Science and Technology Broad Agency Announcement (S&T) (BAA) Naval Undersea Warfare Center Division Newport (NUWCDIVNPT)

1. General Information

1.1 The Naval Undersea Warfare Center Division, Newport, (NUWCDIVNPT) is soliciting research proposals for new and innovative R&D solutions related to the undersea technology subject areas listed below. This publication constitutes a Broad Agency Announcement (BAA) in accordance with FAR 6.102(d)(2) and FAR 35.016. A formal Request for Proposals (RFP), solicitation or other announcement will not be issued. NUWCDIVNPT reserves the right to select for award all, some or none of the proposals submitted in response to this BAA. Offerors submitting proposals may be awarded FAR based contracts, or Other Transaction Agreements (OTA). No grants shall be awarded as a result of this BAA.

Offerors are encouraged (but not required) to identify past and planned investments that would provide leveraging opportunities for NUWCDIVNPT's limited research funds. NUWCDIVNPT provides no funding for direct reimbursement of proposal development costs. The BAA is an expression of interest only and does not commit the Government to pay any costs for responses submitted. It is the policy of NUWCDIVNPT to treat all proposals as sensitive, competitive information and to disclose their content to Government personnel only, and only for the purposes of evaluation or potential sponsorship of the concept. All work awarded as a result of this BAA shall be unclassified. The Government does not commit to providing a response to any comments or questions.

This announcement will be open for approximately five (5) years from date of publication or until replaced by successor BAA. Proposals may be submitted at any time during this period. The Government requires unlimited data rights with regard to any procurement, with the following possible exceptions: 1) a negotiated position for data rights to existing concepts that may be further developed under an award resulting from this BAA; and 2) efforts conducted under a procurement with leveraged funds. Specific deliverables, delivery schedule, and other terms will be negotiated with successful offerors. Successful and unsuccessful offerors will be notified within approximately thirty (30) days of evaluation.

1.2 Any awards placed as a result of this announcement will be funded by the following funding types: RDT&E, RDDA, Overhead, SCC, CIP, Working Capitals, or Special Deposit (specifically, Australia non-FMS effort)

2. Agency Name

Naval Undersea Warfare Center
Code 02, Commercial Acquisition Department 1176 Howell St.
Newport, RI 02841

All inquiries regarding this BAA, as well as white papers, briefs, and proposals, shall be submitted via email to:

NUWC_NWPT_02_BAA_Proposal_Submittal@us.navy.mil

3. Undersea Technology Subject Areas

A) The BAA is comprised of twenty-seven (27) Undersea Technology Subject Areas as listed below:

1. SEAPOWER 21 / SEATRIAL CONCEPT EXPERIMENTATION SOFTWARE TECHNOLOGIES
2. INTEGRATED LIVE, VIRTUAL AND CONSTRUCTIVE MODELING AND SIMULATION TO EXERCISE AND ASSESS EMERGING SYSTEM-OF-SYSTEMS EFFECT CHAINS
3. SUBMARINE AND SURFACE SHIP SONAR
4. SUBMARINE/SURFACE SHIP COMBAT CONTROL AND INFORMATION MANAGEMENT SYSTEMS
5. USW SYSTEMS AND CAPABILITIES CONTRIBUTING TO THE FLEET EXPERIMENTATION (FLEX) CONTINUUM
6. ENVIRONMENTAL AND TACTICAL SUPPORT SYSTEMS
7. SURFACE SHIP UNDERSEA WARFARE (USW) SYSTEMS
8. SUBMARINE ELECTROMAGNETIC SYSTEMS
9. TEST AND EVALUATION
10. UNDERSEA COMMUNICATIONS
11. TORPEDO AND TORPEDO TARGET SYSTEM TECHNOLOGY AND ASSESSMENT
12. THERMAL AND ELECTRIC PROPULSION (FOR TORPEDO, TARGET, UUV, MOBILE MINE AND COUNTERMEASURE APPLICATIONS)
13. HIGH-SPEED UNDERSEA MISSILES, PROJECTILES, AND MUNITIONS
14. UNMANNED OFFBOARD VEHICLES (UxVs): UNMANNED UNDERSEA VEHICLES (UUV)/AUTONOMOUS UNDERSEA SYSTEMS (AUS)/UNMANNED SURFACE VEHICLES (US4)/UNMANNED ARIAL VEHICLE (UAV) TECHNOLOGY AND ASSESSMENT
15. TEST BED TECHNOLOGIES INTEGRATED WITHIN A SECEVOPS ENVIRONMENT, EMPHASIZING AUTOMATION AND MEANS TO PERFORM CAPABILITIES BASED TEST AND EVALUATION (CBT&E)
16. LAUNCHER, MISSILE AND PAYLOAD INTEGRATION SYSTEMS
17. TORPEDO DEFENSE (LAUNCHERS)
18. TORPEDO DEFENSE (MODELING AND SIMULATION)
19. COUNTERMEASURES TECHNOLOGY

20. MATERIALS
21. ARTIFICAL INTELLIGENCE (AI)/MACHINE LEARNING (ML) OR OTHER EMERGING/LEAP-AHEAD TECHNOLOGIES THAT OFFER TO DRAMATICALLY ADVANCE SUBMARINE SONAR AND/OR OTHER ADVANCED UNDERWATER SYSTEMS
22. BIOEFFECTS
23. COMMUNICATIONS AND PRECISION NAVIGATION AND TIMING (PNT) SUPPORTING USE WITHIN DENIED AND DEGRADED COMMUNICATIONS ENVIRONMENTS
24. COMMAND AND CONTROL (C2) AND BATTLE MANAGEMENT TOOLS FOR USE TO SUPPORT COMPLEX, CROSS-DOMAIN, DISTRIBUTED MARITIME OPERATIONS
25. SUBMARINE UNDERSEA WARFARE SYSTEMS
26. CYBERSECURITY
27. MARINE MAMMAL MONITORING AND MODELLING

B) There are a number of subtopics of interest within each Undersea Technology Subject Area. The subtopics are listed below for each Undersea Technology Subject Area.

NOTE: The purpose of the subtopics below is to provide industry with areas of interest and general concepts that might be of potential interest to the Government. The purpose of the BAA is for basic and applied research that have potential uses aligning with the below subtopic areas. Basic research is a systematic study directed toward greater knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications towards processes or products in mind. Applied research attempts to determine and exploit the potential of scientific discoveries or improvements in technology, materials, processes, methods, devices, or techniques. Any submissions under this BAA that do not constitute either basic or applied research will not be considered as they are outside the scope of this BAA.

1. SEAPOWER 21 / SEATRIAL CONCEPT EXPERIMENTATION SOFTWARE TECHNOLOGIES
   - Software Environments and Software Agents to support dynamic and adaptive exchange of information and control among distributed sensors, sensor systems, tactical and staff level commands.
   - Software tools and techniques to promote distributed collaborative military staff coordination.
   - Semantic web tools and techniques applied to military command and control environments.
   - Applications of artificial intelligence to software for military command and control systems.
   - Tools and techniques to negotiate dynamic Quality of Service between software applications and network transport mechanisms.
   - Processes, tools, and techniques for establishing performance and effectiveness baselines in deployed or simulated military environments and comparing these to the performance and effectiveness of prototypes of notional alternative systems.
2. INTEGRATED LIVE, VIRTUAL AND CONSTRUCTIVE MODELING AND SIMULATION TO EXERCISE AND ASSESS EMERGING SYSTEM-OF-SYSTEM EFFECT CHAINS
   - Tools/models to support analysis of complex adaptive systems and dynamic ad hoc networks.
   - Models of small boat acoustic radiated noise based on in-water measurements.

