ONR BAA Announcement #N00014-18-S-B001
Long Range Broad Agency Announcement (BAA) for Navy and Marine
Corps Science and Technology

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I. OVERVIEW OF THE RESEARCH OPPORTUNITY

This publication constitutes a Broad Agency Announcement (BAA) for awards by the ONR Contact and Grants Awards Management Division, ONR Code 25 (or otherwise approved by Code 25) 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 Office of Naval Research (ONR) will not issue paper copies of this announcement. The ONR reserves the right to fund all, some, or none of the proposals received under this BAA. ONR provides no funding for direct reimbursement of proposal development costs. Technical and cost proposals (or any other material) submitted in response to this BAA will not be returned. It is the policy of ONR to treat all proposals 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. For Navy and Marine Corps Science, Technology, Engineering & Mathematics (STEM) programs, refer to N00014-17-S-F002 dated October 31, 2016-R - FA01, and the FY18 successor STEM FOA, which may be found at the ONR Broad Agency Announcement (BAA) webpage: http://www.onr.navy.mil/Contracts-Grants/Funding-Opportunities/Broad-Agency-Announcements.aspx.

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**

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

2. **Funding Opportunity Title -** Long Range Broad Agency Announcement (BAA) for Navy and Marine Corps Science & Technology

3. **Announcement Type -** Initial Announcement

4. **Funding Opportunity Number -** N00014-18-S-B001

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**

   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 N00014-17-S-B001 dated September 28, 2016.

   Submission of Late Proposals (Applicable to White Papers and Full Proposals) - The Government reserves the right to not review proposals submitted after 30 September 2018, 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 "541712" with a small business size standard of "1,000 employees".

II. DETAILED INFORMATION ABOUT THE FUNDING OPPORTUNITY

A. Program Description –

The Office of Naval Research (ONR) 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 ONR's broad role in competitive funding of meritorious research across a spectrum of science and engineering disciplines. A brief description of the ONR Program Codes and the science and technology thrusts that ONR is pursuing is provided at Appendix 1. Additional information can be found at the ONR website at http://www.onr.navy.mil/Science-Technology/Departments.aspx.

List of Departments

- Expeditionary Maneuver Warfare & Combating Terrorism Department (Code 30)
- Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) Department (Code 31)
- Ocean Battlespace Sensing Department (Code 32)
- Sea Warfare and Weapons Department (Code 33)
- Warfighter Performance Department (Code 34)
- Naval Air Warfare and Weapons Department (Code 35)
- Marine Corps Warfighting Lab (MCWL)
- Office of Naval Research Global (ONRG)

* Click on the above hyperlinks to navigate directly to your desired section

Potential offerors are urged to check the program areas that they are interested in throughout the year for updates to thrust areas and research priorities on the ONR website at http://www.onr.navy.mil. Prior to preparing proposals, potential offerors are strongly encouraged to contact the ONR point of contact (POC). To identify the POC, follow the link at the ONR website for the appropriate code or division and then click on the link to the thrust or topic area. Each thrust or topic area will provide a POC or e-mail address.

Basic Research Challenge/Special Opportunity Notices: From time to time throughout Fiscal Year 2018, ONR Program Officers will issue Special Opportunity Notices soliciting program-specific basic research proposals which expand on one of the topic areas discussed in Appendix 1. These Special Opportunity Notices will be posted to the ONR website under Special Notices at http://www.onr.navy.mil/en/Contracts-Grants/Funding-Opportunities/Special-Notices.aspx, to https://www.fbo.gov/ and http://www.grants.gov/, as applicable, and will make reference to this BAA for submission instructions.

Each Special Opportunity Notice will provide a description of the specific research effort being solicited, the application process to be used, as well as the recommended dates for submission of proposals. Proposals submitted in response to the Special Opportunity Notices shall use this BAA's application package and shall be submitted under this BAA following the instructions contained this BAA. Proposals will be evaluated in accordance

with the criteria set forth in this BAA. Interested parties are urged to periodically check the ONR website (http://www.onr.navy.mil/), Federal Business Opportunities (https://www.fbo.gov/) and Grants.gov (http://www.grants.gov/) websites for new Special Opportunity Notices.

B. Federal Award Information

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

2. **<u>Contracted Fundamental Research</u>**. With regard to any restrictions on the conduct or outcome of work funded under this BAA, ONR will follow the guidance on and definition of "contracted fundamental research" as provided in the Under Secretary of Defense (Acquisition, Technology and Logistics

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, ONR will place no restriction on the conduct or reporting of unclassified "contracted fundamental research," except as otherwise required by statute, regulation or executive order. For certain research projects, it may be possible that although the research being performed by the prime contractor is restricted research, a subcontractor may be conducting "contracted fundamental research." In those cases, it is the *prime contractor's responsibility* in the proposal to identify and describe the subcontracted unclassified research and include a statement confirming that the work has been scoped, negotiated, and determined to be fundamental research according to the prime contractor and research performer.

Normally, fundamental research is awarded under grants with universities and under contracts with industry. 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 ONR 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, s, grants, cooperative agreements, technology investment agreements, and other transaction agreements, as appropriate. The following provides brief descriptions of potential instrument types:

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

b. Assistance Instruments.

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 ONR 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 "Other Transactions" OT 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. **Model Contracts and Grants** – The model contracts and grants at the links below are only provided as examples. In the event of any conflict between these examples and current FAR, DFARS, NMCARS, or ONR clauses, current FAR, DFARS, NMCARS, or ONR clauses will govern.

- Examples of model contracts can be found on the ONR website at the following link: http://www.onr.navy.mil/Contracts-Grants/submit-proposal/contracts-proposal/contract-model-awards.aspx.

- Examples of model grants can be found on the ONR website at the following link: http://www.onr.navy.mil/en/Contracts-Grants/submit-proposal/grants-proposal/model-grant.aspx.

   6. **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.onr.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 ONR Technical POC to discuss its area of interest.

The various scientific divisions of ONR are identified at http://www.onr.navy.mil/. As with FFRDCs, these types of federal organizations may team with other 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 ONR.

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. ONR website http://www.onr.mil

2. **Content and Format of Application Submission**

    a. General Information

Full proposals are required for submission. "White Papers" are frequently desired by ONR Program Officers. Offerors should consult the cognizant ONR Program Officer regarding the desirability of "White Paper" submissions or Oral Presentations. ONR departments are identified at http://www.onr.navy.mil/en/Science-Technology/Contacts.aspx.

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

OUTSIDE ENVELOPE - (**no classification marking**):

"Office of Naval Research

Attn: Document Control Unit
ONR Code 43
875 North Randolph Street
Arlington, VA 22203-1995"

The inner wrapper of the classified White Paper and/or Full Proposal should be addressed to the attention of the cognizant TPOC, ONR Code XX and marked in the following manner:

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

"Program Name:
Office of Naval Research
ATTN: ONR Program Officer Name
ONR Code: ONR Program Officer Code
875 North Randolph Street
Arlington, VA 22203-1995"

- For both classified and unclassified proposals, a <u>non-proprietary</u> version of the Statement of Work must also be submitted. <u>Do not put proprietary data or markings in or on the Statement of Work</u>. 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.**

i. <u>White Paper Format</u>

- 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. <u>White Paper Submission</u>. When e-mail submission is required, 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.

- For ONR Only: Electronic (email) submissions should be sent to the attention of the TPOC at: Email address of the TPOC, e.g., <u>Jane.Doe@navy.mil</u>. The subject line of the email shall read: "*N00014-18-S-B0001" White Paper Submission*". Do not send ZIP files. Password protected files are discouraged.

- For ONRG Only (Assistance): Electronic submissions of white papers may be submitted directly to ONRG at <u>ONRG.GrantProposals@mail.mil</u>. **Only electronic submissions will be accepted and reviewed**.

- For Marine Corps Warfighting Lab (MCWL): MCWL Topics of Interest Only – Hard copies of White Papers addressing MCWL topics of interest should be sent to the following address:

Marine Corps Warfighting Lab
Attn: Future Technology Officer
3255 Meyers Ave.
Quantico, VA 22134

(iii) <u>White Paper Content</u>: White papers shall include the <u>following</u>:

FOR ALL WHITE PAPERS

• Cover Page: The Cover Page shall be labeled "WHITE PAPER" and shall include the BAA Number N00014-18-S-B001, 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

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 environment.

- Rough Order of Magnitude (ROM)

    d. Full Proposals:

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

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

   3. **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 A.6 "Key Dates" for information.

   5. **Intergovernmental Review**: RESERVED.

   6. **Funding Restrictions**: RESERVED.

   7. **Other Submission Requirements**

    a. Submission of Grant, Cooperative Agreement, and TIA Proposals through Grants.gov (Appendix 2).

    b. Submission of Full Proposals for Contracts and Other Transaction Agreements

        i. For ONR, contact the Program Officer for electronic submission information for full proposals.

        ii. For MCWL, full proposals should be sent to the following address:

Marine Corps Warfighting Lab
Attn: Future Technology Officer
3255 Meyers Ave.
Quantico, VA 22134

E. Application Review Information

1. **Criteria**. Awards under this BAA will be made in accordance with FAR 35.016(e). The primary basis for selecting proposals for acceptance will be technical, importance to agency programs, and fund availability. Cost realism and reasonableness will also be considered when selecting proposals. ONR reserves the right to request and require any additional information and documentation after it makes the award instrument determination. ONR 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' white papers and 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 ONR and Department of Navy mission.

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

Criteria 1, 2, and 3 are equally important.

2. **Review and Selection Process**

    a. Proposals will not be evaluated against each other since they are not submitted in accordance with a common work statement. ONR'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 ONR's scientific/technical community. Recommended proposals will then be forwarded to the ONR Contracts and Grant Awards Management office. Any notification received from ONR 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 Department 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. <u>Commitment to Small Business</u>- (For Contract Awards Only)

The Office of Naval Research 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 pursing 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 Subpart 19.704, FAR 52.219-9 and as supplemented by DFARS 252.219-7003.

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 the 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://www.acq.osd.mil/osbp/. 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. 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 ONR Office of Small Business webpage at:

http://www.onr.navy.mil/Contracts-Grants/small-business.aspx.

In accordance with FAR Subpart 5.206, the following entities may transmit a notice to a Government Point of Entry (GPE) 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 GPE is the SBA SUB-Net which is a place in which prime contractors may post solicitations or sources sought notices for small business. The SUB-Net database provides a listing of subcontracting solicitations and opportunities posted by large prime contractors and other non-federal agencies.

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. The Government reserves the right to exercise options at time of award.

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

3. **Recipient Qualifications**

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

    b. Applicable to Contracts and Other Transaction Agreements (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. Office of Naval Research (ONR) 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.

ONR 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. ONR recommends that organizations provide a global business address for their entity in Field 5 (Application Information) of the SF424. ONR 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 ONR. 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.

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.

ONR does not provide access to classified material under grants.

iii. *Requirements Concerning Live Organisms*:

(1) Use of Animals: If animals are to be utilized in the research effort proposed, the Offeror must submit a Full Appendix or Abbreviated Appendix with supporting documentation (copies of IACUC Approval, IACUC Approved Protocol, and most recent USDA Inspection Report) prior to award. For assistance with submission of animal research related documentation, contact the ONR Animal Use Administrator at (703) 696-4046. Guidance: http://www.onr.navy.mil/en/About-ONR/compliance-protections/Research-Protections/Animal-Recombinant-DNA.aspx

(2) 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 3900.39D (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 ONR Human Research Protection Official (HRPO), by way of the ONR 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 ONR Human Research Protection Official (HRPO) at (703) 696-4046.

