ONR BAA Announcement # _11-007___

BROAD AGENCY ANNOUNCEMENT (BAA)

This publication constitutes a Broad Agency Announcement (BAA) as contemplated in Federal Acquisition Regulation (FAR) 6.102(d)(2), the Department of Defense Grants and Agreements regulations (DoDGARS) 22.315(a) and 35.061, and DoD's Other Transaction Guide for Prototypes Projects, USD(AT&L), OT Guide, Jan 2001. 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 select for award all some or none of the proposals in response to this announcement. The ONR reserves the right to fund all, some or none of the proposals received under this BAA. ONR provides no funding for direct reimbursement of proposal development costs. Technical and cost proposals (or any other material) submitted in response to this BAA will not be returned. It is the policy of ONR to treat all proposals as sensitive competitive information and to disclose their contents only for the purposes of evaluation.

I. GENERAL INFORMATION

1. Agency Name -

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

2. Research Opportunity Title –

Expeditionary Maneuver Warfare and Combating Terrorism Basic and Applied Research and Advanced Technology Development

3. Program Name -

Expeditionary Maneuver Warfare and Combating Terrorism Basic and Applied Research and Advanced Technology Development

4. Research Opportunity Number -

ONR BAA 11-007

5. Response Date -

White Papers: 01 February 2011

Full Proposals: 06 May 2011

6. Research Opportunity Description -

The Office of Naval Research (ONR) is interested in receiving white papers and proposals to foster new developments in Science and Technology (S&T) which may ultimately lead to future operational capabilities beyond those represented by current acquisition programs and requirements. As such, it is anticipated that successful proposals would ultimately contribute to the S&T underpinning from which future Naval Expeditionary Maneuver Warfare and Combating Terrorism warfighting requirements and capabilities may become possible.

Brief descriptions of ongoing efforts within the Naval Expeditionary Maneuver Warfare and Combating Terrorism S&T thrust areas are posted at:
http://www.onr.navy.mil/Home/Science-Technology/Departments/Code-30.aspx

By necessity, the Basic and Applied Research and Advanced Technology Development efforts are extremely technically diverse. As such, efforts are divided into major investment areas, each representing operational functions critical to Naval Expeditionary Warfare. Background information and specific areas of interest for new contracts or grants are described below for each investment area. Mention of specific systems or programs in the background sections of this BAA is solely for the purposes of informing potential offerors of existing or evolving state-of-the-art technology. Potential offerors, focusing on applied research and advanced technology proposals, should understand that ONR will give priority consideration to technology proposals that fully address the desired capability. Innovative approaches with promise of revolutionary capability that address a subset will be considered. Emphasis on capabilities means that offerors should:

- Propose development that will result in a warfighting capability that can be measured in quantitative terms and found to be “game changing.”
- Address the transformational capability being required by the Department of Defense, particularly the development of a Naval Expeditionary S&T enterprise.
- Leverage or complement other relevant developmental research areas.

- State clearly how the proposed technology development will meet warfighter needs.
- Be oriented toward rapid maturation, demonstration, and transition.

Naval Expeditionary Maneuver Warfare and Combating Terrorism S&T investment areas for which proposals are sought are as follows:

a. Sciences Addressing Asymmetric Explosive Threats (SAAET): SAAET is a ***basic research*** program producing knowledge and understanding to anticipate and affect insurgent networks, and that result in new capabilities to detect, defeat, and protect against asymmetric explosive threats. Four principal tenet areas to be addressed in this BAA are (1) Anticipate-Affect; (2) Detect; (3) Neutralize; and (4) Mitigate.

(1) Anticipate-Affect. In the face of overwhelming military and technological superiority, our adversaries have adopted asymmetric weapons and tactics in order to alter our nation's resolve and military strategy. One of these tactics in order to alter our nation's resolve and military strategy. One of these tactics, suicide or homicide bombings, has been effective in creating an environment of fear and instability within both occupied civilian populations and the U.S. military. Though not a new tactic, data indicate that there is an increased frequency and unpredictability with modern suicide bombing. Suicide attacks are not only deadly, the emotional impact of an attack is felt far beyond its physical location. Many of these attacks are directed against U.S. military personnel or American interests. Improving our ability to identify and prevent suicide bombing is critical to securing stability in regions of national interest.

The 2009 Marine Corps S&T Strategic Plan identified counter-bomber detection as a key science and technology objective (FP STO-5). The plan specifies the need to "Develop technologies that enable dismounted Marines at checkpoints and entry points to detect explosives at sufficient distance to enable effective response to the threat of a suicide bomber. Technologies must be capable of screening multiple individuals rapidly over a wide area and not limited to a single point or isolated individual. Assessment and warning must be near instantaneous." In order to prevent the homicide bomber from reaching his/her intended target, it is critical that we understand and can identify the characteristic behaviors (whether specific to a culture or religion or universal in nature) especially those that are distinguishable from normal behavior and pattern.

