel and innovative ideas not previously investigated.

Address White Papers (WP) to nrl_pv_research@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

68-18-03 - PHOTOVOLTAICS FOR PORTABLE POWER

The Solid State Devices Branch of the Electronics Science and Technology Division of the Naval Research Laboratory (NRL) is interested in receiving proposals to investigate photovoltaic (PV) technologies that enable portable power sources. These power sources are intended for man-portable applications as wells as powering unattended, remote systems. PV devices that provide high photon to electric conversion efficiency and can be produced on flexible substrates are of particular interest for forming flexible PV blankets. PV devices that can be directly integrated into a system for remote powering are also of interest. Proposals ranging from basic device development to system demonstration are encouraged.

Address White Papers (WP) to nrl_pv_research@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

68-18-04 - ANALOG AND MIXED SIGNAL INTEGRATED CIRCUIT DESIGN AND CHARACTERIZATION

The Electromagnetics Technology Branch of the Naval Research Laboratory (NRL) is seeking proposals for innovative technology base development in the broad area of analog and mixed signal integrated circuit design and characterization. The circuits may operate in the 0.3-300 GHz range and specifically designed to process signals with either fixed or variable bandwidths, known or unknown modulation. The areas of interest include but are not limited to novel and innovative design and characterization of:

1) highly linear, broad band system on chip transceivers;

2) on-chip subsystems including but not limited to integrated antennas, integrated passive components, low noise amplifiers, mixers, filters, phase locked loops, voltage control oscillators, analog-to-digital and digital-to-analog converters, bias circuits;

3) power amplifier topologies that can address needs for high power, high linearity and high efficiency under defined or undefined signal drives;

4) low noise amplifier topologies and techniques that can substantially enhance the overall noise capabilities of a system within a wide range of operating temperatures;

5) heterogeneous integration of diverse semiconductors technologies and multi-chip modules;

6) boards able to interface a novel or existing integrated circuit in the frequency range of interest to external circuits for further signal processing.

Address White Papers (WP) to baa681305@nrl.navy.mil. If confirmation of request is desired, please allow one month before submitting your request. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate contact.

69-18-01 - RESEARCH IN BIO/MOLECULAR SCIENCE AND ENGINEERING

The Center for Bio-Molecular Science and Engineering of the Naval Research Laboratory (NRL) conducts multidisciplinary research in biotechnology using the techniques of modern molecular biology, biophysics, chemistry, microelectronics, and engineering to fabricate biosensors, biomaterials, and advanced systems. Current research areas include:

1) Biophysical chemistry of membranes, proteins, DNA, and RNA.

2) Research into biosensors including construction of novel devices, accessories for automated reagent delivery, production of biomolecular recognition elements or configuration of bioassays

for integration into the sensor. Targets of detection include explosives, pollutants, pathogens, toxic agents, and hazardous chemicals.

3) Systems biology, synthetic biology, genomic and proteomic analyses of microorganisms.

4) Synthesis, fabrication, and physical characterization of self assembled thin films and surfaces for material development.

5) Microwave devices, ultramicroelectrodes and electron emitters based on metallized composites. Microwave materials based on nanodimension powders and metallized composites.

6) Self-assembly of microstructures for advanced materials and the assessment of potential applications including: controlled release, advanced composites for electronic, structural, and thermal applications, and environmental applications.

7) Fabrication and integration of microfluidic components for sample processing and analysis.

8) Design, development, and characterization of multifunctional, multilayered assemblies for advanced applications in the areas of environmental protection and general purpose detection, and in the development of non-conventional bioreactors for performing multistep chemistries in single operation.

9) Development of novel lithographic, patterning for fabrication or advanced biosensors processes for high resolution imaging, fabrication of advanced microelectronic or nanoelectronic devices, displays, biosensors, multilayers, or three dimensionally structured materials.

10) Advanced materials using liquid crystals and ordered polymers, relation between molecular structure and material properties, assessment of their properties for potential applications in the areas of real time holography, ferroelectric phenomena, high resolution display, pryoelectric sensors, and piezoelectric materials, electro-optic materials, non-linear optics, and optical wave guiding.

11) Bio-based energy harvesting and production for marine, underwater, and naval applications.

12) Development of bioprotocols and subsequent bioinformatic analysis of DNA chip arrays.

The NRL is inviting White Papers (WI) for applied and basic research in areas closely related to and supportive of these programs. It is expected that multiple projects may result with each targeted to a particular technology or application area.

Address White Papers (WP) to baa6900@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

C. OCEAN AND ATMOSPHERIC SCIENCE AND TECHNOLOGY DIRECTORATE CODE 7000

71-18-01 - ACOUSTIC SIMULATION, MEASUREMENTS AND TACTICS

The Naval Research Laboratory (NRL) conducts broad-based research in ocean acoustics to better understand the effects of the ocean environment on underwater acoustics, and to assess and predict how these environmental effects will impact the performance of Naval systems, operations, and missions. The "ocean environment" includes three-dimensional, time-evolving features such as rough air-sea interfaces, sub-surface bubbles and plumes, volume effects (e.g., internal waves, solitons, fluctuating media, biologics, pollutants, fronts, eddies), rough sea-floor interfaces, and ocean bottom and sub-bottom regions. "Underwater acoustics" includes all acoustic processes and interactions that can occur within the ocean environment (e.g., propagation, scatter, attenuation, dispersion, mode conversion, coherence, ambient noise and sediment penetration). "Naval systems, operations, and missions" include, but are not limited to, sonar systems, Anti-Submarine Warfare (ASW), Mine Counter Measures (MCM), warfare effectiveness, and strategy and tactics optimization. Numerical techniques and computer codes are developed as required to support the Navy's need for improved ocean acoustics models and data bases and to provide supporting analysis for operational and tactical application of computer models.

Current major areas of research interest include:

1) Acoustic Simulation and Modeling (e.g., theoretical formulations, computational acoustics, numerical modeling, inverse methods, stochastic methods, visualization, and scalable computer and supercomputer code development);

2) Warfare Effectiveness (i.e., research in advanced methods of assessing environmental impact on Naval missions and strategy optimization);

3) Mid to High-Frequency Acoustics efforts related to the effect of the environment on the performance of Navy sonar systems, including the effects of the medium coherence, bottom roughness, sediment composition, clutter and their effects on advanced imaging techniques;

4) Coastal Acoustics, as related to the application of sophisticated signal processing methodologies (e.g., matched field processing and high-order spectral techniques), to determine the limits and variability of harsh environments on the performance of Navy sonar systems; and,

5) Novel optimization, clustering, network techniques for acoustic applications.

6) Other research interests include:

7) The combination of acoustics with other sensing techniques, such as optics, magnetics, electromagnetics, hydrodynamics, geophysics and others for both ASW and MCM applications;
   a. Acoustic environmental characterizations, data base modeling, and analysis of those aspects of the marine environment relevant to acoustic propagation; and
   b. Coupled target-waveguide modeling and target recognition, classification, and discrimination.

Proposals for evolutionary improvements are inappropriate under BAA authority and are not desired.

Address White Papers (WP) to Code7180BAA@nrlssc.navy.mil Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

71-18-02 - ELASTO-ACOUSTIC (META) MATERIALS

The Acoustic Signal Processing and Systems Branch of the Naval Research Laboratory conducts basic and applied research in concepts in acoustic materials and metamaterials with the goal of constructing novel devices for use in aqueous, air, and elastic environments. This work seeks to both understand and develop the underlying physics of acoustic and elastic solid wave propagation in engineered and/or patterned materials from the micro constituent level in order to accurately predict the physical properties and geometries of constituent components required to create a desired wave propagation behavior in the bulk material. The work naturally seeks to explore the fabrication of devices using new and exotic materials as possible constituents to provide control over the bulk elasto-acoustic properties of a given material. Additional work involves the study of phonons in nanoscale materials, as well as novel uses of MEMS devices.

Address White Papers (WP) to Code 7160, by email to NRL7160_BAA@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

72-18-01 - LOW FREQUENCY RADIO INTERFEROMETRY

The Remote Sensing Division of the Naval Research Laboratory is developing and deploying imaging HF/VHF radio interferometers for use in developing, demonstrating, and exploiting interferometric imaging through the ionosphere at low frequencies. NRL is interested in proposals for innovative basic and applied research leading to the development of new capabilities and applications for these instruments; the development of new techniques for wide-field interferometric imaging, ionospheric phase correction, or interference excision; or for other innovative science or technical development related to long wavelength radio interferometry.