(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: http://www.onr.navy.mil/About-ONR/compliance-protections/Research-Protections/Human-Subject-Research.aspx

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: http://www.onr.navy.mil/About-ONR/compliance-protections/Research-Protections/Animal-Recombinant-DNA.aspx

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

vii. *Project Meetings and Reviews*: Individual program reviews between the ONR sponsor and the performer may be held as necessary. Program status reviews may also be held to provide a forum for reviews of the latest results from experiments and any other incremental progress towards the major demonstrations. These meetings will be held at various sites throughout the country. For costing purposes, offerors should assume that 40% of these meetings will be at or near ONR, Arlington VA and 60% at other contractor or government facilities. (This statement does not apply to international offerors submitting proposals to ONRG. International offerors should contact the cognizant ONRG Administrative Director (AD) for guidance prior to submitting a proposal.) Interim meetings are likely, but these will be accomplished via video telephone conferences, telephone conferences, or via web-based collaboration tools.

   3. **Reporting**: 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 U.S.C. 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 872 of Public Law 110-417, as amended (41 U.S.C. 2313). As required by section 3010 of Public Law 111-212, 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.

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

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

G. Federal Awarding Agency Contacts

1. **Communications**:

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

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

2. **Questions of a Technical nature** should be submitted to the ONR POC whose program best matches the offeror's field of interest. Explore ONR's website at http://www.onr.navy.mil/Science-Technology/Contacts.aspx, where you can navigate the various directorates and departments within the ONR umbrella. Embedded within the specific exploratory threads should be the relevant POC information for the cognizant ONR Program Office that you seek.

   a.   Questions of a Technical nature related to Marine Corps Warfare Lab (MCWL) topics: Contact the MCWL Future Technology Officer at john.e.moore4@usmc.mil.

   b.   Questions of a Technical nature related to the Office of Naval Research Global (ONRG) topics: Contact the ONRG Grants Team at ONRG.GrantProposals@mail.mil

3. **Questions of a Business nature**, and suggestions for improvement, should be submitted to:

   Matthew Murray
   Office of Naval Research
   ONR Code 252
   One Liberty Center
   875 N. Randolph Street
   Arlington, VA 22203-1995
   Email Address: matthew.murray1@navy.mil

4. **Questions of a Security nature** should be submitted to:

   Torri Woodfolk
   Industrial Security Specialist
   Office of Naval Research
   Security Department, Code 43
   One Liberty Center

875 North Randolph St.
Arlington, VA 22203-1995
Email Address: torri.powell@navy.mil

H. Other Information - RESERVED

APPENDIX – 1 – PROGRAM DESCRIPTION

II. DETAILED INFORMATION ABOUT THE FUNDING OPPORTUNITY

A. Program Description

Potential offerors are urged to check the program areas that they are interested in throughout the year for updates to thrust areas and research priorities on the ONR website at http://www.onr.navy.mil. Prior to preparing proposals, potential offerors are strongly encouraged to contact the ONR point of contact (POC). To identify the POC, follow the link for the appropriate code or division listed in below and then click on the link to the thrust or topic area. Each thrust or topic area will provide a POC or e-mail address.

List of Departments

- Expeditionary Maneuver Warfare & Combating Terrorism Department (Code 30)
- Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) Department (Code 31)
- Ocean Battlespace Sensing Department (Code 32)
- Sea Warfare and Weapons Department (Code 33)
- Warfighter Performance Department (Code 34)
- Naval Air Warfare and Weapons Department (Code 35)
- Marine Corps Warfighting Lab (MCWL)
- Office of Naval Research Global (ONRG)

I.   EXPEDITIONARY MANEUVER WARFARE & COMBATING TERRORISM DEPARTMENT (CODE 30)

Code 30 develops and transitions technologies to enable the Navy-Marine Corps team to win and survive on the battlefield. The Department supports the Naval Expeditionary Force to conduct maneuver warfare and amphibious operations in environments characterized by complex terrain, technology proliferation, information used as a weapon, a battle of signatures, and an increasingly contested maritime domain. To achieve the goals of the department, the expertise of a number of technical communities are needed. The Department supports applied physics efforts ranging from electromagnetics for C4 to condensed matter physics. The Department engages chemistry and materials science to improve structures and efficiencies of our platforms and systems and is interested in emerging opportunities from the computer science community to efficiently control and protect our information and hardware systems. Given the applied nature of some of the Department's work, we frequently support ideas and opportunities from the engineering community including electrical, mechanical, and software engineering. The department is interested in engaging with these and other technical communities to identify concepts and technologies that will improve warfighter effectiveness in the thrusts described below.

A.   **ONR 30 Command, Control, Computers and Communication (C4), and Electronic Warfare (EW)** program seeks to provide tomorrow's small unit naval expeditionary, irregular, and complex hybrid warfighters with the precise information they need, when they need it, in highly-contested environments. S&T proposals selected in response to this BAA will provide advances to the state of the art capabilities that support USMC and Special Forces in the air, ground, and littoral areas.

Proposals submitted in response to this BAA will address C4, EW, and/or Cyber pertaining to Expeditionary, Irregular and Complex Hybrid Warfare including (but not limited to) the following S&T areas:

   1.   <u>C4 S&T areas</u>: Communication electronic and photonic technologies and systems, multifunction and software defined radio technology, low probability of intercept (LPI), low probability of detect (LPD), secure long-haul relay technologies, enhanced unit and joint service interoperability, multi-classification inter-operability, antenna miniaturization, resilient mobile ad-hoc networks(MANET) architectures and technologies; secure C4; autonomous environmental sensing, control, machine learning and adaptation as applied to C4; quantum communications, sensing and processing sciences; distributed and decentralized computing and processing.

   2.   <u>Electronic Warfare (EW) S&T areas</u>: Areas of interest include but are not limited to emphasis on: electronic protection, electronic attack, electronic support, such as counter-measures and counter-counter-measure technologies; compact, resilient sensors; compact, robust positioning, navigation, and timing (PNT) technologies for contested or denied areas;

decentralized and networked EW; behavior learning and adaptive EW techniques; electromagnetic signature control and management.

Other general supporting technologies related to C4-EW:

     a.   Spectral coexistence and efficiency techniques that can greatly increase the information capacity per unit spectrum.

     b.   Electromagnetic spectrum (EMS) and cyber-domain situational awareness at the tactical edge.

     c.   Novel approaches for multi-layer mobile device security.

     d.   Ability to autonomously extract meaning from information flows.

     e.   Architectures of operating in a disconnected, intermittent, low-bandwidth (DIL) environment, for the management of cyber/EW effects.

     f.   Efficient warfighter interfaces for combined C4-EW-Cyber operations

     g.   Multifunction technologies (e.g., electronics, photonics, signal processing, networking science, cyber technologies, computing) that enable combined C4-EW-Cyber technologies with reduced size, weight and power (SWAP).

     h.   Miniaturization, prolonging battery life, and energy harvesting supporting advanced autonomic systems.

     i.   Novel system of systems architectures for combined, resilient C4-EW- Cyber capabilities.

     j.   Modeling and simulation of subsystems, systems, and systems of systems for assessing technology effectiveness in expeditionary and complex hybrid warfare scenarios.

     k.   Expeditionary and complex hybrid warfare technologies rapid prototyping, demonstrations, and experimentation.

     l.   Mission planning tools and aids for improving mission effectiveness within the C4-EW-Cyber domains.

     m.   Anti-tamper technologies for tactical edge use in SWAP restricted applications; robust and efficient cross-domain (e.g., cross-classification-domain) technologies.

     n.   Technologies that enable rapid development, experimentation, prototyping, and insertion of capabilities that exceed the pace of Moore's Law.

     o.   C4-EW-Cyber S&T approaches that demonstrate rapid, low latency OODA (Observe, Orient, Decide, and Act) loop response cycles.

Proposers are also strongly encouraged to consider combined integrated system of systems S&T development approaches that will 'bake-in' capabilities, and security, as early as possible in the development where appropriate. For example, one approach might be a co-designed communication and MANET architecture and reconfigurable topologies that are inherently robust to cyber and EW attacks as evident in a system of system analysis. Proposers are encouraged to consider other combined approaches as well that add capabilities and resiliency.

Further information may be found at:
(http://www.onr.navy.mil/Science-Technology/Departments/Code-30/All-Programs/C4.aspx).

B. **Physical Systems Cyber Program** seeks modern cryptographic systems including attributed based cryptography, identity based keying, and secure multiparty computation; technologies that lead to formal methods approaches being easily integrated into software development workflow; cyber-domain terrain mapping for cyber-physical situational awareness; improved means for white box and black box security testing of software; techniques that provide assurance against the threat of an adversary for modern machine learning technologies; and technologies that provide full platform trust from the individual hardware through the end user software. Research efforts should not only consider passive defense of communications networks; rather, that network should also be able to actively fight back with research providing freedom of movement and influence in the cyber domain. A key aspect of this research is its focus on expeditionary operations and systems consisting of a mixture of commercial and government developed technologies and embedded processors. These technologies may operate in close physical proximity to the adversary.

Research areas include:

1. Physical Systems Cyber Defense and Effects
2. Adversarial Thinking
3. Applied Cryptography
4. Computer Science
5. Data Network Sensors
6. Defense in Depth Security Architectures
7. Dynamic Application Security Testing
8. Intrusion Detection
9. Reverse Engineering
10. Software-Defined Networks
11. Static Application Security Testing
12. Threat Modeling

Further information may be found at:
(http://www.onr.navy.mil/Science-Technology/Departments/Code-30/All-Programs/C4.aspx).

C. **Energetics, Guidance, Navigation and Control (GNC), Targeting and Fire Control Science and Technology Program** seeks a range of weapons technologies, from kinetic weapons to address 21st-century combined-arms warfare against peer states in complex denied and degraded environments. Research efforts are designed to increase precision, range, lethality and magazine capacity, while retaining mobility and tempo. Research includes long-range precision artillery and mortar fires in DIL and satellite-denied environments within SWAP constraints. The effective ranges of these systems against stationary and moving targets will far exceed current systems. Research is needed into high-reliability, cannon-delivered, area-effects munitions to enable massing of fires against peer and near-peer adversaries.

Research areas include:

1. Aerodynamics
2. Control Theory and Systems Integration
3. Energetic Materials and Chemistry
4. Highly-robust Microelectromechanical Systems (MEMS) Devices for Position, Navigation and Timing Applications on Rockets, Artillery and Mortars; and for Munitions Safety and Arming Devices and Fuses
5. Highly-robust Seekers (Electro-optic, Infrared and Radio Frequency) and Sensors for Rockets, Artillery, Mortars and Other Munitions Applications, and for Target Detection and Recognition Devices
6. Material Failure and Fracture Dynamics
7. Materials Science
8. Propulsion and Gas Dynamics

Further information may be found at:
(http://www.onr.navy.mil/Science-Technology/Departments/Code-30/All-Programs/Fires.aspx).