With these needs in mind, the Office of Naval Research (ONR) is interested in receiving proposal that may address the following questions and research areas:

- What are the characteristic behaviors of homicide bombers (suicide, vehicular, etc.) from a social science and psychological perspective? What are the characteristic behaviors of homicide bombers that are specific to a culture, religious affiliation, or region and those behaviors which are universal?

- What are the religious, political, economic, socio-cultural, and historical factors that influence, characterize, and enable human networks to carry out homicide bombings?
- What are anomalous behaviors given context and environment? Can we identify those behaviors which are distinguishable from normal behavior within a region and culture and can those behaviors be detected with high reliability?

U.S. forces and U.S. foreign policy have used economic measures and development funds for decades with the goal of improving stability. Economic conditions are also often used as an explanatory variable as a motivation for radicalization, instability, and insurgency. However, the empirical data is limited and contradictory. Thus, in addition to what is listed above, we are seeking proposals that examine both micro and macro effects of economic conditions (including gray and black markets, institutional corruption, etc.) and development aid in contributing to stability and insurgency. Priority will be given to empirical studies.

(2) Detect. The four objectives of the SAAET Detect tenet are to develop science, phenomena, and methods for standoff spectroscopic detection of trace explosive signatures (vapor and residues); establish fundamentals of sensing and identifying trace explosive signatures by multiple orthogonal parameters for standoff and remote methods, emphasizing sensitivity and selectivity; researching ways to overcome explosive low-vapor pressure, high electro-negativity, and high background clutter; and establishing means to optimize active interrogation and passive observational sensing to obtain high sensitivity and selectivity trace explosive detection and identification.

With these needs in mind, ONR is interested in receiving proposals that may address the following questions and research areas:

- Scientific basic research, innovation, analysis and understanding of novel approaches/concepts leading to high sensitivity and high selectivity micro-miniature chemical sensors (insect-like) capable of close-in detection and identification of trace explosive residues and vapors, and distinguishing these traces amidst a saturated background. Trace levels of residues are nanograms/cm^2 and trace levels of vapors would be concentrations of 10^{-10} torr in ambient atmosphere. Saturated background implies even higher levels of explosive debris and by-products that have been exposed to environmental-aging of chemical/physical properties. Proposed basic research should include scientific feasibility assessment, theory and computational modeling, and where applicable proof-of-concept/principles experimentation.
- Scientific basic research, innovation, analysis and understanding of novel approaches/concepts leading to stand-off (10 – 100 meter distances) wide area illumination mechanisms that enable detection of trace levels of explosive chemical residues and vapors. Desired footprint of the

illuminator is 1-to-10 meters^2, and the illuminator function is to induce observable signals from trace levels of explosive residues and vapors so that higher fidelity point sensors can further diagnose suspected regions for presence of explosives. Trace levels of residues are nanograms/cm^2 and trace levels of vapors would be concentrations of 10^{-10} torr in ambient atmosphere. Proposed basic research should include scientific feasibility assessment, theory and computational modeling, and where applicable proof-of-concept/principles experimentation.

- Scientific basic research, innovation, analysis and understanding on novel approaches/concepts leading to ability to detect trace levels of explosive residues immersed in water mediums. Water mediums include water and sea water itself, as well as water-saturated zones such as mud flats and tidal areas. Proposed basic research should include scientific feasibility assessment, theory and computational modeling, and where applicable proof-of-concept/principles experimentation.

(3) Neutralize. The two objectives of the SAAET Neutralize tenet area are, first, to develop a robust understanding of fundamental principles and characteristics of explosives, explosive devices, and the surrounding environment that could be exploited by potential neutralization methodologies, including improved understanding of initiation, and of energy coupling mechanisms; and, second, to pursue an increased understanding of technologies to enable standoff neutralization, including more powerful and efficient sources and enabling technologies, as well as increased understanding and increased capability to couple radiation near and below the Earth's surface.

With these needs in mind, the ONR is interested in receiving proposals that may address the following questions and research areas:

- Scientific basic research, innovation, analysis and understanding of novel approaches/technologies leading to fundamental improvements in the radio frequency isolation at the antenna between collocated simultaneous transmit and receive antennas, potentially supporting future counter radio controlled improvised explosive device electronic warfare (CREW) devices operating in the same vicinity as traditional communication devices. Isolation potentially includes spatial, spectral, temporal, material, active cancellation, and directional approaches. Desired level of isolation is>>40dB isolation over transmit and receive over several octaves of frequency and low insertion losses and ripple.
- Scientific basic research, innovation, analysis and understanding of novel approaches, technologies or materials leading to fundamental improvements in improving rapid threat detection and response over extremely wide radio frequency bandwidths to potentially supporting future counter radio controlled improvised explosive device electronic warfare (CREW). This includes receivers with very large instantaneous bandwidth and multiple signal and frequency transmission simultaneously while capable of hundreds of watts of output.