Proposers may respond to one or more areas of interest or may propose clearly related investigations; however, each area requires an individual and complete proposal which will be separately evaluated.

Research may be conducted at the unclassified level and proposals must be unclassified.

Address White Papers (WP) to RemoteSensingBAA@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

72-18-02 - OPTICAL REMOTE SENSING OF THE COASTAL REGIME

The Remote Sensing Division of the Naval Research Laboratory (NRL) is developing methods and instrumentation for the remote sensing of coastal waters, near shore areas and adjacent lands, and other coastal regions by means of optical sensors working throughout the electromagnetic spectrum – both active and passive – and the algorithms associated with sensor data. NRL is interested in innovative proposals for basic and applied research which will lead to improved retrieval of environmental parameters be that from novel or improved instrumentation or algorithms. Additionally, the ability to model the performance of instruments and methods in various situations is desirable.

Proposers may respond to one or more areas of interest or may propose clearly related investigations; however, each area requires an individual and complete proposal which will be separately evaluated.

Address White Papers (WP) to RemoteSensingBAA@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

72-18-03 - REMOTE SENSORS AND IMAGING SYSTEMS

The Remote Sensing Division conducts a program of basic research, science, and applications aimed at the development of new concepts for sensors and imaging systems for objects and targets on the Earth and in the near-Earth environment, as well as deep space. The research focuses on the discovery and understanding of the basic physical principles and mechanisms that give rise to the background environmental emission and targets of interest and to absorption and emission mechanisms of the intervening medium. The development effort includes active and passive sensor systems to be used for the study and analysis of the physical characteristics of phenomena that give rise to naturally occurring background radiation, such as that due to the Earth's atmosphere and oceans, as well as man-made or induced phenomena such as ship/submarine hydrographic effects. The research includes theoretical, laboratory, and field experiments leading to ground based, airborne and space systems for use in such areas as remote sensing, astrometry, astrophysics, surveillance, environment and improved operational support systems for the Navy. Areas of interest include all levels of the atmosphere (lower, middle, and upper) and space environment, air/sea interface and oceanography. Special emphasis is given to developing space-based sensors and improving the exploitation of existing space systems. Innovative research is desired in areas of interest including, but not limited to, the following:

1) The impact of the physics of atmosphere and ocean interaction on physical and biological sea surface characteristics, from the viewpoint of global surveillance systems.

2) Research attempting breakthrough advancements in imaging data compression methodology, scene classification, and coherent/non-coherent sensor exploitation.

3) Atmospheric gases and aerosol measurements. Research in this area is wide ranging: propagation effects, pollutant monitoring, global climate change, and cloud physics.

4) Development of instruments, models, and retrieval algorithms for passive remote sensing of the oceans, atmosphere, and land.

Address White Papers (WP) RemoteSensingBAA@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

72-18-04 - AIRBORNE, SHIPBOARD, AND OVERHEAD DATA ACQUISITION AND ANALYSIS

The Marine Physics Branch of the Naval Research Laboratory (NRL) is interested in receiving proposals for research and development in the areas of sensor technology, data acquisition, and data analysis in the field of fixed sensor, airborne and shipboard remote sensing.

The primary areas of interest are synthetic aperture radar, GPS navigation, multi- and hyper-spectral imaging, and radar/laser profilometry. The proposed research would address methods and techniques in data acquisition, analysis, and modeling for all of these sensors, with particular interest in ultra-wide-band SAR and hyperspectral sensors. The research may address issues in surveying and analysis of natural materials - i.e. sediment, water, snow, and ice - surface and sub-surface layers, vegetation, including mulit-layered canopies, as well as man-made object and materials property evaluation using all remote sensing modalities from the entire electro-magnetic spectrum range.

The research may involve new and innovative research in long-range kinematic differential GPS navigation with a goal of producing decimeter level positioning of aircraft for baseline lengths of up to 1,000 kilometers. The research may also involve new methods of acoustic and non-acoustic modeling combining the water column with bottom and sub-bottom acoustic and non-acoustic characteristics in both shallow and deep-water regions. The research may also address issues in seafloor sediment characterization using novel contact and non-contact methods and instruments as well as modeling of sediment behavior in the wide range of deformation and rates-of-deformation regimes – both in situ and in laboratory environments.

The Coastal and Ocean Remote Sensing Branch particularly desires proposals on innovative techniques for:

1) Real-time acquisition and storage of data at high rates from numerous sensor channels;

2) Real-time high-speed data analysis and display; and

3) Optimal combined processing of multi-sensor data.

Address White Papers (WP) to RemoteSensingBAA@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

73-18-01 - OCEAN DYNAMICS AND PREDICTION OCEANOGRAPHY

The Oceanography Division of the Naval Research Laboratory (NRL) is interested in proposals of basic and applied research in its mission areas of ocean dynamics and prediction, and of ocean feature and process analysis using remote and in situ data. Ocean dynamics and prediction includes basic and applied research in computer modeling of ocean hydro/thermodynamics (i.e., ocean circulation and density structure), modeling of ice dynamics, coupled ocean/acoustic, ocean/atmosphere, ocean/sediment, and ocean/biological model development, computational numerical techniques, visualization of ocean features and dynamical processes, data assimilation and the analysis of satellite oceanographic data as related to the development of modeling and data assimilation capabilities. Deep ocean basins, marginal and semi-enclosed seas, coastal regions harbors and rivers are of interest. Expanded ocean physics included in such systems and areas for future research and development include ocean tide and wave and surf modeling as well as upper ocean processes. Research in computational techniques includes the study of efficient solutions to partial differential equations arising in oceanography with a special focus on efficient utilization of massive parallel processing technology. Ocean feature and process analysis includes development of sensor systems that acquire the in-situ spatial and temporal properties of oceanographic environmental parameters including wave height, wave direction, currents, temperature, salinity, wind speed, and wind direction. Innovative ideas, trawl resistant designs, real-time data access, and covert operations are of high interest. Development of algorithms and techniques for processing remotely sensed ocean data, with special application to determining ocean features and properties from multispectral, hyperspectral, and optical data is of high interest. Application of ocean data and analysis to systems performance models for emerging and operational Navy sensors and systems is also of interest. The ocean nowcast/forecast and simulation systems have broad and direct application to issues related to Naval operations (ASW, Search & Rescue, Amphibious landing, Mine and Special Warfare, Mission Planning, etc.). These systems also are directly applicable to the simulation and design of global, regional and coastal observing systems.

Address White Papers (WP) to nrl7302@nrlssc.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

74-18-01 - SEAFLOOR SCIENCES

The Naval Research Laboratory's (NRL) Seafloor Sciences Branch conducts biogeochemical, geophysical, geoacoustic and geotechnical research of marine sediments, which advances the development, and/or performance of naval sensors and systems. Research conducted includes investigation and modeling of the fundamental micro to macro-structural processes which control sediment behavior and seafloor properties. This includes biological, geological, geochemical, historical, and subsequent diagenetic processes that control the distribution, range, and variability of sediment physical properties including bathymetry, roughness, and subseafloor morphology. NRL is responsible for developing, assessing, and improving models and databases for all seafloor properties of interest to the Navy and utilizes state-of-the-art laboratory, in situ, and remote sensing techniques.

Address White Papers (WP) to BAACode7430@nrlssc.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

74-18-02 - GEOSPATIAL SCIENCES AND TECHNOLOGY

The research focus is on development and exploitation of new technology and techniques to support all aspects of geospatial sciences and technology. Current research interest areas are:

1) Geospatial Enterprise Solutions. Web service approaches to service oriented architecture enterprise solutions that promote interoperability and leveraging of community-of-interest content and services for optimized inter agency solutions.

2) Automated Reasoning for Distributed Surveillance and Data Fusion. Approaches to allow advanced reasoning based on multiple, disparate sensor inputs.

3) Open Source Content Exploitation. Techniques to leverage and harness the rapidly expanding structured and unstructured content on open networks.

4) Uncertainty Management. Approaches to allow improved fusion of various sensors with accommodation for propagated uncertainty.

5) Precise Positioning. Techniques for more precisely positioning undersea sensors in the absence of GPS.

6) Acoustic Image Processing. Innovative approaches to exploit acoustic imagery given its complexities inherent in the ocean medium, especially in the area of feature detection and classification.