D. **ONR 30 Human Performance, Training and Education (HPT&E) Program** seeks research on decision making and expertise development and warrior resilience to enable warfighter superiority. For decision making and expertise development, the focus is on accelerating decision making (DM) and expertise development capabilities through assessment, training, education, and operational technologies. Current topics of interest include: understanding the primitives of decision making, objective-based measures of decision-making skills, the impact of intuitive decision-making skills on performance, automated tailoring of development of training content to accelerate learning and expertise, and augmented reality to support training and operations. Warrior Resilience is focused on physical and mental training to enhance the Warfighter's ability to withstand, recover, and grow in the face of stressors and changing demands. Current topics of interest include: unobtrusive technologies to capture physical and/or mental resilience measures, rapid analyses and visualizations of performance, and interventions to enhance performance.

1. Augmented Reality and Mixed Reality Technologies
2. Immersive Sciences
3. Kinesiology and Exercise Science
4. Psychology, Psychometrics and Cognitive Sciences
5. Science of Learning and Decision-Making
6. Synthetic Vision and Visualization

Further information may be found at:
(http://www.onr.navy.mil/Science-Technology/Departments/Code-30/All-Programs/Human-Performance-Training.aspx)

E. **ONR 30 Decision Support, AI, Machine Learning and Graph Analysis Program** seeks to develop and leverage advanced technologies for future intelligence, surveillance and reconnaissance systems.

Program goals include:

1. Enhance situational awareness;
2. Enable real-time tactical decision support tools and systems;
3. Provide proactive and predictive capabilities for conventional and irregular expeditionary and amphibious mission planning and conduct;
4. Understand the physical, military and civil terrain;
5. Understand the human, social, cultural and behavioral factors that influence human behavior and to improve our ability to model these influences and understand their impact on human behavior at the individual, group and society-levels; and
6. Enhance the integration of ISR with other warfighting functions.

Technology investment areas include:

1. Data science;
2. Data fusion;
3. Modeling / Machine learning/ Artificial intelligence;
4. Computer vision / NLP
5. Graph theory
6. Sensor /system collaboration (IoT)
7. Advanced processing methodologies and architectures.
8. Network analysis and shaping

Further information may be found at:
(http://www.onr.navy.mil/Science-Technology/Departments/Code-30/All-Programs/Intelligence-Surveillance-ISR.aspx)

F. **ONR 30 Manufacturing, Maintenance and Logistics Program** is seeking new technologies along two central themes: new maintenance technologies for expeditionary combat systems and new expeditionary energy technologies that support distributed operations (from the individual Marine to small units). Program goals include enhancing the maintainability of current and future warfighting equipment; reducing fuel consumption to enhance small unit self-sufficiency; and
increased energy density for individual Marine power sources. Technology investment areas include:

1. Expeditionary digital manufacturing approaches to improve logistical responsiveness at the point of need while reducing the logistics tail
2. Research and solutions that address and integrate the digital thread of digitally manufactured parts from raw materials, design models, in situ build information, post-processing, and non-destructive evaluation
3. Technologies to reduce the weight of power and energy for the individual Marine
4. Digital Twin technology spanning from rapid requirement development and trade-space decisions, design and prototype efforts, fielding, and operation and sustainment of future combat

systems. Models should support a feedback loop based on condition sensors that monitor actual deployed systems to update digital models for remaining useful life and other lifecycle decisions.

    5. High velocity cold spray technology and process development for high hard steel armor repairs and structural repairs

Further information may be found at:
(http://www.onr.navy.mil/Science-Technology/Departments/Code-30/All-Programs/Logistics.aspx)

G. **ONR 30 Mechatronics Program** seeks innovative technologies that increase ground and amphibious vehicle, and dismounted Marines, operational tempo and temporal dominance, increase efficiencies and extend reach, and provide flexible architectures to gain positional advantage and achieve unmatched mobility across challenging terrain environments. Mobility seeks to enable unrivaled mobility and maneuver in complex terrain and austere environments across the littorals and inland in support of Expeditionary Maneuver Warfare.

Major research areas:

1. Electro-mechanics
2. Servo-mechanics
3. Dynamics / Kinematics
4. Control Systems/Algorithms/Architectures
5. Sensing
6. Modeling and Simulation
7. Systems Engineering

Technology Investment Areas:

    1. <u>Intelligent Mobility</u>: Investigate new ways and means to enable rapid, flexible, and opportunistic maneuver through tailorable platform dynamic behavior and optimized platform chassis management control:

        a. Terrain Characterization
        b   Active Effectors
        c. Chassis Control

    2. <u>Powertrain Efficiency</u>: Decrease the amount of fuel consumed by the ground fleet and improve the power density of vehicle/platform powertrains through incorporation of technologies such as high efficiency engine accessories, power dense high efficiency transmissions, and waste energy:

        a. Power Dense Drivetrains
        b. Thermal Management

    c.   Energy Harvesting

3.   <u>Platform Architecture</u>: A systems approach exploration of unique architectures, multi-mission reconfigurable capability, cyber protection, and evolutionary mobility concepts to envision and revolutionize next generation tactical and combat platforms as well as future mobility concepts including vertical movement of individual dismounted Marines. Keep pace with ever-changing technologies to succeed on the evolving battlefield and provide leading edge vehicle architectures and concepts for next generation platforms that have multi-mission reconfigurable capability.

    a.   Flexible Architecture
    b.   Vehicular Cyber
    c.   Three Dimensional (3D) Movement

Further information may be found at:
(http://www.onr.navy.mil/Science-Technology/Departments/Code-30/All-Programs/Maneuver.aspx)

H. **Robotics and Autonomy Program** seeks research and component technologies to support cooperative autonomy and autonomous navigation for unmanned platforms (surface, surf, and/or ground domains) including dynamic object tracking and terrain segmentation and classification (including novel perception methods), path planning and navigation over and through complex terrain (ground and surf zones), heterogeneous multi-platform cross-domain mission planning, dynamic resource allocation, and coordinated tactical behaviors. Also includes supervisory and sparse control of distributed multi-robot systems and human-swarm interaction.

Research areas include:

    1.   Autonomy Algorithms (Perception and Cognition)
    2.   Navigation, Kinematics, Dynamics and Control
    3.   Robotics
    4.   Sensors for Robotic Systems

Further information may be found at:
(http://www.onr.navy.mil/Science-Technology/Departments/Code-30/All-Programs/Maneuver.aspx)

I. **Vehicle Amphibious Hydromechanics, Counter Detection and Protection Materials** seeks technologies for signature control and management, camouflage, concealment, and deception, situational awareness and threat prediction, active and adaptive protection technologies to include soft and hard kill with a particular focus on fielding on amphibious vehicles and minimizing the threat to dismounted troops, lightweight armor, directed energy protection, underbody blast protection, crew protection technologies, and fire prevention or suppression.

Research areas include:

1. Ballistics
2. Control Theory and Systems
3. Electro-Optics and Infrared Sensors
4. Energetic Materials
5. Hydrodynamics
6. Material Science RADAR Sensor Signal Processing
7. Tracking Algorithms

Further information may be found at:
(http://www.onr.navy.mil/Science-Technology/Departments/Code-30/All-Programs/Maneuver.aspx)

J. **Advanced Electronic, Photonic, and Hybrid Sensing Program** seeks technology that increases force survivability from multiple modes of enemy attack throughout the spectrum of warfare. These capabilities will detect, characterize and neutralize kinetic and non-kinetic threats to expeditionary forces prior to the threat initializing action. This includes threats such as explosive weapons, direct and indirect fires, adversary directed energy, and more. The ultimate impact of these efforts is to enable the expeditionary force to maintain operational tempo and freedom of maneuver at the small-unit (battalion and below) and individual warfighter levels, while enhancing the safety and resilience of the warfighter. Technologies being researched include multi-mode sensing utilizing electromagnetic spectrum, natural and acoustic effects. Advanced computation techniques are used to identify and characterize threats. A system-of-systems capability combines technologies into systems that operate unmanned and unsupervised, minimizing impact to expeditionary warfighter time and attention.

Research areas include:

1. Chemical and Biological Sensors
2. Chemistry, Propellants and Energetic Materials
3. Directed Energy Sub-systems
4. High Energy Lasers
5. High Power Radio Frequency Generation
6. Material Science

K. **Systems of Systems (SoS) Engineering, Modeling, and Simulation Program** seeks research and engineering in systems whose elements are managerially and / or operationally independent systems. These interoperating and / or integrated collections of constituent systems produce results unachievable by the individual systems alone. Efforts include modifications to ensembles of existing and new systems which together address capability needs. ONR 30 seeks work on existing and new systems, where the systems retain their identity and management and engineering continue in the systems concurrently with the SoS but the research and engineering bring the systems further to operational utility.

Research includes:

1. Systems Engineering
2. Force-on-Force Modeling and Simulation
3. Physics-based Modeling and Simulation
4. System of Systems Engineering
5. System Architectur1
6. Operations Research
7. Complex Systems
8. Human in the Loop Systems
9. Complex Systems, Emergence, and Chaos.
10. Non-linear Dynamical Systems
11. Revise and refine portfolio approach and Technology Investment Areas (TIA) as necessary to support ONR Code 30 objectives.
12. Identify and work with Systems Engineering centers of excellence.
13. Establishment and advancement of theory, methods, practices and applications which effectively manage performance, integration, complexity, cost, risk, verification, and validation of SoS.
14. Advance a broad range of science and technology to integrate defense SoS.
15. Focus, align, develop, and integrate advanced component technologies using innovative and new system tools
16. Conduct basic research into System of Systems Sciences to identify areas, topics, and researchers of interest to ONR Code 30 objectives.

L. **Innovative S&T Opportunities.** ONR 30 seeks robust technologies and science opportunities for the Naval Expeditionary Force, but the technology options are constrained. They must have a lightweight deployable character, and the ability to operate in austere conditions with little fixed infrastructure or support while retaining the agility and lethality of an integrated maneuver force. Resultant capabilities must be light enough to get there, advanced enough to prevail, flexible and agile enough to adjust, and cheap enough to buy. Technology must provide full spectrum capability against robust and complex peer and near-peer adversaries while meeting size, weight, power, cost (SWAP-C) limitations, and information availability constraints of the austere expeditionary environment. New S&T approaches to expeditionary and amphibious problems that capitalize on emerging science are particularly desired.

Samples of the types of S&T desired include:

1. Lasers, Plasmonics and Quantum Optics
2. Non-linear Oscillators
3. Neurocomputing
4. Unmanned Swarm Technology
5. Directed Energy Systems
6. Breakthrough technologies

II. COMMAND, CONTROL, COMMUNICATIONS, COMPUTERS, INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE (C4ISR) (CODE 31)

Code 31 invests in areas of science and their applications such as data science, mathematical and computational science, computer and information sciences, quantum information sciences, cyber security, electronics, command and control and combat systems, communications, cyber operations, electronic warfare, sensing and surveillance, and precision timing and navigation.

Specific thrusts and focused research areas are:

A. **Mathematics, Computers and Information Sciences**, which sponsors basic and applied research, and advanced technology development efforts in mathematics, computer and information sciences that address Navy and Department of Defense needs in computation, information processing, information operation, information assurance and cybersecurity, decision tools, and command and control with specific focus on enabling rapid, accurate decision making.

(http://www.onr.navy.mil/Science-Technology/Departments/Code-31/All-Programs/311-Mathematics-Computers-Research.aspx).