(4) Mitigate. The objectives of the SAAET Mitigate tenet area are to advance scientific understanding to allow for the mitigation of the effects of explosive threats through enhanced protection of infrastructure, vehicles, vessels, and personnel. This could include designer high-performance multi-function materials fabricated at the nano- and meso-scales, to achieve bulk material properties needed for mitigation applications at reduced weight; and, increased rarefaction and/or deflection of shock fronts away from targeted vehicle or structure.

With these needs in mind, the Office of Naval Research (ONR) is interested in receiving proposals that may address the following questions and research areas:

- Scientific basic research, innovation, analysis and understanding of novel approaches, technologies or materials leading to fundamental improvements focused on the reduction of the energy output from a detonating device, or impeding the propagation of the blast wave from stand-off distances.
- Scientific basic research, innovation, analysis and understanding of novel approaches for armor materials that provide increased protection for personnel and vehicles with reduced weight. Particular interest is in nano-materials and research efforts towards achieving macro-level materials (i.e., threads and yarns or films) while maintaining robust material properties of the nano-scale product.

b. Human Social Cultural Behavioral (HSCB) Sciences. Recent advances in neuroscience and behavioral sciences methods and discoveries have provided new insights into how individuals learn both skills and information. The majority of this work has looked at the learning of specific tasks and/or knowledge in a laboratory setting or classroom learning. Findings from this work have suggested processes for the development of mental models to assist individuals in understanding the complexities of the world. These models, once formed, allow individuals to discard data points, or new events, which contradict these mental models. This is an adaptive process that prevents individuals from being overwhelmed with the contractions or anomalies in their everyday environment.

With expanding globalization, these processes that discard data that seem to be outliers may be maladaptive in cross-cultural situations. An individual's ability to recognize contradictions and anomalies in new environments is advantageous in a number of contexts – international business, law, travel, humanitarian assistance/disaster relief, and government and non-government personnel working in conflict and post-conflict environments. Anecdotal evidence suggests that some individuals are "better" at adapting to new situations: detecting subtle cultural and social differences, altering their behavior to fit new norms, and updating their mental models. Additionally, the brain, in particular the frontal lobe (an area implicated as critical for the formation and refining of mental models) is still developing into an individual's third decade of life. Understanding the impact of stress, experience and

environment on this development may contribute to an understanding of social-cultural adaptability and general cognitive adaptability.

With these needs in mind, ONR is interested in receiving proposals that may address the following questions and research areas:

- What are the basic mechanisms that underlie cognitive and behavioral adaptability in the social and cultural domain?
- How are cognitive models of cultural and social norms formed, stored and refined? What are the brain mechanisms that underlie these processes?
- Does culture or language of origin influence the flexibility of thought in integrating new socio-cultural information?
- Is there a critical period for development of socio-cultural mental models? What makes individuals, at both behavioral and neural levels, more adaptable?
- How does stress, as indicated by subjective and neuroendocrine markers, impact cultural learning and adaptability?
- What is the impact of a still developing brain?

This research will examine the relationship between social and cultural experiences and the underlying neural processes. In order to decipher the neural mechanisms, behaviors, and cognitive processes that underlie social and cultural adaptability, individual differences in social and cultural adaptability and, perhaps, the ability to train adaptability, a multidisciplinary approach must be applied. Expertise from, but not limited to, across the fields of neuroscience, behavioral endocrinology, behavioral psychology, cognition, cultural anthropology, social psychology, linguistics, organizational psychology, intercultural communication, sociology statistics, geography, and political science should be brought to bear on this topic.

c. Human Performance Training and Education (HPT&E). HPT&E seeks to enable Expeditionary Warfighters who are physically, mentally, emotionally, and cognitively ready to deploy anywhere in the world on short notice, to serve within their team or take on leadership roles as needed, and to complete their mission efficiently and effectively under any extremes of conditions. The S&T investment in HPT&E is intended to enhance the future capabilities of Expeditionary Warfighters by developing training and education technologies and methodologies; individual and team status monitoring technologies; nutritional solutions; and psychological and behavioral skill sets that close human performance gaps. The current focus is on S&T to prepare Expeditionary Warfighters for distributed/asymmetric warfare – from individual through the Company levels.