Address White Papers (WP) to NRL_Geospatial_BAA_Technical_POC@nrlssc.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

75-18-01 - ATMOSPHERIC EFFECTS, ANALYSIS, AND PREDICTION

The Marine Meteorology Division of the Naval Research Laboratory (NRL) is interested in proposals for innovative basic and applied research in atmospheric sciences to increase our understanding of atmospheric processes and to advance the state-of-the-art in numerical analysis and prediction techniques, from short-term local-scales (microscale and mesoscale) to global-scale phenomena. Areas of active interest include numerical methods; parameterization and explicit prediction of physical processes; assimilation of remotely sensed and other non-conventional data including radar data and data collected by autonomous vehicles; dynamic initialization; variational analysis and adjoint techniques; predictability, sensitivity, and targeted observation studies; ensemble prediction methods; data assimilation; middle-atmosphere prediction; tropical cyclone prediction; air-sea interaction; large

eddy simulations; aerosol and cloud modeling and observations; urban and land surface parameterizations; coupled air-land-ocean-ice-hydrology-wave models; computationally efficient methods for environmental prediction on next-generation architectures; and stream processing and and big data analytics for environmental information.

We are also interested in proposals that provide new and novel methods for providing environmental support directly to the warfighter especially using tactical through-the-sensor data. Areas of particular interest include exploitation of atmospheric information from observations and numerical models to derive tactical weather parameters (including the quality control of such information), and research that increases our knowledge of the effects of the atmospheric environment on ship and air platforms as well as on shipboard, airborne, and land-based communications, sensors and weapons systems. Examples of specific research topics include meteorological applications of remotely sensed and non-conventional data; satellite data interpretation and imagery analysis; atmospheric acoustic propagation prediction; tropical cyclone forecast aids; artificial intelligence techniques and expert system development; model post-processing techniques; nowcasting including combined model, satellite and radar data; weather impact on piloted aircraft and UAV operations; aerosol measurement, characterization, and electro-optical effects; ducting, refractivity, and electro-magnetic effects; and atmospheric dispersion of chemical and biological agents.

Address White Papers (WP) to baa@nrlmry.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

76-18-01 - RESEARCH INTO SPACE, BACKGROUNDS, IMAGING AND MODELING

The Naval Research Laboratory (NRL) is interested in receiving proposals that address basic and applied experimental, theoretical and computational research to advance fundamental knowledge of high-energy space, heliospace, and geospace. The results are of importance to orbital tracking, radio communications, and navigation that affect the operation of ships and aircraft; utilization of the near-space and space environment of the earth; homeland defense; and, the fundamental understanding of natural radiation and geophysical phenomena.

The Space Science Division is interested in receiving proposals for research related to the above research interests.

Address White Papers (WP) to TPOC7600@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact

D. NAVAL CENTER FOR SPACE TECHNOLOGY CODE 8000

81-18-01 - CYBER SECURE OPEN SOURCE INFORMATION AND ANALYTICS

The Mission Development Branch of the Space Systems Development Department of the Naval Research Laboratory (NRL) conducts research and development in concepts and techniques for using service oriented system architectures that target technologies designed to increase the effectiveness of Open Source Intelligence (OSINT) information to meet U.S. Navy mission requirements. To provide maximum utility for the US Navy and Department of Defense (DoD), these systems are required to employ advanced cyber security features to limit access to the intended audience. The focus is on creating secure and efficient processes to collect information from available data sources and analyze collected data to produce actionable intelligence while limiting system complexity. The technologies may have utility within federal and state agencies outside of the DoD where open source information is used to monitor, identify, and respond to threats.

Address White Papers (WP) to 8110BAA@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

82-18-01 - SPACECRAFT & SPACE SYSTEMS TECHNOLOGY

The Spacecraft Engineering Department (SED) at the Naval Research Laboratory (NRL) performs research and development by applying advanced technologies and techniques to provide new space capabilities that address critical Navy, DoD, and national needs. The emphasis at the NRL's SED is incubating critical technologies and assembling them into systems that provide relevant and often revolutionary new space capabilities. Past examples include first flight of solar cells, atomic precision clocks leading to the NAVSTAR Global Positioning System (GPS), and the first tactical downlink of space data and on-board processed products to Tactical Receive Equipment (TRE). Each of these systems radically improved operational capability and each was enabled by innovative, system application of new technologies. Therefore, NRL's SED seeks a broad range of innovative space systems technologies included associated and enabling ground systems technologies.

NRL's SED performs research and exploratory development in, but not limited to, the following areas: spacecraft payloads, spacecraft structures; spacecraft mechanisms; spacecraft guidance, navigation, and control; spacecraft robotics; spacecraft thermal control, spacecraft power systems, spacecraft propulsion systems, advanced materials for spaceflight use, on-orbit environment monitoring, ground and flight software, spacecraft electronics, spacecraft ground systems, integration and testing, operational user interfaces, and space integration into operational tiered systems. SED projects range from basic theory and component technology development to full space systems development and operations.

Address White Papers (WP) to code8200baa@nrl.navy.mil. Allow one month before requesting confirmation of receipt of WP, if confirmation is desired. Substantive contact should not take place prior to evaluation of a WP by NRL. If necessary, NRL will initiate substantive contact.

APPENDIX 2 – REQUIREMENTS APPLICABLE TO GRANTS, TIAs AND COOPERATIVE AGREEMENTS

D. Application and Submission Information

2. Content and Form of Application Submission

(e) Full Proposals:

i. Instructions for Grants, Cooperative Agreements, and TIAs

Content and Form of Application:

Applicants must complete the mandatory forms in accordance with the instructions provided on the forms and the additional instructions below. Files that are attached to the forms must be in Adobe Portable Document Format (.PDF).

Full Proposal Format

• Spacing – single spaced
• Font – Times New Roman, not smaller than12 point
• Discuss the limit on the number of pages for the Technical Proposal with the cognizant TPOC. There are no page limitations to the Budget.

NOTE: The electronic file name for all documents submitted under this BAA must not exceed 68 characters in length, including the file name extension.

Required Forms

(1) SF-424 (RESEARCH & RELATED) (Mandatory)

The SF-424 (R&R) form must be used as the cover page for all proposals. Complete all required fields in accordance with the "pop-up" instructions on the form and the following instructions for specific fields. Please complete the SF-424 first, as some fields on the SF-424 are used to auto-populate fields on other forms.

The completion of most fields is self-explanatory with the exception of the following special instructions:

- Field 3 - Date Received by State: The Date Received by State and the State Application Identifier are not applicable to research.

- Field 4a - Federal Identifier: For new proposals, enter N00173. If the application is a renewal or expansion of an existing award, enter the NRL award number.

- Field 4b - Agency Routing Number: Enter the Summary Topic # (i.e., 57-18-01).

- Field 4c - Previous Grants.gov Tracking ID: If this submission is for a Changed/Corrected Application, enter the Grants.gov tracking number of the previous proposal submission; otherwise, leave blank.

- Field 7 - Type of Applicant. Complete as indicated: If the organization is a Minority Institution, select "Other" and under "Other (Specify)" note that the institution is a Minority Institution (MI).

- Field 9 - Name of Federal Agency: List the Naval Research Laboratory as the reviewing agency. This field is pre-populated in Grants.gov.

- Field 16 - Is Application Subject to Review by State Executive Order 12372 Process? Choose "No". Check "Program is Not Covered by Executive Order 12372."

- Field 17 – Certification: All awards require some form of certifications of compliance with national policy requirements. By checking the "I agree" box in field 17, and attaching the representation to Field 18 of the SF424 (R&R) as part of the electronic proposal submitted via Grants.gov, the Grant Applicant is providing the certification on lobbying required by 32 CFR Part 28 and representation regarding an unpaid delinquent tax liability or a felony conviction under any federal law – DoD appropriations.

(2) R&R Form: Project/Abstract Form (Mandatory)

The project summary/abstract must identify the research problem and objectives, technical approaches, anticipated outcome of the research, if successful, and impact on DoD capabilities. Use only characters available on a standard QWERTY keyboard. Spell out all Greek letters, other non-English letters, and symbols. Graphics are not allowed and there is a 4,000 character limit including spaces.