- Capability to generate performance predictions for non-acoustic sensors (such as MAD, FLIR, LIDAR) using models based on measured data.
- Tools/models that explore Human Factor tools, Effects Based Operations, or force/campaign level modeling related to, but not limited to, sensors, payloads, platforms, unmanned vehicles, Undersea Warfare Investment Strategy, etc.
- Advanced 3D and virtual reality displays for allocating forces, platforms, and weapons over a High Level Architecture (HLA) Runtime Infrastructure (RTI).
- Advanced display, data transfer, and networking technology among live units, shore- based simulations, and computer-generated forces to conduct realistic training in the conduct of undersea warfare within a joint mission area context.
- Advanced acoustic prediction capabilities using local environmental parameters, acoustic models and target descriptions.
- Sonar performance modeling, both monostatic and bistatic, including ocean acoustics and targets.
- Concept for USW surveillance (techniques for analysis, modeling, and experimental validation of advanced sonar performance; computational methods for sonar modeling, simulation, and training in littoral warfare environments; computational methods for modeling sonar transducers and arrays with associated structures).
- Advanced techniques for generation of real-time element-level range-dependent coherent broadband reverberation.

3. SUBMARINE AND SURFACE SHIP SONAR

- Micro Electro Mechanical System (MEMS) off-board sensor packages combining sense, processing, power and communications functions (multispectral desired). Surface ship undersea warfare (USW) electronic systems including active sonar processing of signals from large arrays for significant improvements in detection and false alarm rate.
- Sonar information management techniques that use thousands of physically distributed off-board sensors.
- Interactive information display and visualization for sonar
- Automatic sensing and control of undersea warfare (USW) systems (sensor selection, detection method selection, sensor positioning, waveform selection, "hands-off" operation [auto-pilot]).
- Transduction materials technology, vector sensors, textured ceramics, carbon nanotubes, both active (transduction) and passive materials. Active materials include piezoelectric ceramics, single crystals and polymers; electrostrictive materials; liquid crystalline elastomers; magnetostrictive materials; and magnetic materials. Passive materials include rubbers, polyurethanes; epoxies; fluoropolymers; liquid crystalline elastomers; and composites. Other relevant undersea materials technologies. Transducer technology, including underwater acoustic transducers; underwater magnetic transducers; component parts; supporting electronics; broadband technologies; and other relevant underwater transducer technologies.
- Towed and deployed sensors and array technology including the following:

    a. environmentally-adaptive sonar;

    b. tactical towed arrays for passive and active sonars [vertical directionality and tactical speed operation also desired];

c. quick response towed array bearing ambiguity resolution algorithms and hardware technologies;
d. low-cost small acoustic sensors with directional response; hydrodynamic and hydroacoustic analysis for towed and hull-mounted arrays;
e. fiber optic sensor technology for acoustic, temperature, pressure/depth, and magnetic/heading sensors;
f. improved telemetry designs with increased bandwidth and channel capacity for sensors and arrays;
g. affordable optical components [lasers, amplifiers, connectors, filters, photo-multipliers, etc.] for towed and hull-mounted arrays;
h. volumetric towed array technology, including hydrodynamic devices and techniques for generation and control of volumetric array aperture;
i. towed array handling system technology for large aperture arrays and fiber optic arrays;
j. towed array and handler technologies to improve operability and reliability;
k. towed, low frequency, lightweight active arrays, deployed array technology, including low-cost and expendable systems, computer-based decision aids for improved performance in sonar detection, classification and localization;
l. synthetic high strength-to-weight ratio load-bearing materials; sensor, array, and signal processing technologies for reliable, high-performance towed and deployed arrays for littoral applications.

- Hull array technology including the following:
  a. low-cost, small acoustic sensors with directional response;
  b. hydrodynamic and hydroacoustic analysis including finite element analysis for towed and hull-mounted arrays;
  c. improved telemetry schemes with increased bandwidth and channel capacity for optical sensors and arrays;
  d. optical components [amplifiers, connectors, filters, photo-multipliers, etc.] for towed and hull-mounted arrays;
  e. multi- axis motion sensors [conventional and fiber optic] for hull-mounted arrays;
  f. large area hydrophone planar arrays and the associated acoustic baffles and de-couplers;
  g. sonar dome and window materials with frequency-selective transmissivity;
  h. hull-mounted arrays with vertical directionality;
  i. composite structures analysis of and manufacturability of;
  j. synthetic high strength-to-weight ratio load-bearing materials; structural acoustics analysis.
- High frequency (HF) active technology using vertical and horizontal conformal array as transponder and receiver for in stride mine avoidance, Intelligence, Surveillance, and Reconnaissance (IS&R) and bottom topography mapping. Active and passive.
- Underwater acoustic measurements technology.
- Full spectrum signal processing for USW including the following:
  a. passive sonar signal/post processing techniques to counter postulated quieter threats;
  b. passive sonar signal processing for detection, classification, or localization [DCL] of short duration and/or nonstationary signals;
  c. accurate passive range estimation algorithms;

d. active sonar signal/post processing, including detection, classification, normalization, and rejection of reverberation, false targets, and clutter;
e. image processing techniques for sonar detection and classification;
f. passive/active signal/post processing techniques for torpedo DCL; automatic processing techniques for passive and active signals and noise associated with a greater number of hydrophones;
g. software development methods for sonar processing including signal, data, and display processing software.
h. Artificial Intelligence (AI) and Machine Learning (ML) approaches
i. Data science, including mining, fusion, and machine learning

- Data fusion technology (submarine/surface ship/air/unmanned vehicle [UV] platforms).
- Technologies which enable: (1) fusion of organic Mine Countermeasure (MCM) tactical sensor information and environmental data on naval platforms engaged in cooperative organic mine defense; and, (2) presentation of data and information to USW, MCM and other tactical operators on a common workstation.
- Broadband signal processing.
- High-performance computing, such as GPU's, for signal processing.
- Acoustic communications, that include detection resistant capabilities (adaptation of submarine and surface ship sonars for acoustic communications links capable of supporting voice, text, and imaging [video] transmissions).
- Mine and obstacle avoidance sonars (obstacle avoidance sonar, ultrasonic imaging sonars).
- Multi-static capable sonars.
- Human-machine interface technology (display and/or processing techniques to reduce sonar operator effort in detection, classification, localization [DCL], and related operations; operator machine interface devices applied to sonar; display technologies applies to sonar; virtual reality and three-dimensional display concepts for sonar).
- Coordinated, automatic operation of USW systems using onboard and off-board systems to achieve battlegroup operation as a single "system."
- Signal processing techniques for shallow water localization.
- Sensor prototyping
- Digital manufacturing techniques, including additive
- Digital engineering
- Open architecture and Model-Based Systems Engineering (MBSE) approaches

4. SUBMARINE/SURFACE SHIP COMBAT CONTROL AND INFORMATION MANAGEMENT SYSTEMS

- Command environment concepts and technologies applicable to Land Based Integrated Test Site (LBITS) inclusion into an integrated command environment.
- Contact management (contact state estimation; data/information fusion, discrimination and weighting; multi-sensor, multi-contact data association/processing; over-the- horizon (OTH); off-board and remote data processing; full azimuth contact smart processing vice beam, bin processing; integration of non-traditional, real-time data sources.
- Architecture and algorithms that provide integrated platform system processing (i.e., integration of sensor, combat control, and weapon/vehicle processing). Command decision support (common tactical picture generation, disseminated common environmental data, tactical planning, ownship security and self defense, automation to reduce workload).