Specific scientific and technical areas include:

- Applied and computational analysis;
- Command and control;
- Computational methods for decisions making;
- Cyber security and complex software systems;
- Machine learning, reasoning, and intelligence;
- Mathematical data science;
- Mathematical optimization and operations research; and
- Quantum information sciences.

B. **Electronics, Sensors and Network Research** conducts basic research, applied research, and advanced development of technologies that enable new and innovative uses of the electromagnetic spectrum in surface and aerospace surveillance, targeting, communications, electronic combat, and navigation. All of these areas are supported by a broad research program in electronics which is focused on reduction of cost, weight, and size of transmit and receive systems. Two overarching goals are the development of technologies and techniques to support adaptive persistent surveillance, and digital/radio frequency active aperture phased arrays, which are capable of performing multiple functions simultaneously.

(http://www.onr.navy.mil/Science-Technology/Departments/Code-31/All-Programs/312-Electronics-Sensors.aspx).

Specific scientific and technical areas include:

- Active aperture array;
- Atomic, molecular and quantum physics;
- Communications and networkin
- Electromagnetic materials;
- Electronic warfare;
- EO/IR sensors and sensor processing;
- Nanoscale computing devices and systems;
- Precision, Navigation and timekeeping;
- RF surveillance and signal processing;
- Mixed signal (radio frequency and digital) processing devices, circuits and architecture;
- Radio frequency superconducting technologies; and
- Radio frequency semiconductors, radio frequency solid state amplifiers; and wide
bandgap materials.

III.   OCEAN BATTLESPACE SENSING (CODE 32)

Code 32 explores science and technology in the areas of oceanographic and meteorological observations, modeling and prediction in the battlespace environment; submarine detection and classifications (anti-submarine warfare); and mine warfare applications for detecting and neutralizing mines in both the ocean and littoral environment.

Specific thrusts and focused research areas are:

A. **Ocean Sensing and Systems Application**, which conducts an extensive program of scientific inquiry and technology development in maritime sensing, ocean engineering and marine systems, and undersea signal processing.

(http://www.onr.navy.mil/Science- Technology/Departments/Code-32/All-Programs/Ocean-Systems-321.aspx)

Specific technical areas are:

1. Maritime sensing;
2. Ocean engineering & marine systems; and
3. Undersea signal processing.

B. **Ocean, Atmosphere and Space Research**, which concentrates on improving Navy and Marine Corps understanding of environmental evolution, assimilation of data, and the limits of predictability by planning, fostering and encouraging scientific inquiry and technological development in fields ranging from littoral geosciences to high latitude dynamics

(http://www.onr.navy.mil/Science-Technology/Departments/Code-32/All-Programs/Atmosphere-Research-322.aspx).

Specific technical areas are:

1. Arctic and Global Protection;
2. Littoral Geosciences and Optics;
3. Marine Mammals and Biology;
4. Marine Meteorology
5. Ocean acoustics;
6.) Physical oceanography; and
7) Space environment.

IV. SEA WARFARE AND WEAPONS DEPARTMENT (CODE 33)

Code 33 develops and delivers technology to enable superior warfighting capabilities for surface and sub-surface naval platforms and undersea weaponry. Code 33 also develops and delivers technology to reduce total life cycle cost of naval platforms, to minimize the energy footprint of naval forces, and to develop new scientists and engineers for Navy-unique technological areas.

Specific thrusts and focused research areas are:

A. **Ship Systems and Engineering Research**: Focused on providing technologically superior warfighting capabilities at reduced total ownership costs for surface and subsurface platforms through investments in basic and applied research and advanced technology development of programs in: a) hydrodynamics, b) survivability c) electrical and thermal systems d) platform structures and e) autonomy and control for unmanned surface vehicles (USV). The Division is also responsible for the National Naval Responsibility in Naval Engineering (NNR-NE). The NNR-NE supports fundamental and early applied research in the areas of propulsion, platform structures, hydrodynamics, automation control and system engineering, design tools, naval power systems and ensuring a strong and healthy academic infrastructure.

Specific research themes are:

1. Hydrodynamics: Surface ship hydrodynamics is focused on the theory, computation, and lab and at-sea experimentation to develop understanding and prediction capabilities for all hydrodynamic phenomena associated with surface ships and small craft, their effects on vessel performance, and concepts for modification. Propulsor hydrodynamics is focused on understanding the physics of flow around propulsors and their interactions to improve propulsor performance, mobility, efficiency, and affordability, as well as prediction and control of various types of cavitation on propulsors and appendages. This work also includes predictive capability of cavitation inception, thrust breakdown, and erosion phenomenon and scaling laws. Science and technology efforts in the area of Subsurface Hydrodynamics include identifying, understanding, predicting, and controlling flow physics, specifically turbulence and stratified wakes. These capabilities are further applied to develop Subsurface Maneuvering Technologies, and understanding the Dynamics of Interacting Platforms.

2. Survivability: Investigate and understand electromagnetic (EM) sources (including major ferro and non-ferromagnetic sources, eddy currents, and Corrosion Related Magnetic Fields (CRM)) that are associated with naval platforms. Develop understanding of EM field propagation relationships and analysis aids, and technologies to predict the electromagnetic properties of a naval platform. Advance physics based understanding of platform acoustics. Discover and develop algorithms and methods that will enable the development of improved design, analysis, and prediction tools for enhanced acoustic performance. Understand, design and develop optical and acoustic metamaterials to control light and sound propagation over a large frequency range. New architectures to overcome challenges associated with loss, bandwidth, and scalability are being explored. Design and develop models, algorithms, and integrated development environments for simulation and control of complex, interdependent,

distributed shipboard machinery systems to enable integrated, autonomous operation and reconfiguration of shipboard machinery systems.

3.   Electrical and Thermal Systems: Provide a scientific foundation for a reconfigurable electric warship including physical properties, control laws, stability criteria, modeling and simulation, advanced design and development methods. Develop new machinery integration concepts. Develop simulation based Verification, Validation and Accreditation (VV&A) methods and technologies. Contribute to system reconfiguration. Design a ship electrical system architecture based on a main bus that distributes "rough" DC power throughout the ship at nominally 10 KV. Conduct fundamental research necessary for enabling scientific progress and breakthroughs in shipboard and expeditionary power & energy technology. Development of macro- and atomic-scale multi-physics models is being pursued to enhance understanding of materials processing & performance, energy conversion mechanisms, cyber-physical energy concepts, and power management. Advanced magnetics, material surface science, and solid-state conversion concepts are of interest, and alternative energy approaches for powering Navy equipment of the future are being investigated. Advance thermal science and technology through fundamental studies of multi-phase heat transfer, fluid dynamics, and nanostructured materials in order to efficiently acquire, transport and reject heat and enable higher power density electronic systems associated with Advanced Naval Power Systems. System-level studies focus on the scalability and reliability of component technologies. Another thrust is the development of tools to model heat transfer at multiple length scales allowing for simulation of heat flow through the ship in order to evaluate the impact of power conversion electronics, sensors, and weapons on the overall thermal balance of the vessel.

4.   Platform Structures: Focused on time-varying, structural reliability analysis and prediction for a ship structural system with uncertainty quantification and propagation. Specific topics include novel structural configurations across composite and metallic materials and prediction methods for advanced global hull strength, local panel and component strength, fatigue and fracture strength, and seaway loads and load effects for high-speed/high-performance ships and vessels.

5.   Unmanned Surface Vehicles (USV): Development of autonomy and control for USVs and related mission functions.

(http://www.onr.navy.mil/Science-Technology/Departments/Code-33/All-Programs/331-ship-systems-engineering.aspx).

B. **Naval Materials Science and Technology**: Founded on a full spectrum of long-range, fundamental scientific and engineering research with focus on design and realization of new materials, processing techniques, and systems to fulfill the unique requirements of naval applications.

Specific research areas include but are not limited to:

1. Functional materials and processing for power conversion and storage devices; electro- and photo-active materials for devices and sensors; and multifunctionality at all length scales.

    a. Surface- and electro-chemistry and materials for power sources, storage, and distribution
    b. Dielectric materials and films for energy storage and pulsed power applications
    c. Electronic and optical ceramics and affordable, adaptive processing
    d. Photoactive materials for solar cells and other devices
    e. Functional polymeric organic materials, including electroactive materials
    f. Acoustic transduction materials for sonar applications

2. Structural materials and processing for performance improvement and weight reduction.

    h. Polymers to improve blast and ballistic penetration a.   Bulk nanostructured materials (metallic, ceramic, carbon-based)
    b. Composite materials development and processing
    c. Degradation and damage mechanisms for resilient design and predictive capability
    d. High-temperature materials, processing, and coatings for propulsion systems
    e. Ultra-high temperature materials to withstand extreme mechanical and chemical environments.
    f. Structural cellular materials systems materials for multifunctionality; e.g., protection and thermal management
    g. Structural metals, alloys, compositions, and processing, including joining and surface modification survivability

3. Environmental quality technologies to ensure global operations

    a. Environmentally benign marine antifouling coatings
    b. Hull husbandry including autonomous hull grooming
    c. Environmental quality waste treatment/reduction and analysis
    d. Resilient materials and systems design enabling advances desalination

4. Materials and processing S&T development for integration of advanced characterization, experimentation, computation, and data exploitation are pervasive among all program, incorporating and enabling:

    a. Computer Aided Materials Design
    b. Integrated Computational Materials Engineering (ICME)
    c. Additive Manufacturing
    d. Non-Destructive Evaluation and Prognostics

(http://www.onr.navy.mil/Science-Technology/Departments/Code-33/All-Programs/332- naval-materials.aspx).

C. **Sea Platforms and Weapons**: Focused on coordinating the transition of technologically superior systems and equipment that will enhance warfighting capabilities.

   1.   Sea Weapons Program: Accomplished through the Naval Undersea Research Program, which was established in part to increase the number of engineers and scientists in Navy laboratories and University Affiliated Research Centers that conduct research and development of undersea weapon technology. Core technology areas for applied research and technology development include: guidance, control and autonomy; sensors; signal processing; planning and control algorithms; signal management for undersea distributed network systems (UDNS); weapon energy conversion; batteries, air-independent fuel cells and hybrids; motors; otto fuel replacements; vehicle technology; liquid fuels for "gas and go" concepts; corrosion and anti-fouling coatings; hydrodynamics; control surfaces; propulsors; drag and noise reduction; projectiles; warheads; explosives; detonators; and fuses .

   2.   Sea Platforms Program: Focused on corrosion control and prevention S&T and other S&T challenges for platform affordability.

(http://www.onr.navy.mil/Science-Technology/Departments/Code-33/All-Programs/333- sea-platforms-weapons.aspx).

D. **Naval Energy Resiliency and Sustainability**: Focused on, but not limited to, alternative energy research; microgrid analysis and testing; integration of renewable energy resources into energy systems; advanced materials research and testing; and energy efficiency. Research addresses energy challenges ashore, as well as advances energy systems for sea warfare.

V. WARFIGHTER PERFORMANCE (CODE 34)

Code 34 enhances warfighter effectiveness and efficiency through bioengineered and biorobotic systems, medical technologies, improved manpower, personnel, training and system design. There are two divisions: Human & Bioengineered Systems and Warfighter Protection & Applications.