HPT&E supports live, virtual, and mixed modes of training and operations in a variety of Expeditionary Warfare disciplines. Technologies that support simulations for training, live exercises, ranges, or mixed environments (simulations, semi-autonomous forces, unmanned systems, + live) are of interest. Additional areas of interest include, but are not limited to:

- Critical decision making – training and decision support
- Behavior analysis of individual and team performance
- Performance sensing and sense-making
- Task analysis, knowledge extraction, and training effectiveness evaluation
- Modeling and evaluating team interactions
- Physical training and injury reduction
- Performance at altitude, resilience to cold
- Monitoring and mitigating sleep deprivation
- Identifying and validating stress coping skills and training

Specific areas of interest for this BAA are:

1. Small-unit leaders are increasingly challenged to make tactical decisions that have strategic repercussions. Often these decisions must be made quickly, with limited information resources including subtle cues collected from the local environment. Live and virtual simulated environments are increasingly being employed during training to provide scenarios where such "intuitive" decision making can be developed and refined. However, validation of these environments and scenarios is, by and large, limited to subjective reviews by a few warfighter subject matter experts, who may or may not be fully aware of the cues they rely on in the real-world to be successful in their decision making. To enhance the quality of this training, a reliable process for identifying valid, detectable environmental cues used in the real world, and ensuring that they are accurately and effectively represented in both live and virtual simulated training scenarios is needed. This process should also lead to the development of methods to measure and provide feedback on the detection and use of valid environmental cues in the decision making process. The process of knowledge extraction should itself be systematized, validated, and to the extent possible, automated so that it can function within existing "lessons learned" data collection systems utilized by the Services. Evaluation of existing and developing live and virtual simulated training environments to ensure that they accurately and effectively present appropriate cues will also be part of this work. Lastly, there is a requirement to identify the traits and skills/abilities of highly effective ground combatant small-unit leaders during all phases of the deployment cycle, in order to build more effective selection and training strategies for emerging leaders.

2. All warfighting tasks are conducted within the context of team activities. Some tasks can be effectively trained at the individual level (marksmanship, for example), but others can only be addressed at the team level (such as coordination of Squad movement or effective communication between the Company Command and its Platoon leaders). Current team training relies extensively on human observers to identify errors or deviations from desired practices and to provide feedback. However, these observers may not be positioned to catch and correct many errors. Additionally, in larger exercises they may be focused on one level of team interaction (such as Company-level

operations) and may therefore miss opportunities to provide useful feedback to smaller teams (e.g., platoons and squads). Of particular importance, human observers must rely largely on personal experience when assessing team performance because the barriers to small group effectiveness have yet to be formally identified and understood within the asymmetric warfare and Distributed Operations domains. Actionable models of effective team interactions that account for multiple echelons of team interactions (individual, fire-team, and squad level interactions at a minimum) and that provide a foundation for collective team performance assessment and feedback are needed. Both the models and derived assessment and feedback methods must be validated through training effectiveness evaluations.

3. Injuries incurred during deployments can cause major disruptions and put mission success at risk. Injuries due to heavy load and lack of balanced, functionally appropriate muscular development are potentially avoidable and may be reduced through well designed physical assessment and conditioning regimes, and through nutritional/supplementation strategies. Effective adaptation to the heat, cold, and altitude environments of deployment are also necessary for successful operational performance. Identification and development of strategies to enhance the adaptive process are desired for this reason.

   Strategies to optimize human physical performance and prevention of injury through mission specific conditioning regimes are needed. Efforts to develop these regimes should also identify, validate, and provide guidance that prevents physical and physiological deterioration in austere settings, and work to enhance physical performance, through nutritional, supplemental, and practical conditioning strategies. Efforts should help define what "optimal physical readiness" means in terms of physical conditioning and capabilities.

   Critical areas of interest include:

   - Identification and validation of physical training approaches that are tailored to mission types, anthropometric differences, specific/targeted injury reduction.
   - Development and validation of indicators of resilience/susceptibility to cold/altitude, as well as bioassays to identify indicators of individual differences in hardiness toward cold and altitude, and multiple environmental stressors in combination.
   - Observational training studies of physiology in the field and environmental effects.
   - Identification of safe supplemental and nutritional strategies that support injury reduction (muscular injury/soreness) and improve physical conditioning (strength, speed, agility, cardiovascular, and endurance performance) both prior to and during deployment (i.e., while under individual and combined stressors of thermal load, physical load, and altitude exposure).

- Determination of the current state of injuries in theater, the effect of individual protective equipment on low back pain and other areas, and a determination of injury causes, the most common injuries, and their effect on return-to-duty.
- Determination of the nutritional status of incoming recruits, and how diet affects performance through training and afterwards.
- Determination of whether nutritional/supplemental strategies that enhance pre-deployment physical conditioning and deployment sustainability would benefit from tailoring to different genotypes and/or phenotypes.

4. Chronic sleep debt is a common challenge deployed warfighters face. Monitoring technologies and methods for tracking sleep debt unobtrusively exist, but need to be tailored for the austere, extreme environmental and work conditions of the Expeditionary Warfighter. Wearable sleep/activity monitors need to be light weight, rugged, able to store, analyze, and provide actionable data to individuals. Data also needs to be stored on board and uploaded to a central, local, very light weight processor on demand for more elaborate processing and presentation of actionable data for small unit leaders, and to examine the influence of fatigue on injury during extended training. All systems must have very low power requirements. Different system types should be considered: systems that exist only in more rearward locations and presumably offer greater sensor fidelity, and lighter, non-obtrusive systems that can be worn for numerous days. Output of these systems should relate to state-of-the-art models of cognitive and physical deficits that are likely under sleep deprived conditions.