Do not include proprietary or confidential information. The project summary/ abstract must be marked by the applicant as "Approved for Public Release". Abstracts of all funded research projects will be posted on the public DTIC website: https://dodgrantawards.dtic.mil/grants

(3) R&R Form: Research and Related Other Project Information (Mandatory)

- Fields 1 and 1a - Human Subject Use: Each proposal must address human subject involvement in the research by completing Fields 1 and 1a of the R&R Other Project Information form. For proposals containing activities that include or may include "research involving human subjects" as defined in DoDI 3216.02, prior to award, the Applicant must submit the documentation under "Use of Human Subjects in Research" (Section F).

- Fields 2 and 2a – Vertebrae Animal Use: N/A.

- Fields 4a through 4d - Environmental Compliance: Address these fields and briefly indicate whether the intended research will result in environmental impacts outside the laboratory, and how the applicant will ensure compliance with environmental statutes and

regulations.

Federal agencies making grant or cooperative agreement awards and recipients of such awards must comply with various environmental requirements. The National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. Sections 4321-4370 (a), requires that agencies consider the environmental impact of "major Federal actions" prior to any final agency decision. With respect to those awards which constitute "major Federal actions," as defined in 40 CFR 1508.18, federal agencies may be required to comply with NEPA and prepare an environmental impact statement (EIS), even if the agency does no more than provide grant funds to the recipient. Questions regarding NEPA compliance should be referred to the technical point of contact. Most research efforts funded by NRL will, however, qualify for a categorical exclusion from the need to prepare an EIS. Navy instructions/regulations provide for a categorical exclusion for basic and applied scientific research usually confined to the laboratory, if the research complies with all other applicable safety, environmental and natural resource conservation laws.

- Field 7 – Project Summary/Abstract: Leave Field 7 blank; complete Form SF424, Project Abstract.

- Field 8 – Project Narrative: Describe clearly the research, including the objective and approach to be performed, keeping in mind the evaluation criteria. Attach the entire proposal narrative to R&R Other Project Information form in Field 8. To attach a Project Narrative in Field 8 click on "Add Attachment" and attach the technical proposal as a single PDF file. (Save the file as "Technical Proposal," as typing in the box is prohibited).

The technical proposal must describe the research in sections as described below:

- **Cover Page**: This must include the words "Technical Proposal" and the following:

  (a) BAA Number: N00173-18-S-BA01

  (b) Title of Proposal;

  (c) Identity of prime applicant and complete list of subawards, if applicable;

  (d) Technical contact (name, address, phone/fax, electronic mail address)

  (e) Administrative/business contact (name, address, phone/fax, electronic mail address) and;

  (f) Proposed period of performance (identify both the base period and any options, if included).

- **Table of Contents**: An alphabetical/numerical listing of the sections within the proposal, including corresponding page numbers.

- **Technical Approach**. Describe the basic scientific or technical concepts that will be

investigated, giving the complete research plan. Describe what is innovative about the proposed approach. Provide the proposed approach compared to alternate approaches other researchers in this field have taken. Given the successful completion, describe the results, new knowledge, or insights.

FOR BASIC RESEARCH

- Future Naval Relevance (where applicable): A description of potential Naval relevance and contributions of the effort to the agency's specific mission.

FOR APPLIED RESEARCH AND ADVANCED TECHNOLOGY DEVELOPMENT

- Operational Naval Concept (where applicable): A description of the project objectives, the concept of operation for the new capabilities to be delivered, and the expected operational performance improvements.

- Operational Utility Assessment Plan (where applicable): A plan for demonstrating and evaluating the operational effectiveness of the applicant's proposed products or processes in field experiments and/or tests in a simulated environment.

- Project Schedule and Milestones: A summary of the schedule of events and milestones:

- Reports: The following are sample reports that are typically required under a research effort:
    - Technical and Financial Progress Reports
    - Final Report

Grants do not include the delivery of software, prototypes, and other hardware deliverables.

- Management Approach. Describe the overall management approach and provide rationale for participation of key team members. Describe the planned relationships with any subawardees or collaborators. This is a single PI award; if there are subawardees or collaborators, explain how the proposed team fits the single PI structure. If appropriate, briefly describe anticipated schedule.

- Current and Pending Project and Proposal Submissions: Applicants are required to provide information on all current and pending support for ongoing projects and proposals, including subsequent funding in the case of continuing contracts, grants, and other assistance agreements. Applicants shall provide the following information of any related or complementary proposal submissions from whatever sources (e.g., NRL, Federal, State, local or foreign government agencies, public or private foundations, industrial or other commercial organizations). Concurrent submission of a proposal to other organizations will not prejudice its review by NRL.

- Title of Proposal and Summary;
- Source and amount of funding (annual direct costs; provide contract and/or grant numbers for current contracts/grants);
- Percentage effort devoted to each project;
- Identity of prime applicant and complete list of subwards, if applicable;
- Technical contact (name, address, phone/fax, electronic mail address)
- Administrative/business contact (name, address, phone/fax, electronic mail address);
- Period of performance (differentiate basic effort);
- The proposed project and all other projects or activities requiring a portion of time of the Principal Investigator and other senior personnel must be included, even if they receive no salary support from the project(s);
- The total award amount for the entire award period covered (including indirect costs) must be shown as well as the number of person-months or labor hours per year to be devoted to the project, regardless of source of support; and
- State how projects are related to the proposed effort and indicate degree of overlap.

- Principal Investigator Qualifications: A discussion of the qualifications of the proposed Principal Investigator and any other key personnel. Include resumes or curricula vitae for the Principal Investigator, other key personnel and consultants. The resumes/curricula vitae shall be attached to the proposal.

- Responsibility: Applicants must provide the following information to NRL in order to assist in NRL's evaluation of the applicants' responsibility:

  - Describe how you have adequate resources or the ability to obtain such resources as required to complete the activities proposed.

  - Describe how you have the ability to comply with the grant conditions, taking into account all existing and currently prospective commitments of the applicant, nongovernmental and governmental.

  - Describe your performance history; specifically your record in managing Federal awards and the extent to which any previously awarded amounts will be expended prior to future awards.

  - Describe your record of integrity and business ethics.

  - Describe qualifications and eligibility to receive an award under applicable laws and regulations.

  - Describe your organization, experience, accounting, and operational controls and technical skills, or the ability to obtain them (including as appropriate such elements as property control systems, quality assurance measures, and safety programs applicable to the efforts to be performed).

- Facilities & Equipment. Describe facilities available for performing the proposed research and any additional facilities or equipment the organization proposes to acquire at its own expense. Indicate government-owned facilities or equipment already possessed that will be used. Justify the need for each equipment item. (Additional facilities and equipment will not be provided unless the research cannot be completed by any other practical means.)

(4) R&R Form: Research & Related Budget

The applicant must use the Grants.gov forms (including the Standard Form (SF) Research and Related (R&R) Budget Form) from the application package template associated with the BAA on the Grants.gov web site located at http://www.grants.gov/. If options are proposed, the cost proposal must provide the pricing information for the option periods; failure to include the proposed costs for the option periods will result in the options not being included in the award.

Notional Schedule. The following provides a notional schedule to determine proposed period of performance and associated budget for Grant submissions.

Grant proposals submitted	**Use this start date**
October 1 through December 31	March 1
January 1 through March 31	July 1
April 1 through June 30	September 1
July 1 through September 30	January 1

A separate Adobe .pdf document should be included in the application that provides appropriate justification and/or supporting documentation for each element of cost proposed. This document shall be attached under Section K. "Budget Justification" of the Research and Related Budget form. Click "Add Attachment" to attach.

(a) Part 1**:** The itemized budget should include the following

- Direct Labor – Individual labor categories or persons, with associated labor hours and unburdened direct labor rates. Provide escalation rates for out years.

- Administrative and Clerical Labor – Salaries of administrative and clerical staff are normally indirect costs (and included in an indirect cost rate). Direct charging of these costs may be appropriate when a major project requires an extensive amount of administrative or clerical support significantly greater than normal and routine levels of support. Budgets proposing direct charging of administrative or clerical salaries must be supported with a budget justification which adequately describes the major project and the administrative and/or clerical work to be performed.

- Fringe Benefits and Indirect Costs (F&A, Overhead, G&A, etc.) – The application should show the rates and calculation of the costs for each rate category. If the rates have been approved/negotiated by a Government agency, provide a copy of the memorandum/agreement. If

the rates have not been approved/negotiated, provide sufficient detail to enable a determination of allowability, allocability and reasonableness of the allocation bases, and how the rates are calculated. Additional information may be requested, if needed. If composite rates are used, provide the calculations used in deriving the composite rates.