- Situation awareness/assessment (acoustic, non-acoustic, on board and off board). Level 2 sensor fusion.
- Intelligent command agents for mission planning, including the use and control of autonomous platforms.
- R&D development tool or algorithm to make decisions on resources.
- Enhanced telepresence on tactical platforms using shore-based experts communicating over secure networks.
- Human-computer interaction (data visualization, advanced display technologies, application of virtual/augmented/mixed reality for undersea warfare [USW], adaptable human-computer interactions concepts).
- Software technology (software development tools, runtime environments, software reliability and reusability, real-time scheduling).
- Enhanced combat System technology and capabilities
- Enhanced embedded, onboard training methods.
- Intelligent tutoring and diagnostic student models for intelligent computer-aided instruction.
- Adaptive learning methods and technologies applied to schoolhouse and shipboard classroom education and training.
- Image processing, including pattern matching for visual object classification.
- Interior communication for voice, imagery, and data.

5. USW SYSTEMS AND CAPABILITIES CONTRIBUTING TO THE FLEET EXPERIMENTATION (FLEX) CONTINUUM
    - Concepts and tools to support detailed analysis of strategies for and performance of a Task Force near peer ASW Counterparts and High End Parity ASW systems.
    - Integration of off-platform sensors for search (and surveillance) to facilitate Task Force C2 in complex environments, with sophisticated/alerted threats, multiple contacts and secondary mission.
    - Concepts for integrating UAVs for search, localization and possibly attack, including supporting C2.
    - Advanced sensor and information warfare technologies to control the adversary operational response and options.
    - Concepts for C2 as an enabler for netted, distributed fields of "sensors."
    - Combined C2-tracking systems for Large-N autonomous ASW sensor systems that would manage false contacts and detect submarines.

6. ENVIRONMENTAL AND TACTICAL SUPPORT SYSTEMS
    - Computer-based warfare modeling, simulation, and analysis including synthetic environments; analysis methodologies using advanced processing techniques and integration to NUWCDIVNPT's various simulation bed facilities.
    - Environmental and underwater acoustics and non-acoustics (including range dependent parameters).
    - Environmental data integration for combat control processing, mission planning, battle damage assessment (BDA), and underwater survey (including range dependent parameters).
    - Ocean and target physics for multi-static sonar at long range and low frequency (including range dependent parameters).
    - Shallow water modeling, both acoustic and non-acoustic (including range dependent

parameters).
- Surface ship sonar systems evaluation and analysis process, equipment and capability enhancements.
- Increased surface ship sonar analysis capabilities using simulation and stimulation modeling techniques, including upgraded Monte Carlo methods on NUWCDIVNPT simulation facilities and other DoD simulation facilities.
- Surface ship tactical and fleet support improvements for Surface Ship Antisubmarine Warfare (ASW) Analysis Center (SSAAC) sites.
- Rapid prototyping of systems upgrades to conduct Command, Control, Communications and Intelligence (C3I), Undersea Warfare (USW), and small object detection and avoidance.
- Environmental adaptation and model-based signal processing.
- Broadband environmental acoustic modeling including shipboard sonar, towed arrays and weapons frequency bands.
- Enhancement of current and planned computer-based training (CBT) products through the use of advanced interactive computer graphics and visualization technologies.

7. SURFACE SHIP UNDERSEA WARFARE (USW) SYSTEMS
   - Surface ship USW systems engineering including integrating complex outputs of multiple sensors.
   - Gun-launched sensor systems.
   - Common multifunctional mechanical handling and towing system for variable depth sonar, remote mine reconnaissance system, towed arrays, NIXIE (AN/SLQ-25 & 25a torpedo countermeasure), and special operations equipment.
   - Acoustic array concepts with significant forward-looking aperture and minimal hull hydrodynamic impact.
   - Unmanned Surface Vehicle (USV) USW intelligent subsystem for distributed sensor and weapon functionality to host system.
   - Automatic sonar system operation based on tactical environment, mission requirements, and threats.
   - Collective autonomous systems (UUV, USV, UAV) collaborative behavior concepts and algorithms.
   - Concepts and technologies applicable to underwater gun systems for mine and obstacle clearance in surf and very shallow water (VSW) zone using high frequency (HF) sonar for fire control/targeting in stride mine avoidance.
   - Software technology (software development tools, runtime environments, software reliability and reusability, real-time scheduling).

8. SUBMARINE ELECTROMAGNETIC SYSTEMS
   - Advanced antenna technology, including wideband, electronically steerable, reconfigurable, and multifunction antenna technologies.
   - Compact free-space optical communications systems.
   - Antenna and electronic technologies applicable to buoyant cable systems.
   - Antenna and electronic technologies applicable to communications buoys.
   - Technologies applicable to undersea optical communications.
   - Compact antennas and radios for unmanned undersea, air, and surface vehicles.
   - Innovative communications waveform techniques.

- Comms/networking protocols applicable to at-sea or undersea nodes.
- Technologies to enhance image quality, including greater-than-High Definition (HD) resolution video and still cameras, stabilization algorithms and hardware, and atmospheric turbulence correction.
- Large bandwidth recording to support multiple greater-than-HD resolution video cameras.
- Head window water shedding.
- Image processing to support rotating and non-rotating 360-degree imaging architectures.
- Imaging sensors operating in the Short Wave Infrared (SWIR), Medium Wave Infrared (MWIR), and Long Wave Infrared (LWIR) bands, or combinations of these bands
- Image fusion algorithms.
- Polarimetric, hyperspectral and multi-spectral systems.
- Broadband imaging head windows.
- Display technology at resolutions greater than HD, including panoramic displays.
- Automation of imaging system operator tasks, including detection & operator cueing, classification, identification, localization, and tracking.
- Broadband, multifunction EW antennas.
- Reconfigurable sensors.
- Wideband receivers.
- Correlation engines.
- Adaptive systems that reconfigure/optimize antenna/sensor performance using environmental inputs.
- Specific emitter identification algorithm enhancements.
- Human-machine interface automation.
- Technologies to enable remote operation of submarine electromagnetic systems.
- Common radio frequency (RF) distribution methods supporting communications and EW.
- Low loss, low noise figure RF-over-fiber techniques and solutions.
- RF multiplexing technologies to reduce weight and space requirements by reducing the number of cables and connectors.
- Improved materials for submarine radomes.
- Technologies addressing electromagnetic interference and co-site interference mitigation
- Technologies to allow atmospheric sensing (e.g., air temperature or barometric pressure) from submarines
- Technologies to fuse information from imaging and electronic warfare systems
- Thermal management of mast-based antennas and sensor.
- Watershedding and anti-fouling coatings for radomes.
- Technologies supporting common electrical hull penetrators.
- Technologies that significantly reduce Total Ownership Cost for submarine electromagnetic systems.
- Technologies to reduce the visual, infrared, and radar detectability of submarine masts, mast systems, mast emissions, or mast wakes.
- Technologies for improving dip loop reliability or eliminating the need for dip loops.