A. **Human and Bioengineered Systems** covers cognitive science, computational neuroscience, bioscience and bio-mimetic technology, social/organizational science, training, human factors, and decision making. The goals are: sustained and improved warfighter performance and enhanced decision making in all environments through training; creating options for future (perhaps unanticipated) naval decisions, based upon fundamental understanding gained from cognitive and neuroscience; supporting integrated interdisciplinary research program; and cultivating transition of findings to government and industry via advanced technology development, small business and acquisition projects.

(http://www.onr.navy.mil/Science-Technology/Departments/Code-34/All-Programs/human-bioengineered-systems-341.aspx).

Specific thrusts and focused research are:

1. Affordable human behavior modeling;
2. Agile and reconfigurable organizational structures for command and control;
3. Applied instructional research;
4. Biometrics in the maritime domain;
6. Biorobotics;
7. Cognitive science of learning;
8. Computational neuroscience;
9. Human activity recognition;
10. Human robot interaction;
11. Multi-echelon command decision making;
12. Perception, metacognition and cognitive control;
13. Representing and reasoning about uncertainty;
14. Skill acquisition;
15. Social network analysis for combating terrorist networks;
16. Theoretical foundations for socio-cognitive architectures; and
17. Virtual technologies and environments.

B. **Warfighter Protection and Applications** covers bioscience and bio-mimetic technology; biomaterials; biomedical technologies; expeditionary and undersea medicine; physiology and biophysics; immunology; applied manpower, personnel, training, and education; marine

mammal health; and noise induced hearing loss. The division conducts research and technology demonstration programs directed at maintaining the survival, health and performance of Navy and Marine Corps personnel during training, routine and special operations, and in time of war. The goals are to: increase the survival of casualties through intermediate, life-saving treatment and stabilization; prevent personnel injury caused by the stresses of demanding Naval occupations and environments; enhance cognitive and physiological performance of Navy and Marine Corps personnel in military environments; prepare Sailors and Marines to fight and win in an information rich, distributed battlespace; get the right warfighters into the right job, at the right time with the right tools; and provide a 21st century learning environment designed to deliver the right training.

(http://www.onr.navy.mil/Science-Technology/Departments/Code-34/All-Programs/warfighter-protection-applications-342.aspx).

Specific thrusts and topics of interest are:

1. Basic biomedical science;
2. Bio-energy harvesting;
3. Biomaterials and bionanotechnology;
4. Biomedical technologies;
5. Biophysics;
6. Bioscience and bio-mimetic technology;
7. Casualty care and management;
8. Casualty prevention;
9. Gut microbiology and response to stressors
10. Human systems integration (HSI);
11. Manpower and personnel;
12. Marine biofouling control;
13. Marine mammal health;
14. Noise induced hearing loss;
15. Stress physiology;
16. Synthetic biology; and
17. Undersea medicine.

VI. NAVAL AIR WARFARE AND WEAPONS (CODE 35)

The Naval Air Warfare and Weapons (Code 35) Department supports the Navy and Marine Corps needs, fostering basic, applied and advanced research in support of the Sea-Based Aviation National Naval Responsibility as well as directed energy, energetic materials, autonomy, electromagnetic launch, and high speed conventional air and surface weapons.

For more information visit the ONR Code 35 webpage at:
http://www.onr.navy.mil/Home/Science- Technology/Departments/Code-35.aspx

A. **The Aerospace Sciences Research Division** focuses on fundamental advancements in underlying and fundamental knowledge to enable transformational capabilities for Sea-Based Aviation and strike technology. Basic and applied research projects include aerodynamics and aeromechanics for fixed wing and rotary-wing aircraft, advanced power, propulsion, and thermal management for naval air platforms and weapons, advanced materials, coatings, and structures, instrumentation, navigation, guidance and control of air vehicles, autonomous and remotely piloted vehicles and groups of such vehicles, science of autonomy, hypersonic aerodynamics, energetic materials, directed energy, counter-directed energy, new concepts and fundamental methods in the design, analysis, and systems engineering of naval air platforms and weapons.

 1. <u>Sea-Based Aviation National Naval Responsibility – Air Vehicle Technology</u>

The Navy and Marine Corps rely on fixed-wing, rotary-wing, and V/STOL aircraft to perform and support a wide variety of missions such as close air support, air defense, logistics, expeditionary operations, anti-submarine & anti-mine warfare, and search & rescue. The unique requirement to operate from ships at night, in bad weather and at high sea states leads to a number of S&T challenges. Shipboard landings require precise relative navigation and control in highly unsteady ship airwakes to land on pitching and rolling decks in high sea states. Shipboard operations also require unique designs to accommodate limited space and safe operations & support in densely packed areas. The Marine Corps depends on fast, agile air vehicles to execute its Ship-to-Objective Maneuver and distributed operations. Achieving all of these requirements while maintaining the ability for long range force projection calls for air vehicle designs that balance mechanical durability, corrosion resistance, aerodynamic efficiency, lightweight structure and control. This program is soliciting white papers and proposals to conduct basic and applied research addressing Navy-driven and Navy-unique challenges in the following areas:

  a. Flow control methods for improving performance, maneuverability and efficiency.

  b. Advanced control systems to achieve robust and precise shipboard landings in highly unsteady conditions

  c. Scaled experiments to validate the predicted effectivity of novel control mechanisms as well as the basic physics governing interactions with free-body dynamics

  d. Computationally efficient analytical tools for coupled ship/aircraft aerodynamic interface modeling and simulation

  e. Computational methods for aerodynamics of aircraft maneuvering in an unsteady atmosphere, including large control surface motions

     f.   Well-designed experiments providing data for canonical problems in support of verification and validation of computational methods

     g.   Efficient, linear and non-linear control law synthesis for achieving guaranteed performance and stability across a wide range of flight conditions

     h.   Mathematical framework for proving the probability of success for a system of vehicles operating with a common objective

     i.   Efficient, linear and non-linear methodologies for modeling the coupled aero and structural dynamics of an air vehicle

     j.   Novel air vehicle concepts for ship-based persistent ISR platforms

     k.   Efficient, long-range, high-speed V/STOL concepts for sea-based operations

     l.   Innovative experimental methods for ship airwake measurement

2. <u>Sea-Based Aviation National Naval Responsibility - Airframe Structures and Materials</u>

Naval Aviation airframes are a core capability for the Navy power projection mission, including our ability to successfully meet development, operational performance, readiness, and affordability requirements. This program is reviewing white papers and proposals in the following areas:

     a.   Metallic Structures – Topics in combined loading mechanics, SCC, corrosion fatigue, EAC test methods, environmental material damage, electrochemical stress, localized damage evolution, structural protection and maintenance, protective coatings, and structural remediation.

     b.   Composite Structures – Topics in characterization and failure analysis, damage initiation and progression, environmental effects, constituent materials development for resins, fibers, 3D strength, nanocomposites, handling-processing-property relationships, CMC's, inspection, durability and repair of bonded joints and load-bearing repairs for composite life extension.

     c.   Advanced Concepts – Topics in adaptive, reconfigurable structures, multifunctional surfaces, thermal durability, electrical functionality, EMI shielding, protective coatings for IR optical apertures, lightweight armor materials, additive manufacturing for repair and life extension.

3. <u>Sea-Based Aviation National Naval Responsibility – Power and Propulsion</u>

Naval aviation creates several unique demands on aircraft power and propulsion systems. The maritime environment subjects engine and related structures to a corrosive environment. The operation from a carrier or other ships requires higher thrust to weight and airflow engines in highly integrated inlet and exhaust systems along with greater variability in throttle settings as well as the need for more rapid throttle excursions for landing, wave-off, and bolter events. This program is reviewing white papers and proposals in the following areas:

a. Propulsion and combined power-propulsion concepts, thermodynamics cycles, and aero-thermodynamics of components for aircraft and weapons for high speed, long endurance, and responsiveness

b. Advanced high stage-loading and efficient turbomachinery, including distortion tolerant fans and advanced methods in blade-disk aeromechanics

c. Advanced cooling and thermal management for engines and auxiliary systems, including new concepts of heat collection, distribution, and rejection

d. Advanced materials, coatings, and manufacturing science for hot and cold section engine components for naval environments

e. Jet noise reduction for tactical aircraft (TACAIR)

f. Engine diagnostics, prognostics, and control of variable cycle and adaptive engines, including multiple-input, multiple output (MIMO) advanced control methods and systems architectures

g. Component interactions in steady and transient operations

h. Detonation science and rotating detonation combustors

i. Power and/or propulsion for small, unmanned air-vehicles, including small combustors, micro-heat transfer, bearings, and other small gas turbine and reciprocating engine components critical for such applications

j. Other areas leading to more power dense, efficient, responsive, reliable, integrated, power, propulsion, and thermal management systems

4. Hypersonics Aerodynamics

Hypersonic flight provides an unprecedented capability by simultaneously extending range and reducing transit time – enabling rapid reach and global targeting. Future high-speed vehicles will demand efficient aerodynamic designs that deploy light-weight, durable control surfaces, and are capable of enduring the extreme exposure associated with hypersonic flight across a wide range of conditions. This program is reviewing white papers and proposals in the following areas:

a. Boundary layer physics in shock-wave dominated flows around highly-swept or slender bodies

b. Aero-thermo-elastic and/or aero-servo-elastic effects arising from control surface actuation at high speeds

c. Descriptions of high-speed boundary layer transition that unify theories across disparate external conditions

d. Novel strategies for extending regions of laminar flow

e. Advanced hypersonic aerodynamic design tools that incorporate modern predictions of transition pathways, freestream noise contributions, time/heating-dependent surface finish effects, and unsteady aerodynamics

5. <u>Intelligent autonomy for safe, reliable, and scalable control of heterogeneous unmanned air systems based on high-level mission tasking</u>

This includes collaborative and shared use of unmanned systems by a variety of types of operators and users of unmanned system services in complex and cluttered environments. Note that the focus is on autonomy methods and not on new platform, sensor, or communications hardware. This program is reviewing white papers and proposals in the following areas:

      a. Distributed control of large numbers of heterogeneous unmanned systems in complex airspaces

      b. Safe, perception-based control in complex, unstructured, and cluttered environments

      c. Verification and Validation of advanced autonomy including biologically inspired methods, nondeterministic algorithms, decentralized control, organic perception within control/decision-making loops, and complex human interactions for both safety & mission competence

      d. Autonomous systems teaming with manned systems and units

      e. Safe autonomous operations in the maritime environment

6. <u>Science of Autonomy</u>

This involves different autonomous system domains that have traditionally been somewhat separated (air, sea, undersea, ground), control theory, computational intelligence, human factors and related fields such as biology/animal behavior/ cognition, economics/management theory, cognitive science/psychology and neuroscience. This program is reviewing white papers and proposals in the following areas:

      a. Scalable, self-organizing, survivable, organizational structure/hierarchy of heterogeneous unmanned vehicles appropriate to naval mission domains

      b. Autonomous learning, reasoning, and decision-making in unstructured, dynamic, and uncertain environments

      c. Human interaction/collaboration including understanding intent and actions of human team members, adversaries, and bystanders

      d. Organic perception/understanding to support decision-making, reasoning, and actions in a complex, dynamic world