5. Intense acute and chronic stressors are persistent threats for the Expeditionary Warfighter. To achieve success in the extreme, austere, volatile, uncertain, complex and ambiguous environment of distributed/asymmetric operations, Expeditionary Warfighters must develop effective stress coping skills. Several promising behavioral methodologies for enhancing stress coping capabilities exist and are being implemented with Warfighters. However, critical S&T questions remain and need to be addressed:

    - What is the minimum effective training time before training effect levels out?
    - What is the timeline to loss of training effect? What is the optimum re-training interval to maintain training effect?
    - What are the individual differences that make up resilient individuals? Can we develop a model for future training? Are there indicators (psychological, biological, neurophysiological, etc.) that can be detected and that identify sub-populations who would benefit more from training in one form of stress coping skill set over another?

- What are the metrics for effective stress coping/resilience, and how does each individual metric relate to stress resilience as an integrated concept?
- What effect does diet and other nutritional factors have on resilience?

d. Command, Control, Computers, and Communications (C4). ONR seeks to improve C4 capabilities for naval warfighters with an emphasis on small units, asymmetric and irregular warfare, information analysis and communication, and distributed operations. Its technology investment areas include network-centric warfare and interoperability, over-the-horizon communication gateways, and small-unit technologies. Research areas of interest are:

1. Applied research.

A. High Performance Tunable Filter Technology. Mobile and lower-echelon command posts are employing large numbers of tactical radios in limited volumes with limited area for antennas. To partially address these issues, separately funded work is developing broadband low-profile antennas to reduce the number and visual profile of antennas. However, compact, dynamic, high power handling, RF components are needed at VHF and UHF frequencies to provide the desired operational capabilities. Passive tunable filters are limited by the gain-bandwidth product, selectivity, tuning range, etc. Active tunable filters overcome the gain-bandwith product but introduce problems in stability, noise, inter-modulation distortion, and power handling. This topic seeks innovative ideas, approaches, techniques, and technologies to improve tunable filter performance. Proposed solutions should consider wideband tuning range, UHF and VHF frequency ranges, high selectivity, high power handling, low insertion loss, small footprint, low DC power consumption, and high linearity.

B. Decision Aid Service for Tactical Warfighter (DASTW) Learning Algorithm. Warfighters are being asked to support more and more efforts while at the tactical level the level of automation to support them hasn't increased. The warfighter is gathering information and is being asked to conduct various missions while the amount of data generated by various sensors and other battlefield systems is increasing. The tactical level is a harsh environment to deal with small network throughput, outages, and high packet loss. The desire is to increase decision efficiency of small unit leaders while minimizing the user workload and hardware footprint through automation of relevant information collection and processing. Proposed solutions should aim to increase efficiency by presenting only information relevant to the location and mission and be able to learn from previous tasks. The interest is to operate this capability on a small device such as an iPhone, Android or emerging hardware and operating system in a small unit combat environment where the operator can gain useful information while under stress with minimal system interaction. It is

desirable that proposed solutions advance beyond simple content filtering and publish and subscribe architectures, develop methods such as tactical decision making logic flows, and adapt to tactical network performance variability.

C. Secure Personal Area Network. Warfighters carry an increasing number of communication and sensing devices for both personal situation awareness and for communicating with peers and higher echelons. Integrating these devices and managing their effects on the wearing and carrying of these devices and managing their effects on the wearing and carrying of these devices is also an increasing challenge. A personal area network (PAN) that can integrate multiple devices would help manage the connection problem between multiple devices, eliminating wires that can often snag or otherwise limit movement. In addition to managing the information flow for multiple types of devices, this network would also need to be secure. Principal concerns for security are the confidentiality of the information content, the availability of the network, eavesdropping by friendly and adversarial personnel, and the integrity of the system. Configuration of the network with the peripheral devices should be a one-time event and user required interaction minimal after that process is complete. The system design should encompass low size, weight and power (SWAP) characteristics and not be subject to interference from other warfighters with the same systems in close proximity. Anticipated peripheral devices include imaging devices, sensors, computers, radios, and navigation systems.

D. Server-less Information Services. Distributed warfighters require ever-increasing levels of information services while operating on limited capacity networks, often with no consistent connection to infrastructure networks for maintaining common picture, chat, e-mail and other critical services with a minimum of human intervention. Additionally, existing information services often follow a client-server model with clients configured for communication with a priori server details in order to function. The dynamics of tactical operations make it difficult to guarantee that clients will necessarily be able to connect to specific servers during operations whether the servers reside on infrastructure (i.e., reachback) networks or within the local tactical edge network domain. It is expected that more distributed information services can be realized with these tactical networks that are more robust and effective in mobile, tactical network environments than the centralized client-server model.