9. TEST AND EVALUATION
    - Techniques, procedures, and/or processes for analysis of software architectures applied at major test and evaluation and/or training facilities.
    - Technology for lightweight or disposable instrumentation for large area, portable underwater

tracking ranges.

- Advanced concept hydrophones (fiber optic, velocity or acceleration sensing, single crystal, electronics).
- Low-cost radiated noise measurement systems including component elements, sensors and array systems.
- Autonomous direct sound velocity profiling system that can gather data and communicate with underwater range acoustic and non-acoustic sensors.
- Low-cost, low-power, in-water signal processing nodes, both cabled and autonomous for detection, classification or localization.
- Power harvesting technologies for ocean deployed instrumentation, including sea floor and surface locations.
- Long-distance (15-20 nautical miles), high-speed (20 Mbps) digital radio frequency telemetry for buoy to ship communications.
- Advanced 3D virtual displays, data transfer, and networking technology between live units, shore-based synthetic environments, and computer-generated forces to conduct realistic training for undersea warfare within a joint mission area context.
- Improved tools/techniques for conducting undersea vehicle analysis. Areas of interest include advanced data visualization, multi-source data fusion/integration, automated analysis tools, and data presentation, reporting, and storage. Applications include vehicle performance, sensor efficiencies, vehicle operational availability and persistence.
- Underwater structures for compact lightweight sensor deployment and retrieval (e.g., Airbeam Structure technology).
- In-situ reconfigurable inflatable sensor frames based on biomechanical models.
- New advanced materials, composites and coatings including hull treatments for corrosion prevention of in-water structures.
- Advanced innovative techniques for wireless communications of sensor systems in marine environments.
- Novel concepts for laser acoustic communication systems.
- Modeling and simulation of laser acoustic communication systems and related systems.
- Test-bedding and simulation of collective autonomous systems (UUV, USV, UAV) collaborative behavior concepts and algorithms in the execution of USW missions.
- Advanced statistical models for sparse tracking of surface and undersea targets.
- High fidelity, mobile tracking system for USW targets.
- High bandwidth underwater communications.
- Modular, wet-reconfigurable undersea sensors.
- Two body flow field hydrodynamic modeling
- Experimental launch and trajectory hydrodynamics for Underwater Vehicle Launch Dynamics Simulation (UVLDS) validation

10. UNDERSEA COMMUNICATIONS

- Advanced Communications algorithm development to improve, robustness, throughput, bandwidth efficiency and covertness.
- Advanced Communications modeling software to support in-situ performance analysis. This software could provide assistance to fleet operators in analyzing own ships (speed, depth, range, etc.) profile for best undersea communications.
- Investigation of jammer and interference-resistant acoustic communication algorithms.

- Development of multiuser communication methods and undersea acoustic networks to support maximum number of communications nodes and users in the anticipated acoustically congested undersea battlespace.
- Investigations of efficient implementation of acoustic communication algorithms in hardware and/or software.
- Development of man-machine interfaces and automated operation of remote acoustic modems.
- Optics based sensors, systems and algorithms.

11. UNDERSEA WEAPONS AND TARGET SYSTEM TECHNOLOGY AND ASSESSMENT
    - Processing algorithms for improved target detection/classification against low-speed targets at all aspects and for improved countermeasure resistance with an emphasis on highly reverberant shallow water environments; such algorithms might include:
        a. Coherent broadband processing,
        b. Advanced transmit waveforms and/or beamsets,
        c. Target/non-target classification techniques for single and/or multiple pings,
        d. Adaptive processing techniques to enhance signal-to-noise ratio (SNR) in highly reverberant environments,
        e. Signal processing algorithms and projector developments to limit surface and bottom effects for shallow water target operation.
        f. Methods and algorithms to reduce the probability of target alertment to torpedoes; such methods might include:
            1. Reducing the alertment associated with torpedo active acoustic search;
    - Lightweight, stiff, corrosion resistant, acoustically damped vehicle structures;
    - Technology improvements for lightweight and heavyweight torpedo propulsion silencing, including prime mover, machinery, and propulsor quieting.
    - Operational torpedo processing technology and systems applicable to lightweight and heavyweight torpedo commonality initiatives, including size reduction, including:
        a. Application of commercial processing technology and systems to lightweight and heavyweight torpedo sonar signal processing and tactical control functions,
    - Improved torpedo logistical support, maintenance support, and hardware/software acquisition processes and techniques enhancing commonality.
    - Improved post-launch communication techniques between torpedo/submarine and torpedo/torpedo.
    - Enabling methods/techniques/materials applicable to the stowage of torpedoes external to submarine pressure hull.
    - Reduced volume, low-cost navigational sensors.
    - Weapon System Modeling (also see the first subject area, which is titled Undersea Warfare Modeling, Simulation, and Analysis) to enable lower cost development and/or support of torpedo/target systems; the approaches might include:
        a. Simulation Based Design (SBD), Rapid Prototyping & Design for
        b. Manufacturing (DFM) methods to enhance system performance while reducing Total Ownership Cost (TOC);
        c. Tools/models to support torpedo improvement Investment Strategy (performance vs. cost);
        d. Integrated structural, acoustic, kinematic, and hydrodynamic design codes for

paperless design and design simulation;

e. Shallow water environment acoustic models to support upgrade of digital torpedo simulations and hardware in the loop simulators (real-time operation required), including surface and bottom effects and range dependent characteristics;

f. In-air and water entry trajectory digital models, lightweight torpedo configuration dependent, to support performance evaluation of alternate lightweight torpedo configurations and air launch accessories (parachutes, etc.) designs;

g. Digital models to support design and evaluation of propulsion silencing technology and/or hardware.

- Low-cost weapons concepts for low-volume, high-speed targets.
- Non-lethal weapon systems concepts.
- Concepts for regenerative weapons and defensive system.
- Improved torpedo sonar systems to support shallow water environment and/or low/zero Doppler target scenario performance improvement; areas of interest include:

  a. Non-traditional sensor technology, systems and environmental sensing technology and systems applicable to various platforms for shallow water environment and low Doppler target scenario performance improvements.
- Studies and assessments of the effects of the environment on processes and activities utilized in weapons and combat systems.
- Delivery of Kinetic and Non-Kinetic Effects.
- Torpedo submarine and surface combatant self-defense technology and systems applications including anti-torpedo torpedo concepts/technologies.
- Non-acoustic simulation technology for mobile ASW targets.
- Wake generation/simulation techniques for mobile target and countermeasure use.