- Travel – The proposed travel cost must include the following for each trip: the purpose of the trip, origin and destination if known, approximate duration, the number of travelers, and the estimated cost per trip must be justified based on the organizations historical average cost per trip or other reasonable basis for estimation. Such estimates and the resultant costs claimed must conform to the applicable Federal cost principals. Applicants may include travel costs for the Principal Investigator to attend the peer reviews described in Section II of this BAA.

- Subawards/Subcontracts – Provide a description of the work to be performed by the subrecipient/subcontractor. For each subaward, a detailed cost proposal is required to be submitted by the subrecipient(s). A proposal and any supporting documentation must be received and reviewed before the Government can complete its cost analysis of the proposal and enter negotiations. NRL's preferred method of receiving subcontract information is for this information to be included with the Prime's proposal. However, a subcontractor's cost proposal can be provided in a sealed envelope with the recipient's cost proposal or via e-mail directly to the Program Officer at the same time the prime proposal is submitted. The e-mail should identify the proposal title, the prime Applicant and that the attached proposal is a subcontract.

- 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 rate/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, and the basis for the estimate (e.g., quotes, prior purchases, catalog price lists).

- Recipient Acquired Equipment or Facilities – Equipment and/or facilities are normally furnished by the Recipient. 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). Allowable items normally are limited to research equipment not already available for the project. General purpose equipment (i.e., equipment not used exclusively for research, scientific or other technical activities, such as personal computers, laptops, office equipment) should not be requested unless they will be used primarily or exclusively for the project. For computer/laptop purchases and other general purpose equipment, if proposed, include a statement indicating how each item of equipment will be integrated into the program or used as an integral part of the research effort.

- Other Direct Costs – Provide an itemized list of all other proposed other direct costs

such as Graduate Assistant tuition, laboratory fees, report and publication costs, and the basis for the estimate (e.g., quotes, prior purchases, catalog price lists).

NOTE: *If the grant proposal requests funds for a conference, workshop or symposium:*

1. NRL will not sponsor an NRL, Navy, or DoD event. Provide a list of other sponsors and the requested amounts to be funded by all sponsors.

2. The funds provided by NRL may be used to pay for food or beverages as a direct cost only in exceptional circumstances. The funds shall not be used for food or beverages unless:

a. The grant proposal contains a request for such funding that is fully supported factually in accordance with the cost principles of the relevant OMB Circular, and
b. The Grants Officer determines that the funding is a reasonable, allocable, allowable expense under the relevant cost principles.

3. Specify in your proposal how the event and related outcomes will directly and programmatically relate to the US Naval or Marine Corps Science & Technology Plan and identify specific focus areas that will be addressed. The proposal must provide the technical and scientific objectives of the program or event and clearly state the desired outcomes (e.g. conference proceedings, journal articles, algorithms, tools, additional research, etc.).

- Fee/Profit – Fee/profit is unallowable under assistance agreements at either the prime or subaward level but may be permitted on subcontracts issued by the prime awardee.

(5) Other Submission Requirements

a. Submission of Grant, Cooperative Agreement, and TIA Proposals through Grants.gov

Grants.gov Application Submission and Receipt Procedures

This section provides the application submission and receipt instructions for the Naval Research Laboratory (NRL) program applications. Please read the following instructions carefully and completely.

1. Electronic Delivery

NRL is participating in the Grants.gov initiative to provide the grant community with a single site to find and apply for grant funding opportunities. NRL encourages applicants to submit their applications online through Grants.gov.

2. How to Register to Apply through Grants.gov

a. *Instructions:* Read the instructions below about registering to apply for NRL funds. Applicants should read the registration instructions carefully and prepare the information requested before

beginning the registration process. Reviewing and assembling the required information before beginning the registration process will alleviate last-minute searches for required information.

The registration process can take up to four weeks to complete. Therefore, registration should be done in sufficient time to ensure it does not impact your ability to meet required application submission deadlines.

If individual applicants are eligible to apply for this grant funding opportunity, refer to: https://www.grants.gov/web/grants/applicants/individual-registration.html

Organization applicants can find complete instructions here: https://www.grants.gov/web/grants/applicants/organization-registration.html

1) *Obtain a DUNS Number*: All entities applying for funding, including renewal funding, must have a Data Universal Numbering System (DUNS) number from Dun & Bradstreet (D&B). Applicants must enter the DUNS number in the data entry field labeled "Organizational DUNS" on the SF-424 form.

For more detailed instructions for obtaining a DUNS number, refer to: https://www.grants.gov/web/grants/applicants/organization-registration/step-1-obtain-duns-number.html

2) *Register with SAM*: In addition to having a DUNS number, organizations applying online through Grants.gov must register with the System for Award Management (SAM). All organizations must register with SAM in order to apply online. Failure to register with SAM will prevent your organization from applying through Grants.gov.

For more detailed instructions for registering with SAM, refer to: https://www.grants.gov/web/grants/applicants/organization-registration/step-2-register-with-sam.html

3) *Create a Grants.gov Account*: The next step in the registration process is to create an account with Grants.gov. Applicants must know their organization's DUNS number to complete this process. Completing this process automatically triggers an email request for applicant roles to the organization's E-Business Point of Contact (EBiz POC) for review. The EBiz POC is a representative from your organization who is the contact listed for SAM. To apply for grants on behalf of your organization, you will need the Authorized Organizational Representative (AOR) role.

For more detailed instructions about creating a profile on Grants.gov, refer to: https://www.grants.gov/web/grants/applicants/organization-registration/step-3-username-password.html

4) *Authorize Grants.gov Roles*: After creating an account on Grants.gov, the EBiz POC receives an email notifying them of your registration and request for roles. The EBiz POC will then log in to Grants.gov and authorize the appropriate roles, which may include the AOR role,

thereby giving you permission to complete and submit applications on behalf of the organization. You will be able to submit your application online anytime after you have been approved as an AOR.

For more detailed instructions about creating a profile on Grants.gov, refer to: https://www.grants.gov/web/grants/applicants/organization-registration/step-4-aor-authorization.html

5) *Track Role Status*: To track your role request, refer to: https://www.grants.gov/web/grants/applicants/organization-registration/step-5-track-aor-status.html

b. *Electronic Signature*: When applications are submitted through Grants.gov, the name of the organization's AOR that submitted the application is inserted into the signature line of the application, serving as the electronic signature. The EBiz POC **must** authorize individuals who are able to make legally binding commitments on behalf of the organization as an AOR; **this step is often missed and it is crucial for valid and timely submissions.**

3. How to Submit an Application to the Naval Research Laboratory via Grants.gov

White Papers must not be submitted through the Grants.gov application process. White paper submissions must be e-mailed directly to the appropriate NRL Technical Point of Contact.

All attachments to grant applications submitted through Grants.Gov must be in Adobe Portable Document Format. Proposals with attachments submitted in word processing, spreadsheet, or any format other than Adobe Portable Document Format will not be considered for award.

Grants.gov applicants can apply online using Workspace. Workspace is a shared, online environment where members of a grant team may simultaneously access and edit different webforms within an application. For each funding opportunity announcement (FOA), you can create individual instances of a workspace.

Below is an overview of applying on Grants.gov. For access to complete instructions on how to apply for opportunities, refer to: https://www.grants.gov/web/grants/applicants/apply-for-grants.html

1) *Create a Workspace*: Creating a workspace allows you to complete it online and route it through your organization for review before submitting.

2) *Complete a Workspace*: Add participants to the workspace, complete all the required forms, and check for errors before submission.

a. *Adobe Reader*: If you decide not to apply by filling out webforms you can download individual PDF forms in Workspace so that they will appear similar to other Standard or [INSERT AGENCY NAME] forms. The individual PDF forms can be downloaded and saved

to your local device storage, network drive(s), or external drives, then accessed through Adobe Reader.

NOTE: Visit the Adobe Software Compatibility page on Grants.gov to download the appropriate version of the software at: https://www.grants.gov/web/grants/applicants/adobe-software-compatibility.html

b. *Mandatory Fields in Forms:* In the forms, you will note fields marked with an asterisk and a different background color. These fields are mandatory fields that must be completed to successfully submit your application.

c. *Complete SF-424 Fields First*: The forms are designed to fill in common required fields across other forms, such as the applicant name, address, and DUNS number. To trigger this feature, an applicant must complete the SF-424 information first. Once it is completed, the information will transfer to the other forms.