7. <u>Energetic Materials</u>

Energetic Materials (EM) weapon systems can be a "game changer" by increasing warfighters' lethality and area of dominance. EM is the pillar which establishes future advanced warhead (explosives) and solid rocket motor (propellants) performance and characteristics. Catastrophic damage improves battlefield damage assessment and reduces sorties. Equally powerful, but smaller weapons optimize internal carry and facilitate higher weapon load outs. Improved propellant ingredients and design concepts will provide the extended ranges needed in volume limited ordnance systems. Future new ordnance must be adaptable in size to fit a family of

delivery systems, contain sufficient energy to defeat the target, have the capability to fly further and faster, while being safe and affordable. To this end, our program is reviewing white papers and proposals in the following areas:

     a.   New approaches to novel materials that maximize molecular design, synthesis efficiencies, predicted stabilities to achieve performance goals

     b.   Develop a new class of ingredients that can surpass the oxygen content of Ammonium Perchlorate (AP)

     c.   Development of macroscopic mechanical and chemical models; an understanding of molecule dynamics; strength/reactivity correlations

     d.   Consistent processing and performance results; process research and development (commonly referred to as "scale-up"); areas of concern are safety and remote operations, critical thermal management, batch to batch reproducibility, standardized process for the chemistry, and conditions and product quality and purity

     e.   Explore the chemistry and physics of non-traditional energy space between chemical and nuclear bonding energies (disruptive energetic concepts)

     f.   Combat Safe Insensitive Munitions: The Navy has concerns over conventional munitions and propellant systems, since all munitions are stored on maritime platforms. It is critical that conventional munitions display maximum insensitivity when stowed, handled, carried or otherwise exposed to friendly forces and environments, but have sufficient energy/lethality to perform mission expectations reliably

     i.   Establish the connectivity between molecular structure, crystal morphology prediction and synthesis chemistry to provide IM compliant energetic ingredients shock and thermal sensitivity

     ii.   Focus modeling and simulation to predict stable crystal structures/crystal morphology

     iii. Establish methodologies to model, measure and predict molecular and crystal energetic material response to external shock and thermal modeling

     iv. Validate design criteria for molecular stability as a function of insensitivity

     v.   Push the boundaries of traditional theory and experimentation to provide energy concepts that are beyond traditional chemistry and physics energy release regimes

8. Counter Directed Energy Weapons

The Counter-Directed Energy Weapons (CDEW) Program was initiated in response to the rapid development of high energy laser (HEL) and high-power microwave (HPM)/high-power radio frequency (HPRF) threats. Directed energy weapons (DEWs) for the purposes here are systems that radiate energy from a source and deliver that energy to a target in a manner and/or quantity which causes target damage, disruption or neutralization. Directed energy weapons technology advancements, particularly in high energy lasers and high power radio frequency sources, and the

resultant decrease in acquisition costs has raised the urgency of developing techniques and technologies for defense of Navy assets from the expected DEW proliferation. Thus, ONR is considering research topics which propose means or novel methodologies for countering the efficacy of directed energy weapons systems. The CDEW program addresses directed energy threats in an operational space containing three layers of defense: detection, mitigation, and protection. Within this operational space are seven technology thrust areas of research and development of counter DEW technologies:

     a.   Advanced materials including nano- and/or nonlinear materials for enhanced HEL protection to platform integrity, electronic/optical subsystem -including navigation and sensor systems, and occupants
     b.   Metamaterial structures for the control and mitigation of HEL and HPRF irradiation
     c.   HEL and HPRF mitigation and protection utilizing material obscurants or techniques to synthetically degrade the atmosphere for directed energy propagation
     d.   Modeling and sensing of low level laser irradiation for off-axis (off-target directed) detection and source geo-location
     e.   Novel instrumentation for detection of HEL and HPRF irradiation
     f.   Active/Passive circuit protection and limiters for HPRF
     g.   Modeling of HPRF and HEL effects to materials, electronics and sensors as applied to CDEW objectives

The CDEW program seeks white papers and proposals for innovative research and development within or closely related to this portfolio of topic areas. For research topics, the objective of any theoretical studies must be clearly stated. Development efforts should include illustrative examples or targets for the application of innovation to an existing system, or system of systems, with potential improvement to resist threats, methods of use; or change to the underlying principles of construction and fabrication at either the platform or subsystem (weapon, sensor, etc.) level are requested, but not required. Proposals for development efforts should provide milestone oriented timelines for potential or notional insertion or transition points, inside or outside the FYDP. Additionally, research studies related to Tactics, Techniques, and Procedures (TTPs) and Concept of Operations (CONOPS) associated with these or other defensive methods are sought relative to Counter-Directed Energy Weapons (C-DEW).

   9.   <u>Directed Energy Weapons - High Energy Laser Technologies</u>

The Directed Energy Weapons (DEW) program is investigating the ability to respond to emerging system level needs through the development of high power, high energy laser (HEL) weapon technologies. Specifically, HEL technologies that improve component, subsystem and system level capabilities, in the maritime environment, to deliver that energy to a target in a manner which causes target damage, disruption or neutralization is the focus of interest. HEL technology advancements, particularly in advanced design and integrative technologies that include innovative technologies in beam director and fire control architectures, or lighter weight beam directors, or higher power optics and coatings, are of interest. Additionally, improvements that lead to novel lethality and vulnerability mechanisms which can be demonstrated against naval targets are of interest. Specific interests are in efforts which could lead to specific updates for assessments that could be included in the Joint Munitions Effectiveness Manuals (JMEM). However, any technology applications for components, subsystems, and HEL weapons systems should remain

focused and suitable for naval platforms of interest within the current naval warfare domain and potentially include surface combatant, carrier, amphibious, naval aviation, or submarine based weapon systems. Within this topic technology thrust areas of research and development of HEL technologies of interest include:

a. HEL Beam Director and Fire Control Architectures, including

  i. Novel HEL beam director configurations and components
  ii. HEL fire control architecture and components
  iii. Sensor and illuminator technologies, including tracking development
  iv. Automated Target Recognition, including those occurring with or without HEL illumination, leading to automated HEL aim-point selection and maintenance
  v. Rapid tracking and pose/trajectory estimation, including ability to track through limited or intermittent viewing conditions including intermittent obscuration

b. HEL Optics and Coatings, including those which offer

  i. increases in high peak/average power performance
  ii. advanced materials and gratings, including novel processing
  iii. Electro-magnetic interference (EMI) shielding of optics or optical components through coatings or novel materials
  iv. improved corrosion and aging effects, including resistance to maritime exposure or partial and complete sea water immersion

c. HEL Lethality/Vulnerability studies, including

  i. Material studies leading to structural defeat, subsystem degradation, or adverse target effects and interactions
  ii. High fidelity modeling and experimentation to characterize effects during dynamic engagements
  iii. Target damage assessment methodologies
  iv. Complex aero-thermal and aero-optic interactions
  v. Novel/alternative kill mechanisms

d. Advanced Design and Integrative Technologies, including

  i. Novel power architectures for low-duty cycle applications
  ii. Micro-channel component cooling for thermal distortion

Component and subsystem technology developments that lead to novel approaches and improve the efficacy of HEL based weapons through increased "power in the bucket" (PitB) or increased "irradiance at range" (IaR) is a near term priority. Current interest also exists for HEL operational

capabilities that support "line of sight" precision attack or defenses against threats, including those which are agile-maneuvering or swarming.

    a. Ultra Short Pulse Laser (USPL) Program

        i. Characterization of USPL-matter interaction, induced RF and spectral emissions
        ii. Study HPRF and spectral effects on target components/systems
        iii. Study synergistic effects of USPL and HEL
        iv. Investigate novel laser sources in MWIR-LWIR (4-12 microns)
        v. Investigate USPL propagation, filamentation, and beam control

    b. Advanced lasers and scalable architectures

        i. Spectral stability and control
        ii. Electrical to optical efficiency improvements
        iii. Eye-safer sources
        iv. Spectral and phase combined systems
        v. Solid state and gas-phase media

    c. Atmospheric Characterization and Modeling

        i. Study the lower atmosphere over the littoral water
        ii. Robust tracking algorithms, compensated imaging, Target ID
        iii. Tracking and aimpoint designation and maintenance
        iv. Active Illumination for active tracking
        v. White-light super-continuum generation for imaging, and filament-target interaction effects for aim pointing, tracking, and adaptive optics
        vi. Wave front sensing / atmospheric compensation

            (1) Adaptive target loop
            (2) Adaptive local loop

        vii. Compensate for distributed turbulence, platform disturbances
        viii. Compensate for thermal blooming
        ix. Real-time and predictive characterization of atmospheric conditions relevant to laser weapon performance
        x. Tools to enhance understanding and mitigation of weather and turbulence induced beam effects

    d. Adaptive Optics and Jitter Control

  i. Jitter control: Deployment of a directed energy beam on a tactical naval platform will result in additional challenges as compared to fixed ground or high altitude, large aircraft platforms

  ii. Resolution needed for target ID and aim point selection?

   (1) Short ranges (<10 km) for UAV
   (2) Long ranges (>10 km) for supersonic sea-skimmers
   (3) Compensated imaging to ID and select aim point on incoming target
   (4) How do HEL effects (thermal blooming and aerosol interactions) affect aim point maintenance?

 e. Adaptive optics techniques and components that enable designs that have

  i. Low weight
  ii. Immunity to distortion
  iii. Large amplitude correction capabilities
  iv. High power handling
  v. Reduced complexity

The HEL Technology program seeks white papers and proposals for innovative research and development within or closely related to this portfolio of topic areas. For research topics, the objective of any theoretical studies must be clearly stated. Development efforts should include objectives for the application of technologies to an existing HEL demonstrator or subsystem. Initially, focus is expected to be at the component level, with potential expansion to the subsystem level for an HEL weapon leading to higher power levels (hundreds to mega-watts of HEL power). Proposals for development efforts should provide an estimated timelines (in months) required to reach specific technology readiness levels, milestone for potential or notional demonstrations, leading to insertion or transition points, inside or outside the FYDP.

 10. <u>Design and System Level Analysis Tools</u>

Sea Based Aviation has several unique features that impose additional system and system-of-system level constraints and non-traditional design options that lead to alternative architectures and naval specific configurations. New and novel techniques and analyses are sought for naval aircraft and aircraft-ship combinations and design and optimization methodologies for systems or systems-of-systems to preform naval aviation missions and understand the operational effectiveness of such systems. This program is reviewing white papers and proposals in the following areas:

 a. New and novel analytical or computational methods for air combat and campaign analyses

 b. New analytical methods in air operations, including air-traffic control for large systems that may include manned, unmanned and autonomous systems

c.   Aircraft susceptibility and vulnerability reduction including analytical tools, concepts, and component demonstrations in a range of categories including active and passive damage suppression

B. **The Applications Division** undertakes Naval unique or essential projects involved with applied research and advanced technology aligned with current and future naval capability gaps and innovative naval prototypes.