12. THERMAL AND ELECTRIC PROPULSION (FOR TORPEDO, TARGET, UUV, MOBILE MINE AND COUNTERMEASURE APPLICATIONS)

- High-energy fuels and oxidants for power conversion, including but not limited to internal and external combustion engines, hot gas expander engines, turbines and electrochemical devices.
- Battery, semi-fuel cell, and fuel cell technology including: a) high rate primary and secondary batteries for high-speed underwater vehicles; and, b) low rate rechargeable energy systems for long endurance missions in unmanned underwater vehicles (UUVs).
- Rapidly rechargeable secondary systems and smart chargers for high and low rate application.
- Analytical models, studies and assessments of:

  a. electric propulsion systems.

  b. thermal propulsion systems.

  c. aqueous battery and semi-fuel cell systems.

  d. primary and rechargeable battery systems.

  e. Electric motors and power controllers for undersea systems.

  f. Power converters and regulators with high power density, high overall efficiency, and wide conversion range.

  g. Thermal management of electrical systems and compact heat transfer systems.

  h. Affordable propulsion systems.

  i. Novel propulsion concepts.

  j. Energy Harvesting concepts, technologies and systems.

  k. Flow of conducting fluids in the presence of strong electric and/or magnetic fields.

  l. Micro electromagnetic system (MEMS) devices for energy conversion and micro- sensor and controller

applications.

13. HIGH-SPEED UNDERSEA MISSILES, PROJECTILES, AND MUNITIONS
    - Supercavitating projectile in-bore, in-water dynamics simulation.
    - Supercavitating projectile system targeting concepts and technologies.
    - Undersea gun launch concepts and technologies, including high frequency (HF) sonar for targeting.
    - Drag reduction (supercavitation, ventilated-cavity, enveloping-vapor-flow).
    - Rocket propulsion and underwater ramjet power systems.
    - High power and energy metal-water combustion systems.
    - Stability and guidance control techniques.
    - Supercavitating torpedoes and bombs.
    - Subsonic, supersonic, and hypersonic payloads.
    - Sensors.
    - Communications.
    - Launchers.
    - Command and Control Systems.
    - Combat and Weapon Control Systems.

14. UNMANNED OFFBOARD VEHICLES (UxVs): UNMANNED UNDERSEA VEHICLES (UUV)/AUTONOMOUS UNDERSEA SYSTEMS (AUS)/UNMANNED SURFACE VEHICLES (US4)/UNMANNED ARIAL VEHICLE (UAV) TECHNOLOGY AND ASSESSMENT
    - Sensors for Anti-Submarine Warfare (ASW)/ Anti-Surface Ship Warfare (ASUW)/IS&R and Oceanographic applications – traditional and non- traditional sensors and sensing methodologies/phenomenologies and systems to support both overt and covert sensing.
    - Precision covert navigation concepts for UUVs at speed and depth.
    - Innovative and cost-effective solutions to improve on the current state-of-the-art capabilities of UUV acoustic communication systems. Areas of improvement include, but are not limited to:
        a. Providing higher data rate capability, including RF;
        b. Decreasing the computational load required for a given data rate;
        c. Providing low probability of intercept (LPI) capability;
        d. Higher data reliability (robustness to errors);
        e. Lossless and lossy data compression;
    - Electromagnetic and acoustic signature reduction technologies.
    - UUV materials with specific focus on:
        a. Material performance at depth;
        b. Water absorption;
        c. Biofouling mitigation for persistent operations;
        d. Low oxygen/low light biofouling and corrosion;
    - Intelligent, fault tolerant controller capable of reliable, long-range unattended operation of UUVs/USVs with embedded mission control.
    - Oceanographic data collection, including but not limited to temperature, pressure, and current profiling, in support of tactical decision aids and the national oceanographic database.
    - Sensor systems for object detection, classification, identification, or avoidance.
    - Object detection and avoidance of objects anywhere in the water column.

- Manual, semi-autonomous, and autonomous technologies for guidance and control of UVs (USVs, UUVs).
- Novel propulsion concepts.
- High-efficiency, high-energy density, safe long-endurance chemical, electrochemical, and thermochemical energy sources for UUVs and USVs.
- Lightweight, stiff, corrosion resistant, acoustically damped vehicle structures.
- For Simulation Based Design (SBD), Rapid Prototyping & Design For Manufacturing (DFM) methods to enhance system performance while underway Total Ownership Cost (TOC.)
- Programming technology providing the capability to install tactical software at the operational level.
- Programming technology providing the capability to prevent compromise of tactical software.
- Technology and advanced concepts for launch and retrieval of UUVs from submarines and USVs from surface ships including concepts for platform vehicle communication prior to launch and during the retrieving process.
- Low-power mission payload technologies for distributed and unmanned systems.
- Simulation of undersea launch and retrieval of UUVs and USVs.
- Low-observable self-righting technologies for USVs.
- Capabilities and Systems for UVs:
- Acoustic, electromagnetic (EM), electro-optical (EO), chemical sensing
- Lethal and non-lethal weapons for CONUS and OCONUS application
- Intelligence, surveillance and reconnaissance (ISR)
- COMMs
- Anti-Terrorism and Force Protection
- Mission planning capability for pre-mission and for in-mission.
- Tamper detection, integrity of the communication source
- Increased payload capacity/multi-payloads on single vehicle
- Docking technologies for long-term/permanent submersion

15. TEST BED TECHNOLOGIES INTEGRATED WITHIN A SECEVOPS ENVIRONMENT, EMPHASIZING AUTOMATION AND MEANS TO PERFORM CAPABILITIES BASED TEST AND EVALUATION (CBT&E)
    - Large vehicle system concepts.
    - Undersea systems for detection and tracking of undersea objects.
    - Improved processes, equipment or capabilities for physics modeling of high-Mach- number undersea flows, including high-Mach- number supercavitating or ventilated flows.
    - Improved processes, equipment or capabilities for physics modeling of undersea rocket exhaust interaction with external vehicle flows, including supercavitating or ventilated flows.
    - Technology for the measurement and assessment of high-Mach-number supercavitating or ventilated flows.
    - Homing/maneuvering/depth independent concepts for high-speed/supercavitating torpedoes.
16. LAUNCHER, MISSILE AND PAYLOAD INTEGRATION SYSTEMS
    - Corrosion detection, repair and prevention.
    - Cruise missile simulation.
    - Advanced submarine weapon concepts for battle group protection and submarine stand and fight against air marine patrol craft and small craft surface vessels.

- Submarine launcher technology including acoustic modeling, transient hydrodynamics, structural analysis, and shock analysis.
- Advanced launcher concepts for the ejection of weapons, countermeasures, and auxiliary devices for submarines including electromagnetic launcher technology.
- Launch dynamics and cable dynamics.
- Advanced concepts for wireless pre- and post-launch weapon/platform communication.
- Advanced concepts for loading, handling, and stowing of weapons aboard submarines.
- Analytical and/or experimental techniques for achieving a better understanding of the physics associated with launching a vehicle from a moving underwater platform.
- Technology and advanced concepts for launch and retrieval of unmanned undersea vehicles (UUVs) from submarines including concepts for wireless platform vehicle communication prior to launch and during the retrieving process.
- Technology and advanced concepts for launch of unmanned aerial vehicles (UAVs) from submarines including concepts for launch control and platform/vehicle communication.
- Techniques such as drag reduction, noise isolation/suppression/attenuation that reduce the radiated noise, including flow noise associated with the launch of vehicles from submarines.
- Mission flexible modular launcher system for surface ships that provides rapid reconfiguration to accommodate various payloads
- Small vehicle encapsulation
- Launcher concept to support variable speed and launch pulse strength
- Universal payload system capable of deploying unique and different shapes
- Pickup/handling/stowage of irregular shaped payloads
- Deployment of UUVs from a larger host UUV

17. TORPEDO DEFENSE (LAUNCHERS)
    - Universal and/or modular surface ship launcher for countermeasure and other vehicles/devices up to 12.75-inch diameter.
    - Wireless common data and power transmission with countermeasure device and universal launcher.
    - No/minimal maintenance, unmanned surface ship launcher design.
    - Advanced launcher concepts (including external and tubeless concepts) for the ejection of weapons, countermeasures, and auxiliary devices from surface ships.
    - Technology for the simulation and design of torpedo defense launchers.
    - Low-cost, modular, portable stimulators for on-board training.