With the development of disruption tolerant networking and its distributed "store and forward" methodology, both a gap and an opportunity now exist for server-less capabilities that can deliver services while disconnected from centralized servers. Potential solutions should be based on open standards and have growth potential for future insertion into the Marine Corps' Marine Air Ground Task Force Command and Control

Systems Applications (MAGTF C2 SA) service-oriented architecture-like framework for provision of future tactical wireless services. Proposed solutions should also operate with low additional overhead but still maintain the best possible services given the constraints of local, stale and limited information resources. At a minimum, proposed solutions will need to manage frequent, limited-time reconnection to centralized services and interface with TCP/IP gateway nodes. In many cases the producers and consumers of information services in a tactical edge environment may be among a group of participants (e.g., shared situational awareness, collaborative mission planning and execution, force order distribution, etc.) and techniques that efficiently support group communication should be leveraged where possible. Please assume that computational and storage capabilities equivalent to today's smart phones will be available, but that communications links may be limited to throughput of 20 kb/s. However, higher data rate connectivity may also be available on an opportunistic basis, and new service mechanisms should be able to adapt to take advantage of high quality connectivity (including reachback to infrastructure) while also continuing to operate as effectively as possible when network communications capacity is small and/or reachback to infrastructure networks is unavailable.

2. Advanced Technology Development.

A. High-Capacity Networking Waveform for Software Reprogrammable Payload. The software programmable payload (SRP) is a government-developed on-the-fly reprogrammable communications, RF-sensing and electronic attack payload developed in various versions for airborne, ground and surface platforms, and individuals. SRP, which is software communications architecture compliant, has available a waveform development which must be used by prospective developers. Desired SRP-supportable waveform characteristics include: note-to-node data rate adjustable between 100 kb/s and 2Mb/s (minimum/maximum); minimum media sharing data rate of 50 kb/s node-to-node in a minimum five-hop network of 100 users; open-space link range minimum of 10 miles; ability to maintain performance when being used in an airborne relay; and ability to autonomously form and maintain a network (layer 2 is acceptable) of at least 100 users. The desire is to use current military frequency bands, and TCP/IP is necessary only at gateway nodes. It is also desirable that the networked waveform is suitable for urban, forested, and open terrain and that the waveform is robust against intentional and unintentional interference and is preferably Type 1 secure, thought Type 2 secure solutions will be considered.

e. Fires. ONR seeks to enable warfighters employed in small, distributed units with tools to locate and decisively destroy larger enemy forces by applying timely, reliable, precise, and accurate fires from a myriad of platforms. Products will equip warfighters with integrated, lightweight optics and sensors to see through all

battlefield conditions (day, night, low light, obscuration) and lightweight, organic, advanced weapons for the rapid, accurate, effective application of firepower. Productions would also equip tactical units frequently operating well beyond conventional parameters of direct fire mutual support. The increased intelligence capabilities delivered by company intelligence cells will generate more potential targets in the future. Research areas of interest are:

1. Targeting and Engagement Technology. Advanced targeting and engagement systems will empower warfighters of the future to acquire and apply precision fires against unconventional and hybrid targets, across the full range of military operations and environments. Effective fires will be a commodity. Lightweight, all weather, precision targeting technologies are desired. These include automated fire control systems, for mounted and dismounted infantry to locate, discriminate, and acquire targets, and transmit the information necessary for immediate engagement by direct or indirect fires, at extended ranges, in all weather. Examples may include 360 degree, long range, all weather target acquisition systems; target location, ranging, ballistic compensation, and target data handoff systems for infantry weapons; and hand-held target location systems providing target location error (TLE) of 10 meters at 10 kilometers renage, with night and adverse weather operating capabilities. Technologies are sought for lightweight, durable, low power consumption, continuous day-through-night, easy to use optics for target detection and discrimination or designation, for individual and crew served infantry weapons and for watercraft weapons at their maximum effective ranges. Examples may include carbon nanotubes (metallic or semi-conducting single wall carbon nanotubes with or without chromophores, or multi-walled carbon nanotubes); optical or infrared (IR) frequency black silicon focal plane arrays (FPA); and conformal optoelectronic systems using stretchable silicon or other polymers over curved FPAs for lightweight, wide field of view sights. Technologies that enable automatic target detection, recognition, identification, tracking, and hand-off in dismounted targeting systems are also desired. These may include real-time, sensor data fusion, and automatic target recognition (ATR) technologies. Specific examples may be pattern recognition algorithms using IR, short wave infrared (SWIR), or other sensor arrays with classification libraries of target types.