1.   Autonomous Aerial Cargo/Utility System Program

The Autonomous Aerial Cargo/Utility System (AACUS) is an Innovative Naval Prototype. The AACUS program explores advanced autonomous capabilities for reliable resupply/retrograde by an unmanned air vehicle under adverse conditions. Key features of AACUS include a vehicle autonomously avoiding obstacles while finding and landing at an unprepared landing site in dynamic conditions, with goal-directed supervisory control by a field operator with no special training. Areas of special interest in this program include the following areas:

a.   User interfaces (software and/or hardware) for supervision of single or multiple autonomous rotary wing aircraft
b.   Sensors and algorithms for obstacle detection and landing zone evaluation in degraded visual environments
c.   Sensors and algorithms for terrain classification, especially in degraded visual environments
d.   Sensors and algorithms for wind velocity estimation in flight and in the landing zone
e.   Test & evaluation and verification & validation methods for complex autonomous systems operating in unstructured outdoor environments
f.   Robotic devices for autonomous offloading of cargo from a helicopter in an unstructured field environment

2.   Electromagnetic Railgun

The Electromagnetic Railgun is an Innovative Naval Prototype.   Development through 2019 is focused on thermal management and achieving operation at a high repetition rate of fire. The launch energy of this system stresses many components. Areas of special interest in this program include the following areas:

a.   Advanced thermal management techniques for long slender metal rail structures
b.   Extended service life for materials and components in harsh environment
c.   High-strength, dielectric, structural materials
d.   High-speed, high-current metal-on-metal sliding electrical contact
e.   System interfaces between high-power loads and platform power distribution
f.   Compact pulsed power systems and power electronics
g.   High-conductivity, high-strength, low-density conductors

     h. Repetitive rate switches and control technologies
     i. High pulsed current transfer slip ring technologies

  3. <u>Hypervelocity Projectile</u>

The Hypervelocity Projectile (HVP) is a next-generation, common, low drag, guided projectile capable of completing multiple missions for gun systems such as the Navy 5-Inch, 155-mm, and future railguns. Types of missions performed will depend on gun system and platform. The program goal is to address mission requirements in the areas of Naval Surface Fire Support, Cruise Missile Defense, Anti-Surface Warfare and other future Naval mission areas. Mission performance will vary from gun system, launcher or ship. HVP's low drag aerodynamic design enables high-velocity, maneuverability and decreased time-to-target. These attributes coupled with accurate guidance electronics provide low-cost mission effectiveness against current threats and the ability to adapt to air and surface threats of the future. Areas of special interest in this program include the following areas:

     a. Compact, high acceleration tolerant control actuation systems
     b. High-acceleration tolerant electronic components
     c. Light-weight, high-strength structural composites
     d. Miniature, high-density electronic components
     e. Safe high-energy propellants compatible with shipboard operations
     f. Aerothermal protection systems for flight vehicles

  4. <u>Laser Weapons System Technologies</u>

These technologies support full threat kill-chain engagement from target detection to engagement and damage assessment. These technologies must be suitable for operations in the maritime environment and integration with air, surface and submarine platforms. Priorities include the ability to engage asymmetric, small boat, and air platforms as well as to counter Intelligence, Surveillance, and Reconnaissance (ISR) systems.   Areas of special interest in this program include the following areas:

     a. High-efficiency laser generation technology
     b. Beam forming and control technologies
     c. Ruggedized, high-energy, power density-tolerant, optical path components
     d. Light-weight, rechargeable, high-energy generation and storage devices
     e. Modeling & Simulation of laser weapons system and subsystems to quantify
system performance and atmospheric propagation in a maritime environment
     f. System Performance, Test & Evaluation

  5. <u>Sea-Based Automated Launch and Recovery System</u>

The Navy and Marine Corps will increasingly need to operate highly capable unmanned air vehicles (UAVs) from ships at sea. The MQ-8 Fire Scout is the first naval UAV of this type, operating from small deck ships, using the UCARS radar-based recovery system to provide

precision ship-relative navigation (PS-RN) for its fully automated landings. The Unmanned Combat Air System Demonstration (UCAS-D) program has demonstrated the capability for an advanced UAV (represented by the X-47 demonstration aircraft) to operate from aircraft carriers, using a GPS-based PS-RN system for its automated launch and recovery capability. Analyses of and experience with both of these PS-RN approaches indicate that backup or alternative system options are desirable in order to ensure that highly reliable UAV operations can be conducted under demanding at-sea conditions. Areas of special interest in this program include the following areas: Non-GPS PS-RN systems performance related to:

    a. Degraded weather
    b. High deck motion
    c. Electro Magnetic Interference / multipath/jamming
    d. Alternate missions (e.g., landings ashore, landings on non-surveyed ships, etc.)
    e. Ship reference displays, and aircraft cockpit displays for manned aircraft
    f. Automated aircraft carrier air traffic control

6. <u>Variable Cycle Advanced Technology</u>

The Variable Cycle Advanced Technology (VCAT) program develops and matures gas turbine engine technologies to improve power, propulsion, and thermal management for next generation fighter and strike aircraft. Technology challenges include aerodynamics, aeromechanics, instrumentation, control, mechanical durability, and turbine heat transfer of variable geometry engines. Areas of interest in adaptive engines include:

    a. Low speed thrust response for approach, wave-off, and bolter
    b. Maximum efficiency and specific thrust over a wide range of engine operating conditions
    c. Environmental and corrosion resistance in a marine environment
    d. Takeoff water/steam ingestion tolerance
    e. Dimension and weight constraints to meet aircraft/ship integration requirements

7. <u>Future Naval Capabilities</u>

Air Warfare and Weapons Future Naval Capabilities (FNC) seek to provide enhancements to capabilities identified as needs in the FNC technology gaps.

    a. Naval Needs

        i. Tactical Missile Enhancements, Offensive and Defensive Capabilities
        ii. Survivable, Standoff, All Weather ASuW Capabilities
        iii. High Threat Time-Critical Strike
        iv. Countermeasures to Advanced Seekers and Hostile Fire
        v. Air Vehicle Performance Enhancements
        vi. Air Platform Survivability, Total Ownership Cost, and Operational

Availability
       vii. Hypersonic Missile Defense
       viii.   Naval Fires Enhancements
       ix. Non-Kinetic Warfare Capabilities
       x. Unmanned Naval Aviation

  b. Technology Areas

       i.   Energetics – Warhead and Propulsion
       ii. Warhead Design Improvements
       iii. G&C Navigation/Autonomy
       iv. Airframe Technology
       v. Power and Energy Enhancement
       vi. Propulsion Design Improvements
       vii. Sensor, Seeker and Targeting
       viii.   Directed Energy Offensive and Defensive
       ix. Collaborative Operations, System of Systems
Improvements
       x. Advanced Manufacturing Technologies
       xi. Reduced Maintenance Concepts

  c. Additional Focus Areas of Interest
       i.   Life-Cycle Cost
       ii. Kill-Web Enhancements
       iii Flight Performance Enhancements

VII.   THE MARINE CORPS WARFIGHTING LAB

The Marine Corps Warfighting Lab (MCWL) utilizes concept-based experimentation as a primary means to explore both material and non-material solutions enabling warfighting concepts. The concept-based experimentation process provides the unique opportunity to assess the utility of experimental technologies employed in operational scenarios and environments. MCWL leverages ONR's science and technology efforts to inform and support the concept-based experimentation process.

ONR Code 30 thrusts and technology investment areas support MCWL science and technology interests. Because ONR and MCWL focus on technologies of different maturity levels (TRL), offerors responding to ONR Code 30 thrusts and research areas are encouraged to submit white papers to both organizations for wider consideration.

Amplifying instructions on White Paper submissions to MCWL can be found at http://www.mcwl.marines.mil/Divisions/Science-and-Technology/Future-Technology-Office/TISO/.

Focus areas for MCWL experimentation include:

1. Expeditionary Logistics. Technologies to sustain distributed operations in austere and remote environments.

    a. Efficient generation of energy and purified water at points of consumption.
    b. Reduced consumption of energy.
    c. Demand and resupply visibility and efficiency.
    d. Autonomous/unmanned support and resupply capabilities.
    e. Secure resupply in urban environments.
    f. Operations from a sea base comprised of either US Navy amphibious shipping or alternate platforms.
    g. New and efficient additive manufacturing technologies for metal.

2. Interoperable C2 Systems. Technologies that enhance information sharing within the MAGTF and among Joint and Coalition forces that are Tactical Service Oriented Architecture (TSOA compliant.

    a. Efficient data sharing in a multi-level classification/security environment.
    b. Common Operational Picture accessible and tailorable to command needs.

3. C2 Afloat. Technologies to improve ship-to-shore communications and enhance the ability to command and control distributed operations from sea-based platforms.

    a. Modular systems that enable rapid installation of communications and networking capabilities aboard ships that can quickly transition from a sea based platform to a land based configuration.

4. <u>Communications and Networking</u>. Technologies to improve secure information exchange over the horizon and on the move.

    a. Self-forming/self-healing secure, high bandwidth voice and data mesh networks.
    b. Novel approaches for NSA Commercial Systems for Classified Program (CSFC) compliant, multi-layer mobile device security.

5. <u>Lightening the Load</u>. Technologies that reduce the size and weight of the total load of the MAGTF as well as the individual Marine.

    a. Reduced weight/size of equipment embarked on amphibious shipping.
    b. Reduced weight/size of equipment carried/worn by individual Marines.
    c. Autonomous/unmanned systems used for small unit logistic enablers or armed surveillance roles.

6. Counter IED/Mine. Technologies that enhance IED/mine detection, neutralization or pre-detonation.

    a. IED detection, neutralization or pre-detonation from standoff distances, to include explosive hazards on unmanned platforms.
    b. Detection and neutralization of suicide bombers and vehicular bombs.

7. <u>Persistent ISR</u>. Technologies that enhance sensor acquisition, fusion and data distribution, Technologies to maximize payload flexibility and endurance of unmanned systems.

    a. Unmanned airborne systems that can be launched from ship or land to provide over the horizon, long endurance surveillance capabilities.
    b. Unmanned systems (air or ground) that can be launched from larger unmanned systems to extend operational reach.
    c. Technologies that can fuse data and provide scalable information to the end user (small unit leader to commander).
    d. Technologies that leverage open source information, to include social media.

8. <u>Urban Operations</u>. Technologies that enable the ability to operate in densely populated cities.
    a. Sensors to improve surveillance in an urban environment.
    b. Technologies that enable secure, inter-squad communications in high rise buildings.
    c. Technologies that provide rapid, stealth ingress/egress of urban centers.
    d. Technologies that enable urban mobility in vertical, subterranean, or ground level environments.

9 Amphibious Operations Enablers. Technologies that enhance the ability to operate from ship to shore.

    a. Technologies to assess maneuverability of the shallows, beach and shore with respect to obstacles, mines, enemy presence, landing and driving conditions.

b. Sea wall breaching technologies.
c. Technologies that reduce or eliminate ship to shore signature of surface craft.
d. Technologies that speed the transport of armored vehicles ashore.

10. <u>Precision Fires</u>. Technologies that reduce target location error and extend the reach of ship- to-shore fires.

a. Increase the range and timeliness of air, ground and naval fires.
b. Improve the ability to provide all weather fire support among distributed forces.
c. Technologies to counter adversary unmanned systems (air, ground and sea surface).
d. Technologies to maintain precision in a GPS denied environment.
e. Technologies that locate location of enemy indirect fires.

11. <u>Cyberspace Operations</u>. Technologies to defend networks, evade/react to attacks and counter or exploit enemy networks.

a. Create, maintain and provide cyberspace situational awareness, command and control, planning and decision support.
b. Capabilities to enable reconnaissance of network activities and response to attacks and threats.
c. Enabling operations in support of information warfare and electronic warfare support needs
d. Create meaningful, accurate, and specific fires coordinated adversarial effects.
e. Prevent intrusion, compromise, and/or data exfiltration of our own information systems (IS).
f. Reconstitute compromised information systems to a usable, trustworthy state with minimum downtime.
g. Live, virtual, and constructive training .
h. Cyber hardening and security to include hand held devices and unmanned systems.
i. Identification and attribution of network activity of users and devices.