18. TORPEDO DEFENSE (MODELING AND SIMULATION)
    - Acoustic and magnetic properties models within various surface ship wakes.
    - Acoustic and magnetic surface reverberation models.
    - Models of acoustic and magnetic multiscatter effect within various wakes.
    - Models of high-speed torpedo operation at shallow depths within various wakes.
    - Models addressing operation in a shallow water environment (propagation loss, multiple bottom types, performance prediction tools, etc.).
    - Models and concepts addressing Terminal Defense issues.
    - Low-cost, modular, portable simulators for on-board training.

19. COUNTERMEASURES TECHNOLOGY

- Technology supporting mobile and stationary surface and submarine launched jammers and countermeasures (CMs) capable of operating in layered defense scenarios and in open ocean and/or littoral environments.
- Improved countermeasure systems, transmit waveforms, beam patterns, sound pressure levels, endurance, in-situ design, and classification smart adaptive processing, mobility, fuze influence technologies, and acoustic communication links.
- Passive/active signal processing techniques for countermeasure application including but not limited to the following: wavelet theory, time frequency distributions, full spectrum processing, transients, digital signal processing, parameter/feature extraction, neural networks, curve fitting routines, clustering algorithms, fuzzy logic, field programmable gate arrays (FPGA), application specific integrated circuits (ASIC), smart adaptive processing, and active signal processing for detection, classification, and localization (DCL)
- Multi-domain undersea ecoy and deception technologies and techniques (i.e. capability from or against undersea systems)
- Ocean physics simulation and analysis including but not limited to: broadband environmental acoustic modeling - shallow water; blue water; low, sonar, weapon, high, and very high frequency; wake physics - acoustic properties of wakes; non-acoustics, i.e., electromagnetic, laser.
- Undersea material technology: small expendable high-energy primary batteries.
- Countermeasure (CM) system engineering including but not limited to packaging, versa module European (VME) extension instrumentation (VXI), simulation based design tools, commonalty, modular, rapid prototyping, and CM device operation in multiple device environment including CM data acquisition systems in support of CM development and testing in laboratory and at sea.
- Computer-based warfare modeling, simulation, and analysis including but not limited to synthetic environments, analysis methodologies using advanced processing techniques and integration to NUWCDIVNPT's various simulation bed facilities.
- Dual-use (sonar and torpedo) countermeasure that fits in existing launchers.

20. MATERIALS
- Metamaterials.
- Composites.
- Engineered coatings.
- High surface area per unit volume (nanostructure) materials, and/or synthesis thereof, for consideration as electrode substrates within electrochemical cells. This includes synthesis and application of nano-scale metallic and metal oxide particles.
- Non-Destructive Evaluation technologies
- Cost engineering in advanced material manufacturing.
- High-strength, lightweight, low cost, corrosion resistant, metallic material.
- High-strength, lightweight, low-cost, flame-resistant, non-metallic materials.
- High-strength, rare earth permanent magnet materials and fabrication processes.
- Lightweight, nonferrous, shielding of electromagnetic energy.
- Low multi-signature materials (e.g., radar and infrared low observable materials).
- Acoustic signature reduction materials including hull, mount and coating technologies, material property measurement and characterization processes and procedures.
- 1-3 piezo electric composites for sonar arrays with large bandwidth and low Q, high power

transmit capabilities and receive arrays.

- Anti-fouling materials or processes/systems for undersea and surface vessels, vehicles and structures.
- Inflatable structures.
- Smart textiles.
- Rapidly manufactured foam structures.
- Biocides.
- Resilient materials.
- Cathodic delamination resistance.
- Self-healing materials.
- Low/high temperature effects
- Long term seawater immersion effects
- Accelerated aging methods
- Composite failure modeling
- Flexible/shape changing materials
- Embedded sensors

21. ARTIFICIAL INTELLIGENCE (AI)/MACHINE LEARNING (ML) OR OTHER EMERGING/LEAP-AHEAD TECHNOLOGIES THAT OFFER TO DRAMATICALLY ADVANCE SUBMARINE SONAR AND/OR OTHER ADVANCED UNDERWATER SYSTEMS

- Applications to state-of-the-art underwater Fully Automated Systems Technology (FAST) involving:
    a. Automatic sonar detection, classification and/or localization of diverse acoustic sources.
    b. Autonomous guidance and control.
    c. Autonomous perception, data fusion, analysis and decision-making.
    d. Adaptive reasoning.
- Applications from on-going research in:
    a. Biologically-based visual and auditory systems.
    b. Architectures involving autonomous agents.
    c. Improved computational models based on biologically accurate neurons.
    d. Sub-neuronal computations.
    e. Network of network computing.
    f. Information transfer to/from human using multiple senses for input to human and multiple methods of human input to system (five senses for input; voice, feet, hands, eyes, etc. for input to system).
- Large language models
- Analysis of visual information/acoustic data
- Vulnerabilities of data analysis
- Identifying reliability of the methods when deployed in field and theatre
- System health monitoring
- Counter-detection and avoidance
- Quantum computing and methods
    a. Sensing;
    b. Encryption;

c. Signal processing;
d. Quantum materials

- Additive Manufacturing (AM)
  a. Developing an AM solution that could build low-cost UUVs on demand in a host submarine
  b. Dynamic material properties of AM parts and shock qualification
  c. Finite Element Analysis (FEA) methods for AM parts
  d. Relying on AM to reduce spares stored onboard or tenders
  e. Post-processing technologies
  f. Corrosion issues with AM components

22. BIOEFFECTS
- Basic and applied research on the biochemical and physiological effects of underwater sound and other environmental stressors on the organ systems and behavior of humans and marine vertebrates.
- Development of safe exposure guidelines and damage risk criteria for exposure to water-borne sound below one MHz.
- Mathematical modeling of the mechanisms responsible for the physical effects of exposure to sound or other environmental stressors.
- Mathematical modeling and development of methods for characterizing sound fields in hyperbaric chambers, tanks, pools, small lakes, and other confined environments.
- Mathematical modeling and development of methods of simulating or producing sound fields with open-water characteristics in confined environments, to include modeling of construction noise and seismic activities.
- Development of physiological and psychological monitoring and performance tests for humans and other organisms to evaluate the effects of exposure to underwater sound.
- Development and evaluation of techniques and equipment for protection from underwater sound or other environmental stressors.
- Development of underwater sound measurement techniques, methods, and equipment

23. COMMUNICATIONS AND PRECISION NAVIGATION AND TIMING (PNT) SUPPORTING USE WITHIN DENIED AND DEGRADED COMMUNICATIONS ENVRIONMENTS
- Develop virtual reality 3D display with voice recognition/voice command module.
- Develop tactical awareness module/virtual reality 3D display with voice recognition.
- Model human operator's tactical strategies and embed in 3D display system.
- Physical and psychophysical modeling of spatial hearing for use in binaural and virtual-reality displays.
- Psychophysical measurement and modeling of auditory performance with auditory displays for simulations or under conditions of multiple sensor inputs and high workloads.
- Design and evaluation of auditory signal-attenuating headsets and communications systems.
- Assessment of speech communication and voice recognition.
- Assessment of applicability of otoacoustic emissions for use in hearing conservation programs.
- Assessment of hearing risk and auditory performance in diving environments.
- Assessment of auditory and non-auditory effects of noise.