2. Advanced Ammunition Technology. Future ammunition will provide improved lethality and dominance for the individual warfighter within his area of influence through advanced warhead, propulsion, and ammunition technologies, enabling engagement of the enemy from greater distances and with tailorable effects. Technologies for low cost, modular, scalable effects munitions are desired, for personnel, vehicles, light armor, or watercraft targets; and may include means for decreasing Circular Error Probable (CEP) and tailoring Effective Casualty Radius (ECR), to minimize collateral damage. Technologies for low cost guided flight control for light, medium, and heavy mortar munitions (60mm, 81 mm, and 120 mm) are sought, to provide flight trajectory shaping and precision fires. Examples may include novel seekers, control systems, and means of projectile maneuver to increase first round Probability of Kill (Pk). Technologies to correct

the course of small caliber rounds, including sniper ammunition, are desired. Examples may include laser target detection and bullet guidance; use of Micro-electromechanical Systems (MEMS) or nanotechnology applications for miniature stabilization, guidance, and control; and LIDAR-visible nanoscale coatings on bullet tail and sides for small course corrections. Technologies to attack disparate target types including a variety of watercraft, to create personnel entry points in double reinforced concrete structures and triple brick walls, or to defeat targets behind walls are sought. Examples may include enhanced high energy combinations and hypergolic mixtures for lethal effect on fast moving watercraft, enhanced high energy warhead designs for hardened targets, advanced penetrating warheads combining multiple effects, and dispersed explosive powders or nanoscale powders. Technologies to defeat advanced armor systems for all classes of ground vehicles, future advanced protection materials, and future body armor systems are sought. Technologies are desired for ammunition to deliver less than lethal effects on personnel, vehicles, and watercraft, suitable for warning or suppression fires from crew served weapons, with effective ranges beyond 150 meters. Examples may include .50 caliber, 7.62mm, or other ammunition compatible with service weapons to enable rapid escalation of force from warning, to non-lethal, to lethal effects. Insensitive primary explosives and fuses for advanced warheads are also desired. These may include high output explosives with low sensitivity to shock, impact, storage environments, and hot chambering conditions. Specific examples may include porous chromium oxide matrices that control the ignition and detonation of high output explosives with advanced nano-circuits for reduced sensitivity.

3. Advanced Weapons Technology. Future weapons will be lightweight and affordable, enabling engagement of diverse and hybrid threats from ground and naval platforms, with the ability to escalate from non-lethal to lethal force, over the full spectrum of military operations. Advanced weapons technologies are sought for increased range, improved precision, increased responsiveness, improved user ergonomics, and scalability of lethality for direct and indirect fire weapons, small arms through major caliber, to decrease weights, costs, and logistics burdens, with improved weapons systems or components service life, and improved operating, transportation, and storage safety characteristics. Examples may include combustion light gas guns and lightweight components such as gun barrels. Technologies are desired for lightweight stand-off weapons systems for use by expeditionary watercraft in direct or indirect fire support roles, against inbound small, fast watercraft used as suicide or autonomous bombers (the "go-fast" threat), able to defeat multiple craft engaged in swarm tactics, and against moving ground vehicles near the shoreline. Examples may include multi-role precision guided munitions and man-portable missile systems suitable for maritime and littoral environments, and may include lethal, less-than lethal, or variable lethality systems to disable or halt watercraft. Technologies are desired for low cost, lightweight, stabilized mounts for families of weapons systems for watercraft, suitable for harsh maritime operating environments. Technologies that will enable precision engagement and escalation of force from unmanned ground, air, and surface platforms are also desired. These may include wireless lethal

effectors for safe and legally permissible employment from unmanned platforms, null latency targeting and C2 technologies, and autonomous on-board target recognition algorithms.

f. Intelligence, Surveillance, and Reconnaissance (ISR). The opportunity presented by this BAA is to perform research that enables improvement to expeditionary ISR capabilities, especially when facing an asymmetric threat. The following are critical shortcomings in tactical expeditionary ISR:

- Agent source characterization
- Wide area hyperspectral imaging
- Efficient on-board and ground processing and storage of data from wide-area sensors
- Entity disambiguation
- Audio exploitation
- Ultra low power, long life, smart ISR sensors

Proposals addressing the following specific research and technology investment areas are desired:

(1) Spiral Development. The ISR program conducts yearly integrated capability demonstrations with acquisition programs in order to validate the relevance of S&T projects as well as mature transition paths. To support this, a spiral development of capability is encouraged. Spiral development employs rapid injection of technology as well as tactics, techniques, and procedures through evolutionary modular insertion techniques to ensure systems remain effective in the face of emerging threats. Spiral development controls costs while decreasing cycle times for technology insertion by using features such as open architecture, module interface standards, and commercial processors in conjunction with strict configuration control. Technologies of greatest interest to the Office of Naval Research for this BAA fall into two categories in regard to spiral development: a) technologies that can be directly inserted into Naval acquisition programs due to technology maturity, enabled by open-system architecture, and b) technologies that can mature through follow-on investment until they can be inserted into programs of record.