3) *Submit a Workspace*: An application may be submitted through workspace by clicking the Sign and Submit button on the Manage Workspace page, under the Forms tab. Grants.gov recommends submitting your application package at least 24-48 hours prior to the close date to provide you with time to correct any potential technical issues that may disrupt the application submission.

4) *Track a Workspace*: After successfully submitting a workspace package, a Grants.gov Tracking Number (GRANTXXXXXXXX) is automatically assigned to the package. The number will be listed on the Confirmation page that is generated after submission.

For additional training resources, including video tutorials, refer to: https://www.grants.gov/web/grants/applicants/applicant-training.html

Applicant Support: Grants.gov provides applicants 24/7 support via the toll-free number 1-800-518-4726 and email at support@grants.gov. (Foreign applicants should contact 1-606-545-5035.) For questions related to the specific grant opportunity, contact the number listed in the application package of the grant you are applying for.

If you are experiencing difficulties with your submission, it is best to call the Grants.gov Support Center and get a ticket number. The Support Center ticket number will assist NRL with tracking your issue and understanding background information on the issue.

4. Timely Receipt Requirements and Proof of Timely Submission

a. *Online Submission.* The applicant AOR will receive an acknowledgement of receipt and a tracking number (GRANTXXXXXXXX) from Grants.gov with the successful transmission of their application. Applicant AORs will also receive the official date/time stamp and Grants.gov Tracking number in an email serving as proof of their submission.

When the Naval Research Laboratory successfully retrieves the application from Grants.gov, and acknowledges the download of submissions, Grants.gov will provide an electronic acknowledgment of receipt of the application to the email address of the applicant with the AOR role.

Applicants using slow internet, such as dial-up connections, should be aware that transmission can take some time before Grants.gov receives your application. Again, Grants.gov will provide either an error or a successfully received transmission in the form of an email sent to the applicant with the AOR role. The Grants.gov Support Center reports that some applicants end the transmission because they think that nothing is occurring during the transmission process. Please be patient and give the system time to process the application.

E. Application Review Information

3. Recipient Qualifications

a. Grant, Cooperative Agreement, and TIA Proposals

i. The Grants Officer is responsible for determining a recipient's qualification prior to award. In general, a Grants Officer will award grants or cooperative agreements only to qualified recipients that meet the standards at 32 CFR 22.415. To be qualified, a potential recipient must:

(1) Have the management capability and adequate financial and technical resources, given those that would be made available through the grant or cooperative agreement, to executed the program of activities envisioned under the grant or cooperative agreement;

(2) Have a satisfactory record of executing such programs or activities (if a prior recipient of an award);

(3) Have a satisfactory record of integrity and business ethics; and

(4) Be otherwise qualified and eligible to receive a grant or cooperative agreement under applicable laws and regulations.

Applicants are requested to provide information with proposal submissions to assist the Grants Officer's evaluation of recipient qualification.

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

If the total Federal share will be greater than the simplified acquisition threshold on and Federal award under a notice of funding opportunity (see 2 CFR 200.88 Simplified Acquisition Threshold):

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

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

(3) The Federal awarding agency will consider any comments by the applicant, in addition to the other information in the designated integrity and performance system, in making a judgment about the applicant's integrity, business ethics, and record of performance under Federal awards when completing the review of risk posed by applicants as described in 2 CFR 200.205 Federal awarding agency review of risk posed by applicants.

F. Federal Award Administration Information

2. Administrative and National Policy Requirements

d. Applicable to Grants, Cooperative Agreements, and TIA's (See Appendix 2).

i. Federal Funding Accountability and Transparency Act of 2006:

The Federal Funding Accountability and Transparency Act of 2006 (Public Law 109-282), as amended by Section 6202 of Public Law 110-252 and expanded by the Digital Accountability and Transparancy Act of 2014 (Public Law 113-101), requires that all agencies establish requirements for recipients reporting information on subawards and executive total compensation as codified in 2 CFR Part 170. Any company, non-profit agency or university that applies for financial assistance (either grants, cooperative agreements or TIAs) as either a prime or sub-recipient under this BAA must provide information in its proposal that describes the necessary processes and systems in place to comply with the reporting requirements identified in 2 CFR Part 170 Appendix A. Entities are required to meet reporting requirements unless an exception or exemption applies. Please refer to 2 CFR Part 170, including Appendix A, for a detailed explanation of the requirements, exceptions, and exemptions.

ii. Certification regarding Restrictions on Lobbying:

Grant and Cooperative Agreement awards greater than $100,000, as well as OTAs not under 10 U.S.C. 2371b, require a certification of compliance with a national policy mandate concerning lobbying. Grant applicants shall provide this certification by electronic submission of SF424 (R&R) as a part of the electronic proposal submitted via Grants.gov (complete Block 17). The

following certification applies likewise to each Cooperative Agreement and normal OTA applicant seeking federal assistance funds exceeding $100,000:

(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.

iii. Representation Regarding an Unpaid Delinquent Tax Liability or a Felony Conviction Under any Federal Law - DOD Appropriations:

All grant applicants are required to complete the "Representation on Tax Delinquency and Felony Conviction" found at http://www.onr.navy.mil/Contracts-Grants/submit- proposal/grants-proposal.aspx by checking the "I agree" box in block 17 and attaching the representation to block 18 of the SF424 (R&R) as part of the electronic proposal submitted via Grants.gov. The representation reads as follows:

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

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

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

iv. Representation Regarding the Prohibition on Using Funds with Entities that Require Certain Internal Confidentiality Agreements

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

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

Note that, as applicable, the bases for this representation are the prohibition(s) as follow:

a. Section 743 of the Financial Services and General Government Appropriation Act, 2015 (Division E of the Consolidated and Further Continuing Appropriations Act, 2015, Pub. L. 113-235)

b. Section 101(a) of the Continuing Appropriation Act, 2016 (Pub. L. 114-53) and any subsequent FY2016 appropriations act that extends to FY2016 the same restrictions as are contained in section 743 of Division E, title VII of the Consolidated and Further Continuing Appropriations Act, 2015 (Pub L. 113-235)

c. Pub. L. 114-223, Continuing Appropriations Act, 2017, or any other Act that extends to fiscal year 2017 funds the same prohibitions as contained in section 743, Division E, title VII, of the Consolidated Appropriations Act, 2016 (Pub. L. 114-113).

d. Any successor provision of law on making funds available through grants and cooperative agreements to entities with certain internal confidentiality agreements or statements.

The prohibitions stated above do not contravene requirements applicable to Standard Form 312, Form 4414, or any other form issued by a Federal department or agency governing the nondisclosure of classified information.

v. Code of Conduct:

Applicants for assistance are required to comply with 2 CFR 200.318(c), Codes of Conduct, to prevent real or apparent conflicts of interest in the award and administration of any contracts supported by federal funds. This provision will be incorporated into all assistance instruments

awarded under this BAA.

vi. Peer Review

In the case of proposals funded as basic research, NRL may utilize peer reviewers from academia, industry, and Government agencies to assist in the periodic appraisal of performance under the awards, as outlined in NRL Instruction 3966.1. Such periodic program reviews monitor the cost, schedule and technical performance of funded basic research efforts. The reviews are used in part to determine which basic research projects will receive continued NRL funding. Peer reviewers who are not U.S. Government employees must sign nondisclosure agreements before receiving full or partial copies of proposals and reports submitted by the basic research performers. Applicants may include travel costs for the Principal Investigator (PI) to attend the peer review.

APPENDIX 3 - REQUIREMENTS APPLICABLE TO CONTRACTS AND OTHER TRANSACTION AGREEMENTS

D. Application and Submission Information

2. Content and Form of Application Submission

(e) Full Proposals:

ii. Instructions for Contracts and Other Transaction Agreements

Proposal Package:

The following six documents with attachments comprise a complete proposal package:

(1) Proposal Checklist (.pdf)
(2) Technical Proposal Template (.pdf)
(3) Cost Proposal Spreadsheet (Excel)
(4) Adequacy Checklist for Pre Award Audit (SF 1408) (as applicable)
(5) Stand-alone non-proprietary Statement of Work (SOW) in Word
(6) Representations and Certifications

NOTE: The electronic file name for all documents submitted under this BAA must not exceed 68 characters in length, including the file name extension.