- Design and assessment of passive and active noise reduction technologies; design and evaluation of automated information systems for reduced shipboard manning.
- Design and evaluation of auditory signal enhancement algorithms and auditory interface techniques; development of auditory models of detection and classification;; development and testing of underwater sound measurement.

24. COMMAND AND CONTROL (C2) AND BATTLE MANAGEMENT TOOLS FOR USE TO SUPPORT COMPLEX, CROSS-DOMAIN, DISTRIBUTED MARITIME OPERATIONS
    - Research into enhanced understanding of networked behavior, structural topology, and the dependency of interconnectivity on organizational relationships for effective command and control of a geographically dispersed networked force (not the LANS, servers, nodes or electronic connections).

25. SUBMARINE UNDERSEA WARFARE SYSTEMS
    - Non-traditional sensors for ASW.
    - Rapidly deployable non-traditional sensors.
    - Novel techniques for detecting UUVs, gliders, and swimmers.
    - Novel and non-traditional data transmission/communication systems.
    - Non-traditional techniques and systems for reducing self-noise.
    - Traditional and non-traditional submarine ASW statistical models.
26. CYBERSECURITY
    - Cybersecurity technologies that provide resilient systems by focusing on integrating security into systems architectures from early in the design phase such as Zero-Trust Network Architectures and Software-Defined Networking.
    - Cybersecurity anomaly detection/response systems that leverage adaptive computing techniques such as machine learning to provide adversarial attack detection and response at machine-speed.

27. MARINE MAMMAL MONITORING AND MODELLING
    - Innovative technologies to track and collect field data from marine species.
    - Enhanced Passive Acoustic Monitoring (PAM) methods and systems.
    - Passive acoustic density and abundance methodologies.
    - Statistical analysis methods including Population Consequence of Disturbance (PCoD) modelling.
    - Improved environmental effects models.
    - Characterization of potential effects of both impulsive and non-impulsive energy in the marine environment.
    - Development of improved technologies and methods to map prey species in study areas.

4. Format/Submission Information

4.1 Submission of White Papers and Proposals

Electronic submission of white papers and proposals is the preferred method of submission. Offerors shall submit signed white papers and proposals as PDF documents except for the cost proposal that shall be a Microsoft Excel document. Submissions shall be sent via email to

NUWC_NWPT_02_BAA_Proposal_Submittal@us.navy.mil The offeror shall clearly mark each electronic file to show the proposal volume number, BAA number and offeror's name. Electronic proposals shall not contain classified data. All information relating to cost and pricing type data shall be included only in the section of the proposal designated as the Cost Proposal. Under no circumstances shall cost and pricing type data be included elsewhere in the proposal. The offeror shall cross-reference between Cost Proposal paragraphs and technical/management proposal paragraphs to provide clarity.

4.2 White Papers and Briefs

A. White Papers or Briefs Background:
White papers or briefs are initially sought to preclude unwarranted effort on the part of the offeror in preparing full technical and cost proposals without an initial assessment of the operational, technical and logistical feasibility of the concept.

B. White Papers or Briefs Evaluation/Notification:
White papers or Briefs will be reviewed in terms of scientific merit, relevance to the NUWC mission and likelihood of success. Each paper will subsequently be assigned one of the following ratings: Promising, Promising but No Funding Available at this Time, or Not of interest at this time.

Reviews of all white papers or briefs submitted in response to this BAA will be issued via e- mail notification about thirty (30) days after receipt by the Government. Offerors that receive a rating of "Promising" will be given the opportunity to submit full technical and cost proposals; however, any such offer of opportunity does not assure a subsequent award.

C. Submission of Full Proposal
Any offeror may submit a full proposal even if its white paper or brief was not identified as being Promising. However, the initial evaluation of the white papers or briefs should give potential offerors some indication of whether a full proposal would likely result in an award. If the white paper is identified as Not of interest at this time, it is unlikely that an award will be made as the result of a full proposal submission.

D. Content and Format of White Papers

i. The white papers or briefs submitted under this BAA shall be unclassified.

ii. Restrictive Markings On White Papers:

a. Records or data bearing a restrictive legend may be included in the white paper or brief. Any proprietary data included that the offeror intends for use exclusively by the Government for evaluation purposes must be clearly identified. The white paper or brief must be marked with 'CUI' at the top and bottom of each page submitted. The first page of the document must contain the below five (5) line Designation Indicator with "XXXX" replaced with Offeror's entity name.

Controlled By: Vendor XXXX
CUI Category: PROCURE, PROPIN
Limited Dissemination Control: DL Only, Distribution to C02 FED, 00L FED, Technical Review Team FED, and Vendor XXXX
POC: Vendor XXXX

The offeror must also identify any technical data contained in the white paper or brief that is to be treated by the Government as limited rights data. In the absence of such identification, the Government will assume to have unlimited rights to all technical data in the white paper or brief. It is the Governments intent to treat all white papers or briefs as controlled unclassified information and to disclose their contents only for the purpose of review.

b. The offerors are cautioned, however, that portions of the white papers or briefs may be subject to release under the Freedom of Information Act, 5 U.S.C. 552, as amended.

c. Care must be exercised to ensure that classified, sensitive, and critical technology(ies) are not included. If such documents are required, appropriate restrictive markings and procedures should be applied.

iii. White Papers or Brief Format

• Paper Size – 8.5 x 11 inch paper
• Margins – 1" inch
• Spacing – single spaced
• Font – Times New Roman, 12 point
• Number of Pages for a White Paper – The technical description section of the white paper shall not exceed five (5), single-sided pages. Reviewers will be advised that they are only required to review the white paper cover page, addendum, cost estimate and up to five (5) pages of the technical description.
• Number of Slides for a Brief – The brief shall not exceed fifteen (15) slides. The Offeror may submit a white paper or a brief, but shall not submit both.

iv. White Papers or Brief Content

White papers or Briefs should include the following items:

a. Cover page: clearly labeled "White Paper", including BAA title and number, Undersea Technology Subject Area(s) of Interest, title of white paper or brief, date, administrative and technical points of contact along with telephone, and e-mail addresses. The cover page will not count toward the page limit.

b. Technical Description, to consist of:

1. A technical discussion of the objectives, approach, and level of effort;
2. The nature and extent of the anticipated results, the manner in which the work will contribute to the accomplishment of NUWC's mission, and how this would be

demonstrated;

3. The type of support, if any, that the offeror requests of the Government, such as facilities, equipment, demonstration sites, test ranges, software, personnel or materials, identified as Government furnished equipment (GFE), Government furnished information (GFI), or Government furnished property (GFP). Offerors shall identify any Government coordination that may be required for obtaining equipment or facilities necessary to perform any simulations or exercises that would demonstrate the proposed capability.