12. <u>Electronic Warfare</u>. Technologies enabling electronic warfare support, attack, and protection in order to ensure maneuver in the electromagnetic spectrum and deny the adversary the same.

a. Create, maintain, and provide electronic warfare situational awareness, command and control, planning and decision support
b. Interoperability of sensors, emitters, and electronic warfare platforms within Marine Corps architecture
c. Live, virtual, and constructive training within geographical and spectrum limitations
d. Maneuver in electromagnetic environment, including electromagnetic feints and signature masking
e. Multi-band wide spectrum detection, geolocation, and classification of electromagnetic signatures
f. Identifying and/or defeating adversarial attempts to deny or degrade communications, sensors, or ISR operations.

g.   Denying or degrading adversarial attempts to use communications, sensors, or other operations in the electromagnetic environment.

h.   Special tactical edge considerations including HF detection and geolocation, small form factor sensors, and intuitive systems requiring limited to no subject matter expertise

i.   Incorporation of automation and artificial intelligence into electronic warfare processes

13. <u>Recommended New Focus Area for Information Operations</u>. Technologies enabling information related capabilities.

a.   Create, maintain, and provide situational awareness, planning and decision support for information operations

b.   Training aids to enable training in the information environment considering statutory and policy limitations

14. <u>Simulation, Training & Human Performance</u>. Adaptable and deployable training systems and technologies that enhance the speed and effectiveness of training.

a.   Integration of live, virtual and simulated training through networked venues.

b.   Simulation systems that immerse individuals in operationally realistic training scenarios.

c.   Technologies that link actors at the tactical and operational levels.

15. <u>Medical Technologies</u>. Technologies to improve the medical care for Marines through prevention, protection and casualty response.

a.   Networked, hand held real-time health assessment devices.

b.   Technologies to increase casualty survivability through improved forward care and speed of casualty transport.

c.   Containerized Medical Systems for Alternative Shipping: Ability to utilize ship power and water, to load on/off alternative shipping with capability modules for emergency rooms, operating rooms, wards, burn care, labs, communications, and pharmacy.

d.   Blood Storage: Ruggedized ability to store blood with redundant power, constant monitoring, and Marine aircraft compatible.

e.   Patient Warming: Uninterrupted warming throughout evacuation chain with ability to raise and maintain patient temperature. Flexible power sources (solar, batteries, etc.) and near silent operation.

f.   Mobile Power: Technologies capable of providing power for medical equipment while maneuvering with ground forces, and is internally transportable by all Marine aircraft.

g.   Energy Efficient Medical Shelter: Hybrid material shelters that require low energy/small footprint heating for forward surgery.

h.   Mobile loading systems for Medical Operations: Ability to move medical supplies autonomously on/off Marine aircraft with a mobile pallet that has organic medical life support (power, heating, water purification).

16. <u>Counter Shooter/Counter Surveillance</u>. Situational awareness and options to counter enemy surveillance and direct fire targeting.

    a. Pre-shot identification of shooters and enemy observation/surveillance.
    b. Detection of optics used for observation and recording.

17. <u>Other Supporting Missions</u>

    a. Scalable, flexible-range non-lethal weapons.
    b. Automated, hand held language translation systems.
    c. Systems to improve boarding of vessels for search and seizures.
    d. Technologies that can detect and/or neutralize small unmanned aerial systems.
    e. Technologies that enable operations in a GPS denied environment.
    f. Technologies that enable 'swarming' of unmanned systems.

VIII. OFFICE OF NAVAL RESEARCH GLOBAL (CODE 600)

ONR Global (ONRG) brings the Department of the Navy Science & Technology (S&T) connectivity between the international S&T community, the Fleet/Force, and the Naval Research Enterprise (NRE).ONRG does not fund investigators from the United States. ONRG serves as an external network facilitator for ONR headquarters and the NRE by ensuring connections are maintained between the international S&T community, the NRE and the Navy-Marine Corps team regarding the execution and development of long range, strategic basic research efforts. ONRG fields a team of internationally located scientists and engineers (Associate Directors) seeking out and engaging international researchers.

Associate Directors (ADs) are subject matter experts and/or regional specialists whose primary mission is to provide access to international experts in fields of interest to the Naval S&T community and to provide them opportunities to connect to their multiple technology counterparts at ONR HQ in Arlington, VA and/or other organizations in the NRE. In addition, ONRG's AD's assess international S&T innovation while conducting liaison visits to international scientists, renowned universities and international organizations.

AD's can be reached through the following link:
http://www.onr.navy.mil/Science-Technology/ONR- Global/associate-directors/~/media/Files/ONRG/Associate-Director-Contacts-FY15.ashx

ONRG supports basic and applied research and sponsors exchange visits, conferences, and workshops that fosters collaboration between the U.S. Navy and international scientists and technologists around the world which identify new technologies, promote and address the needs of the Navy and Marine Corps and enhance the S&T priorities of ONR and the NRE.

- The Collaborative Science Program (CSP) supports international workshops, conferences, and seminars of naval interest held outside of the United States.
- The Naval International Cooperative Opportunities in Science and Technology Program (NICOP) provides direct research support to international scientists to help address naval S&T challenges. NICOPs support the insertion of innovative, international S&T into core ONR and Naval Research Enterprise (NRE) Programs.

Funding Opportunities: http://www.onr.navy.mil/en/Science-Technology/ONR-Global/funding-opportunities.aspx

APPENDIX 2 – REQUIREMENTS APPLICABLE TO GRANTS, TIA's AND COOPERATIVE AGREEMENTS

D. Application and Submission Information

    2. <u>Content and Form of Application Submis</u>sion

      (e) Full Proposals:

          i.   Instructions for Grants, Cooperative Agreements, and TIAs

Content and Form of Application:

Prospective offerors 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).

<u>Full Proposal Format</u>

• 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 Program Officer. 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.

<u>Required Forms</u>

(1) Form: 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:

• <u>Field 3 - Date Received by State</u>: The Date Received by State and the State Application Identifier are not applicable to research.

• <u>Field 4a **-** Federal Identifier</u>: For new proposals, enter N00014. If the application is a renewal or expansion of an existing award, enter the ONR award number.

• <u>Field 4b - Agency Routing Number</u>: Enter the three (3) digit Program Office Code and

the Program Officer's name, last name first, in brackets (e.g., 331 [Smith, John]).

> o   Where the Program Office Code only has two digits, add a "0" directly after the
Code (e.g., Code 30 would be entered as 300)

> o   Use Code 600 for ONRG).

Applicants who fail to provide a Program Officer Code identifier may receive a notice that their proposal is rejected.

- 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 Office of Naval Research 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: Each proposal must address animal use protocols by addressing Fields 2 and 2a of the R&R Other Project Information form. If animals are to be utilized in the research effort proposed, the Applicant must submit the documents described under "Use of Animals" (Section F).

- 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 ONR 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: N00014-18-S-B001;

  (b) Title of Proposal;

(c) Identity of prime Offeror 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.

INCLUDE FOR BASIC RESEARCH, IF IT APPLIES

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

INCLUDE FOR APPLIED RESEARCH AND ADVANCED TECHNOLOGY DEVELOPMENT, IF IT APPLIES

➢ 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 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:
  o Technical and Financial Progress Reports
  o 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: Offerors 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. Offerors shall provide the following information of any related or complementary proposal submissions from whatever sources (e.g., ONR, 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 ONR.

  o Title of Proposal and Summary;
  o Source and amount of funding (annual direct costs; provide contract and/or grant numbers for current contracts/grants);
  o Percentage effort devoted to each project;
  o Identity of prime Offeror and complete list of subwards, if applicable;
  o Technical contact (name, address, phone/fax, electronic mail address)
  o Administrative/business contact (name, address, phone/fax, electronic mail address);
  o Period of performance (differentiate basic effort);
  o 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);
  o 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
  o 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: Offerors must provide the following information to ONR in order to assist in ONR's evaluation of the offeror's responsibility:

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

  o 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.

  o 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.

- o   Describe your record of integrity and business ethics.

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

- o   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 services 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 offeror 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, 2017	March 1, 2018
January 1 through March 31, 2018	July 1, 2018
April 1 through June 30, 2018	September 1, 2018
July 1 through September 30, 2018	January 1, 2019

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

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

- <u>Administrative and Clerical Labor</u> – 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.

- <u>Fringe Benefits and Indirect Costs</u> (F&A, Overhead, G&A, etc.) – The proposal 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.

- <u>Travel</u> – 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. Offerors may include travel costs for the Principal Investigator to attend the peer reviews described in Section II of this BAA.

- <u>Subawards/Subcontracts</u> – 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. ONR'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 Offeror and that the attached proposal is a subcontract.

- <u>Consultants</u> – 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. ONR (including ONRG) will not sponsor an ONR, 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 ONR (including ONRG) 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 issued by the prime awardee.

7. 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 Office of Naval Research (ONR) program applications. Please read the following instructions carefully and completely.

1. Electronic Delivery

ONR is participating in the Grants.gov initiative to provide the grant community with a single site to find and apply for grant funding opportunities. ONR 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 ONR 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 Office of Naval Research **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 ONR Program Officer/Program Manager.

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 ONR 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 timely submission.

When ONR 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. <u>Administrative and National Policy Requirements</u>

b. 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, 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 Section 845, 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.

    v. Peer Review

In the case of proposals funded as basic research, ONR may utilize peer reviewers from academia, industry, and Government agencies to assist in the periodic appraisal of performance under the awards, as outlined in ONR 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 ONR 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. Offerors 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. <u>Content and Form of Application Submission</u>

   (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, ONR 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 proposals below the simplified acquisition threshold (less than or equal to $150K), the Technical Proposal Template and Proposal Checklist documents, and the Cost Proposal Spreadsheet are required. Purchase orders can also contain options, as long as the total amount of the base and all options does not exceed $150K.

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 Program Officer 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 Program Officer 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 ONR 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 ONR, because the contracts issued by ONR 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% to 7.5% on an ONR 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. <u>Administrative and National Policy Requirements</u>

      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:

<u>Safety</u>

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*. The Offeror is solely responsible for contacting the cognizant Defense Contract Management Agency (DCMA) office and obtaining a required preaward safety survey before proposal submission. The Offeror should include required preaward safety surveys with proposal submissions.

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. The Offeror is solely responsible for contacting the cognizant DCMA office and obtaining a required preaward security survey before proposal submission. The Offeror should include a required preaward security survey with proposal submission. (See DoD manual 5100.76-M, *Physical Security of Sensitive Conventional Arms, Ammunition and Explosives*, paragraph C1.3.1.4)

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, Appendix 2.

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 Appendix 2.12.

(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 ONR 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 ONR 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 ONR 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 ONR did not award the contract or agreement, provide a copy of the document. If ONR 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) <u>OCI Mitigation Plan Contents</u>. 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) <u>Review</u>. 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. <u>FAR / DFARS Provisions/Clauses</u>: For purposes of illustration and not of limitation, the following provisions may be applicable to ONR 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 Awards
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 Solicitation
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 |

(a) Combating Trafficking in Persons: Appropriate language from 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 $500,000 where the contractor has current active Federal contracts and grants with total value greater than $10,000,000.

(7) Production and Testing of Prototypes

ONR 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, 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.