Items 1 – 5 above are located at: http://www.ONR.navy.mil/Contracts-Grants/submit-proposal/contracts-proposal/. All have instructions imbedded into them that will assist in completing the documents. Also, both the Proposal Checklist and the Cost Proposal Spreadsheet require completion of cost-related information. Please note that attachments can be incorporated into the Proposal Checklist.

For item 6, above, NRL contract specific representations and certifications are located at http://www.ONR.navy.mil/en/Contracts-Grants/submit-proposal/contracts-proposal.aspx

The format requirements for attachments are as follows:

- Paper Size- 8.5 x 11 inch paper
- Margins – 1 inch
- Spacing- single or double spaced
- Font- Times New Roman, 12 point

Offerors responding to this BAA must submit a separate list of all technical data or computer software that will be furnished to the Government with other than unlimited rights. The Government will assume unlimited rights if offerors fail to identify any intellectual property restrictions in their proposals. Include all proprietary claims to results, prototypes, and/or deliverables. If no restrictions are intended, then the offeror should state "NONE."

For proposed subcontracts or inter-organizational transfers over $150,000, Offerors must provide a separate fully completed Cost Proposal Spreadsheet in support of the proposed costs. This

spreadsheet, along with supporting documentation, must be provided either in a sealed envelope with the prime's proposal or via e-mail directly to both the TPOC and the Business Point of Contact at the same time the prime proposal is submitted. The e-mail should identify the proposal title, the prime Offeror and that the attached proposal is a subcontract, and should include a description of the effort to be performed by the subcontractor.

Offerors should submit an appropriate number of hard copies as discussed with the cognizant TPOC of their proposal package.

The electronic copy must be submitted in a secure, pdf-compatible format, except for the electronic file of the Cost Proposal Spreadsheet which must be submitted in a Microsoft Excel 2010 compatible format and the Statement of Work Template which must be submitted in Microsoft Word format. All attachments to any required proposal documents must be submitted in a secure, pdf-compatible format.

The secure pdf-compatible format is intended to prevent unauthorized editing of the proposal prior to any award. A password should not be required for opening the proposal document, but the Government must have the ability to print and copy text, images, and other content. Should an Offeror amend its proposal, the amended proposal should be submitted following the same hard and electronic copy guidance applicable to the original proposal.

Any proposed options that are identified in the Technical Proposal Template or Proposal Checklist documents, but are not fully priced out in the Cost Proposal Spreadsheet, will not be included in any resulting contract, cooperative agreement, or other transaction. If proposing options, they **must** be separately priced and separate spreadsheets should be provided for the base period and each option. In addition to providing summary by period of performance (base and any options), the Contractor is also responsible for providing a breakdown of cost for each task identified in the Statement of Work. The sum of all costs by task worksheets MUST equal the total cost summary.

The electronic submission of the Excel spreadsheet should be in a "useable condition" to aid the Government with its evaluation. The term "useable condition" indicates that the spreadsheet should visibly include and separately identify within each appropriate cell any and all inputs, formulas, calculations, etc. The Offeror should not provide "value only spreadsheets" similar to a hard copy.

Fixed Fees on NRL Contracts: The Government Objective is set in accordance with the DFARS 215.404-71. See the below table for range and normal values:

Contract Risk Factor	**Contract Type**	**Assigned Value (Normal range)**	**Normal Value**
Technical(1)		3% - 7%(2)	5%
Management/Cost Control(1)		3% - 7%(2)	5%
Contract Type Risk	Firm Fixed Price	2% - 6%(3)	3% - 5%(4)
Contract Type Risk	Cost Plus Fixed Fee	0% - 1%(2)	0.5%

(1) Assign a weight (percentage) to each element according to its input to the total performance risk. The total of the two weights equal 100%
(2) Assign a weighting score relative to the Risk Factor.
(3) Depends on the specific Contract Type (With/without financing, performance-based payments, and/or progress payments).
(4) Depends on the specific Contract Type.

Technology Incentive (TI) is rarely utilized at NRL, because the contracts issued by NRL typically are not eligible for TI (See DFARS 215.404-71-2(c) (2)). Any consideration of TI requires strong and convincing justification in the proposal, which are then subject to negotiation and determination of a fair and reasonable fee, within the context of the specific award.

Typically the range of fee is 5% to7.5% on an NRL awarded contract.

E. Application Review Information

3. Recipient Qualifications

b. Contract Proposals:

i. Contracts shall be awarded to responsible prospective contractors only. See FAR 9.104-1 for a listing of the general standards against which an applicant will be assessed to determine responsibility.

Applicants are requested to provide information with proposal submission to assist the Contracting Officer's evaluation of responsibility

ii. FAPIIS (Federal Awardee Performance and Integrity Information System) will be checked prior to making an award. The web address is:

httsp://www.fapiis.gov/fapiis/index.action

The applicant representing the entity may comment in this system on any information about the entity that a federal government official entered. The information in FAPIIS will be used in making a judgment about the entity' integrity, business ethics, and record of performance under Federal awards that may affect the official's determination that the applicant is qualified to receive an award.

F. Federal Award Administration Information

2. Administrative and National Policy Requirements

c. Applicable to Contracts and Other Transaction Agreements (See Appendix 3).

i. Applies to Contracts (and may be applicable, as revised, to Other Transactions):

(1) Government Property/Government Furnished Equipment (GFE) and Facilities: Government research facilities and operational military units are available and should be considered as potential government-furnished equipment/facilities. These facilities and resources are of high value and some are in constant demand by multiple programs. It is unlikely that all facilities would be used for any one specific program. The use of these facilities and resources will be negotiated as the program unfolds. Offerors should indicate in the Proposal Checklist, Section II, Blocks 8 and 9, which of these facilities are critical for the project's success.

(2) Use of Arms, Ammunition and Explosives:

Safety

The Offeror is required to be in compliance with DoD manual 4145.26-M, *DoD Contractor's Safety Manual for Ammunition and Explosives* if ammunitions and/or explosives are to be utilized under the proposed research effort. (See DFARS 223.370-5 and DFARS 252.223-7002) If ammunitions and/or explosives (A&E) are to be utilized under the proposed research effort, the Government requires a preaward safety survey in accordance with DFARS PGI 223.370-4(C)(iv) entitled *Preaward survey*.

If the Offeror proposes that the Government provide Government-furnished A&E containing any nitrocellulose-based propellants and/or nitrate ester-based materials (such as nitroglycerin) or other similar A&E with a tendency to become chemically unstable over time, then NMCARS 5252.223-9000 will also apply to a resulting contract award. (See NMCARS 5223.370-5)

Security

If arms, ammunition or explosives (AA&E) are to be utilized under the proposed research effort, the Government requires a preaward security survey. (See DoD manual 5100.76-M, dated April 17, 2012, *Physical Security of Sensitive Conventional Arms, Ammunition and Explosives*, Enclosure 2, paragraph 2.a.)

If AA&E are to be utilized under the proposed research effort, the Government may require the Contractor to have perimeter fencing around the place of performance in accordance with DoD 5100.76-M dated April 17, 2012, Enclosure 5, paragraph 2.a.

If AA&E are to be utilized under the proposed research effort, the Offeror is required to provide a written copy of the Offeror's AA&E accountability procedures in accordance with DoD 5100.76-M. If the Offeror is required to provide written AA&E accountability procedures, the Offeror should provide the respective procedures with its proposal submission. See DoD 5100.76-M dated April 17, 2012, Enclosure 9, paragraph 9.

(3) System for Award Management (SAM):

FAR 52.204-7 System for Award Management and FAR 52.204-13 System for Award Management Maintenance are incorporated into this BAA, and FAR 52.204-13 will be incorporated in all awards.

(4) Employment Eligibility Verification (E-verify):

As per FAR 22.1802, recipients of FAR-based procurement contracts must enroll as Federal Contractors in E-verify and use E-verify to verify employment eligibility of all employees assigned to the award. All resultant contracts from this solicitation will include FAR 52.222-54, "Employment Eligibility Verification."