NOTE: Offerors are to annotate in any initial white papers or briefs submitted whether the Offeror intends to utilize the NavalX Tech Bridge resources (see attached Appendix 1). This annotation will be taken into careful consideration during evaluation of the white papers or briefs submitted. The Government does not commit to sponsoring an Offeror interested in utilizing the NavalX Tech Bridge. The Government will make a determination as part of the review and provide the determination in any subsequent request for full proposal as appropriate.

c. Cost estimate: The cost portion of the white paper shall contain a brief cost estimate revealing all the component parts of the proposal, including research hours, burden, material costs, travel, etc. The cost estimate will not count toward the page limit.

d. Addendum: As an optional addendum to the white paper, include biographical sketches (one page each) of the key personnel who will perform the research, highlighting their qualifications and experience. The addendum will not count toward the page limit.

4.3 Proposals

A. Proposal Content and Format

Proposals submitted under this BAA must be for unclassified basic research. The Government will protect proposal submission from unauthorized disclosure in accordance with FAR 3.104-5 and 15.207, applicable law and DoD & DoN regulations. Offerors shall appropriately mark each page of their submission that contains proprietary information.

Proposals shall be marked with 'CUI Source Selection Information – See FAR 2.101 and 3.104' at the top and bottom of each page submitted. The first page of each document submitted shall contain the below five (5) line Designation Indicator with 'XXXX' replaced with Offeror's entity name.
Controlled By: Vendor XXXX
CUI Category: PROCURE, PROPIN, SSEL
Limited Dissemination Control: DL Only, Distribution to C02 FED, 00L FED, Technical Review Team FED, and Vendor XXXX
POC: Vendor XXXX

i. Proposal Format

- Paper Size – 8.5 X 11 inch paper
- Margins -- 1 inch

- Spacing -- 1.5 or double-spaced
- Font -- Times New Roman, 12 point
- Number of Pages -- The Technical Proposal must not exceed fifteen (15) pages. There is no page limit for the cost estimate. The cover page, table of contents and resumes are excluded from the page limitations. Full proposals exceeding the page limit may not be reviewed.
- Proposals submitted in response to this announcement shall include the attached cover page, see Attachment 1 – Proposal Cover Page.

ii. Proposal Content

Offerors shall submit a technical proposal, including the offeror's proposed Statement of Work (SOW), specifying the Undersea Technology Subject Area addressed; describing the technical approach, the technology innovation and technical risk areas. Offerors shall also provide a cost proposal which includes a breakdown of cost elements such as direct labor, overhead, G&A, Fee or Profit, and all other significant cost factors. The contractor shall base its pricing and period of performance upon the assumption that work would begin no sooner than 120 days after proposal submission.

The Government anticipates incorporating the proposed SOW, or a negotiated revision thereof, within the award instrument. The Government reserves the right to negotiate elements of the SOW. To this end, proposals must include a severable, self-standing SOW without any proprietary restrictions which can be attached to the contract.

In addition, the proposals shall include resumes of key personnel identifying relevant expertise and experience.

NOTE: Offerors are to annotate in any initial proposals submitted, or in any subsequent requests for a full proposal as appropriate, whether the Offeror intends to utilize the NavalX Tech Bridge resources (see attached Appendix 1). This annotation will be taken into careful consideration when evaluating the proposals submitted. The Government does not commit to sponsoring an Offeror interested in utilizing the NavalX Tech Bridge.

B. Peer or Scientific Review Process

Government Subject Matter Expert(s) (SME) will review the white papers or technical proposals. Cost proposals will be evaluated by Government business professionals. Proposals will be reviewed in accordance with the following criteria:

i. Technical:

a. Overall scientific and technical merits of the proposal.
b. Potential relevance and contributions to the identified undersea technology areas.

c. The offeror's capability and likehood of success as indicated by the qualifications, capability, and experience of key personnel identified in the proposal.
d. Requests to utilize the NavalX Tech Bridge.

ii. Cost:

Reasonableness and realism of the proposed costs and any fee. The Government will assess proposals for reasonableness in accordance with FAR 15.404-1(a)(1). The Government will conduct a cost realism analysis in accordance with FAR 15.404-1(d).

iii. Availability of Funds:

"Promising" ratings are subject to the availability of funds at the time of proposal received.

5. Administrative Requirements

5.1 To be eligible for award of a FAR Based contract and Other Transaction Agreements, offerors must first be registered in the System for Award Management (SAM) and meet the eligibility criteria of FAR Part 9. For more information and to register on-line, visit the SAM Web Site at https://www.sam.gov/portal/public/SAM/.

5.2 Organizational Conflict of Interest (OCI) Organizational conflicts of interest are covered under the FAR Subpart 9.5. It is the offeror's responsibility to identify and disclose conflicts of interest. The offers shall address any potential conflicts of interest in their proposals and include a plan to mitigate all conflicts of interest. The mitigation plan will not be part of the technical review. However, the Government may reject proposals containing any organizational conflicts of interest.

Attachment 1 (double click image to open)

PROPOSAL COVER PAGE

ORGANIZATION PROPOSAL #

NAME AND ADDRESS OF ORANIZATION TO WHICH AWARD SHOULD BE MADE: UNDERSEA

TECHNOLOGY AREA:

TITLE OF PROPOSED EFFORT:

ACKNOWLEDGEMENT OF BAA AMENDMENTS, if Any:

DATA UNIVERSAL NUMBERING SYSTEM (DUNS #):

COMMERCIAL AND GOVERNMENT ENTITY (CAGE) CODE:

TAXPAYER ID # (TINS):

BUSINESS SIZE/TYPE:

NON-PROFIT/PROFIT:

COST PROPOSAL VALID TO:

U.S. WHOLLY OWNED FIRM OR INSTITUTION: YES OR NO OFFEROR HAS SECRET CLEARANCE: YES

OR NO PROPOSED PERIOD OF PERFORMANCE:

TYPE OF AWARD PROPOSED AND AMOUNT REQUESTED:

COGNIZANT DCAA OFFICE, if known:

PAYMENT SCHEDULE (PROPOSAL PAGE#):

DATA RIGHTS: (PROPOSAL PAGE #)

GOVERNMENT FURNISHED PROPERTY, MATERIAL OR EQUIPMENT (PROPOSAL PAGE #, IF

APPLICABLE): TECHNICAL CONTACT (TITLE, NAME, ADDRESS, PHONE #, E-MAIL, FAX):

CONTRACT NEGOTIATIONS CONTACT (TITLE, NAME, ADDRESS, PHONE #, E-MAIL, FAX):

BYSUBMITTINGTHISPROPOSAL, THEOFFERORISPROVIDINGTHECERTIFICATIONS CONTAINED IN THIS BAA.

SIGNATURE_____DATE _____