(5) Conflicts of Interest:

(a) Disclosure. An offeror shall state in its proposal whether it is aware of any information bearing on the existence of any actual or potential organizational conflict of interest (OCI) as defined in FAR 2.101 and as further discussed in FAR Subpart 9.5 as to itself and any proposed subcontractors, partners, consultants or other affiliates. Offerors performing systems engineering and technical assistance (SETA) for NRL are considered to have an OCI that may not be susceptible to mitigation. See ONR's Statement of Policy on OCIs, which can be found at the following address: http://www.ONR.navy.mil/en/About-ONR/compliance-protections/Organizational-Conflicts-Interest.aspx

The nondisclosure or misrepresentation of an interest creating an OCI may result in the disqualification of an offeror for award, or if such nondisclosure or misrepresentation is discovered after award, the Government may terminate the contract for default, recommend that the contractor be disqualified from subsequent related contracts, or be subject to such other remedial actions as may be permitted or provided by law (see 18 U.S.C. § 1001 and 31 U.S.C. § 3802(a)(2)). Therefore, offerors should interpret the requirements of this section broadly.

An offeror who does not provide support services to NRL or concludes no actual or potential OCI exists shall include the following statement in its proposal: "I [NAME] as an authorized negotiator on behalf of [NAME OF OFFEROR] certify that **NO** actual or potential organizational conflict of interest (OCI) exists under [BAA NUMBER]. I understand that the failure to disclose the existence of actual or potential OCI shall result in the offeror not being considered for award."

An offeror who does provide support services to NRL or is aware circumstances exist that may result in the appearance that it may have an unfair competitive advantage shall submit the following with its proposal:

(i) The name of the entity the offeror, its subcontractors, partners, consultants or affiliates supports.

(ii) The number of the contract, subcontract, or agreement that creates the actual or potential OCI. If NRL did not award the contract or agreement, provide a copy of the document. If NRL awarded the contract, provide the name of the technical point of contact.

(iii) A description of the actual or potential OCI. The statement must describe in a concise manner all relevant facts concerning any past, present or currently planned interest (financial, contractual, organizational, or otherwise) relating to the work to be performed hereunder and bearing on whether the offeror has a possible organizational conflict of interest with respect to (1) impartial, technically sound, and unbiased assessments, recommendations, or evaluations, or (2) being given an unfair competitive advantage. If relevant, offerors shall address the personal conflicts of their employees.

(iv) A Mitigation Plan. Offerors should refer to FAR Subpart 9.5 for policies and procedures for avoiding, neutralizing, or mitigating organizational conflicts of interest.

(v) A concluding statement as follows: "I [NAME] as an authorized negotiator on behalf of [NAME OF OFFEROR] certify that I have, to the best of my knowledge and belief, disclosed all actual or potential organizational conflicts of interest (OCI) under [BAA

NUMBER]. I understand that the failure to disclose the existence of an actual or potential OCI shall result in the offeror not being considered for award."

(b) OCI Mitigation Plan Contents. At a minimum, a Mitigation Plan shall:

(i) Provide organizational charts showing the offeror's (and, as appropriate, those of its subcontractors, partners, consultants, and affiliates) structure as it relates to performance under the contract awarded under this BAA and all contracts and agreements relevant to the OCI, highlighting those elements that create the actual or apparent OCI.

(ii) Demonstrate how the elements that create the actual or apparent OCI will be isolated from the resources that will perform work under the contract awarded under this BAA.

(iii) Provide information showing whether the organizational elements that will perform work under the contract awarded under this BAA will be geographically or physically separated from the elements that create the actual or apparent OCI.

(iv) For each contract or agreement relevant to the OCI, describe the process for reassigning personnel, including those belonging to subcontractors, partners, consultants, and affiliates, from one organization to another. Include restrictions that apply.

(v) For each contract or agreement relevant to the OCI, describe the any controls, including nondisclosure agreements, that are exercised over the future employment of departing employees as it relates to the OCI.

(vi) For each contract or agreement relevant to the OCI, describe any OCI training the employees are offered or required to attend, along with the timing (before or after starting work on a government contract), frequency, length, and content of such training.

(vii) Provide evidence of facts and circumstances that the offeror asserts mitigate or address the concerns related to the actual or potential OCI.

(c) Review. The Contracting Officer will review an offeror's certifications, statements, and OCI Mitigation Plan (if applicable) submitted and may require additional relevant information from an offeror. All such information and any other relevant information will be used by the Contracting Officer to determine whether an award to the offeror may create an OCI. If found to exist, the Government may: (1) impose appropriate conditions which avoid such conflict, (2) disqualify the offeror, (3) determine that it is otherwise in the best interest of the Government to award a contract to the offeror and include appropriate conditions mitigating such conflict in the award, or (4) seek a waiver. If the Contracting Officer determines that an actual or significant potential conflict of interest exists that cannot reasonably be avoided, neutralized or mitigated, the offeror will be ineligible for award. If accepted, the Mitigation Plan shall become part of the contract.

An offeror who has refused to disclose the information or make the certification required by this BAA concerning an actual or potential OCI shall be disqualified from consideration for award.

6. FAR / DFARS Provisions/Clauses: For purposes of illustration and not of limitation, the following provisions and clauses may be applicable to NRL contracts:

#	Provision/Clause
52.204-7	System for Award Management
52.204-13	System for Award Management Maintenance
52.215-16	Facilities Capital Cost of Money
52.215-22	Limitations on Pass Through Charges - Identification of Subcontract Effort
52.216-1	Type of Contract
52.216-27	Single or Multiple
52.217-4	Evaluation of Options Exercised at time of Contract Award
52.217-5	Evaluation of Options
52.217-9	Option to Extend the term of the Contract
52.222-24	Preaward On-Site Equal Opportunity Compliance Evaluation (Applies if exceeds $10M)
52.226-2	Historically Black College or University and Minority Institution Representation
52.230-7	Proposal Disclosure - Cost Accounting Practice Changes
52.232-15	Progress Payments not included
52.233-2	Service of Protest
52.252-1	Solicitation Provisions Incorporated by Reference
52.252-3	Alterations in
52.252-5	Authorized Deviations in Provisions
252.203-7005	Representation Relating to Compensation of Former DoD Officials
252.204-7004	Alternate A, System for Award Management
252.204-7008	Compliance with Safeguarding Covered Defense Information Controls (DEC 2015)
252.204-7012	Safeguarding Covered Defense Information and Cyber Incident Reporting (DEC 2015)
252.215-7003	Requirements for Submission of Data Other than Certified Cost or Pricing Data - Canadian Commercial Corporation
.252.219-7000	Advancing Small Business Growth
252.219-7003 (DEVIATION 216-O0009) ALT II	Small Business Subcontracting Plan (DOD CONTRACTS) – BASIC

(a) Combating Trafficking in Persons: FAR Clause 52.222-50 will be incorporated in all awards.

(b) Certification Regarding Trafficking in Persons Compliance Plan:
Prior to award of a contract, for the portion of the contract that is for supplies, other than

commercially available off-the-shelf items, to be acquired outside the United States, or services to be performed outside the United States, and which has an estimated value that exceeds $500,000, the contractor shall submit the certificate as specified in paragraph (c) of 52.222-56, Certification Regarding Trafficking in Persons Compliance Plan

(c) Updates of Information regarding Responsibility Matters: FAR clause 52.209-9, Updates of Publicly Available Information Regarding Responsibility Matter, will be included in all contracts valued at $550,000 where the contractor has current active Federal contracts and grants with total value greater than $10,000,000.

(7) Production and Testing of Prototypes

NRL may modify a contract awarded under this BAA to add a contract line item or contract option for the provision of advanced component development or for the delivery of initial or additional prototype units. However, such a contract addition shall be subject to the limitations contained in Section 819 of the National Defense Authorization Act (NDAA) for Fiscal Year 2010, as modified in Section 811 of the NDAA for Fiscal Year 2015.

i. **Applies to Other Transaction Agreements only:**

(1) Federal Funding Accountability and Transparency Act of 2006:

The Federal Funding Accountability and Transparency Act of 2006 (Public Law 109-282), as amended by Section 6202 of Public Law 110-252 and expanded by the Digital Accountability and Transparency Act of 2014 (Public Law 113-101), requires that all agencies establish requirements for recipients reporting information on subawards and executive total compensation as codified in 2 CFR Part 170. Any company, non-profit agency or university that applies for financial assistance (either grants, cooperative agreements or TIA's other transaction agreements) as either a prime or sub-recipient under this BAA must provide information in its proposal that describes the necessary processes and systems in place to comply with the reporting requirements identified in 2 CFR Part 170 Appendix A. Entities are required to meet reporting requirements unless an exception or exemption applies. Please refer to 2 CFR Part 170, including Appendix A, for a detailed explanation of the requirements, exceptions, and exemptions.