(2) Expeditionary ISR Product Areas. The objectives of the ISR product areas are:

A) Source Characterization. One of the consequences of irregular warfare has been an increased reliance on human collected and open source data. Establishing the reliability of data from these sources remains a challenge for higher level inferencing applications. The objective of this research area is to develop application services that can continuously track the reliability of a source, a challenging task given:

- Uncertainty about the causal relationships between a specific low level report and a specific observed event.
- Observation errors associated with the measurement of events, given that some events may be unobservable or others may be incorrectly reported as having occurred.
- Challenges associated with vocabulary differences between human and open source data and event reporting.

Technical approaches that can lead to a testable prototype system capable of tracking the reliability of a data source are of interest.

B) Wide Area Hyperspectral Imaging. The goal of persistent surveillance for the DoD is to provide continuous information about an area of interest to a warfighter. Recently, great strides have been made towards the development of day and night tactical wide area airborne payloads for tactical UAVs. Hyperspectral imaging, if enabled over a wide area, would provide the warfighter valuable information about disturbed areas and hidden objects. The objective of this research area is to retire risk related to development of a wide area (circle with a diameter of several kilometers) hyperspectral imager. Proposals offering a fully developed sensor are not expected.

C) Efficient On-Board and Ground Processing and Storage of Data from Wide Area Sensors. A goal of tactical EO-IR wide area airborne sensor (WAAS) development programs is to be able to produce and distribute actionable intelligence in real time to warfighters and analysts. The first tactical EO WAAS payload is expected to be fielded for the purpose of an operational evaluation in the near future. The objective of this research project is to develop enhancements to what is currently possible in the areas of on-board and ground station processing and information distribution. Specifically, proposals are of interest that:

- Develop trackers and video condition of interest detection algorithms that can run on tactical UAS on-board power efficient processors.
- Develop situational awareness notification services that can run on tactical UAS on-board processors and deliver information cubes to tactical warfighters based on data sent to the payload from the ground, WAAS imagery and warfighter position updates.
- Mature ground station meta tagging of WAAS video clips in order to allow stored video data to be found from anywhere in an ISR enterprise.
- Mature ground station storage and retrieval systems needed for several months of disconnected tactical WAAS ground station operation.

D) Entity Disambiguation. The mission of tactical ISR now includes the task of tracking the location and behavior of low level entities including people of interest. In data sets, an entity can be represented in many ways such as an

address, a vehicle description, a name, biometric description, avatars, email addresses and on-line nicknames. Information about the presence, location and behavior of an entity can be found in many diverse data sets, including:

- Tracks
- RF derived geolocations
- Biometrics
- Be on the lookout for vehicle sightings
- HUMINT reports

E) Open Source Data. The objective of this research area is to mature a capability to cluster entity identifiers that have metadata in order to more effectively bin data to a unique set of entities.

F) Low Signal to Noise Audio Exploitation. Advances in the development of small form factor dense audio arrays have enabled audio collection at long distances. Low signal to noise audio data can contain valued actionable intelligence, but its low signal to noise character make it difficult to effectively use automated processing tools such as speaker identification and transcription. The objective of this research area is to mature technologies that can be used to either improve the signal or the ability of automated tools to work against low signal to noise streams.

G) Ultra-Low Power, Long Life, Smart ISR Sensors. Long term battlefield threat identification and intrusion warning remains a valued capability. Though the application can vary from securing high valued assets to securing an area of interest, the life expectancy of the energy source and sensor processing power requirements remain the limiting factors in determining how long a sensor can remain operative while unattended. The goal of this research area is to develop low cost, low power architectures as well as the enabling power efficient processing and fusion algorithms required to field an unattended smart sensor field for periods of up to ten years. The sensor field should be able to support sensors of the same as well as varying modalities to provide user customized security based on user defined alerts. Sensors should be able to monitor motion, sound, temperature, light and scene changes using highly efficient energy states and awaken upon triggering of user defined criteria to collect and fuse additional sensor data to assess a situation. If an alert is triggered, sensors should be able to publish alerts in real time using low power transmission modes to identify intrusion, tampering, removal, etc., to enable real time user response. A user interface that uses common office tools is the preferred means of enabling the user to set sensor alert causing criteria. This topic is not seeking development of energy sources.

(3) Technology Transition. ONR desires that capabilities funded as a result of this BAA be capable of, and ready for, integration into yearly integrated demonstrations and current or planned Marine Corps systems, using current or

planned open standards and information architectures. Innovative technology proposals that ONR considers transitionable will be seriously considered and if selected, ONR will provide assistance in shaping the technology transition.

g. Naval Expeditionary Dog Program (NEDP). In response to the threat of IEDs, the Marine Corps has investigated new methods of selecting, conditioning, training, and integrating off-leash explosive detector dogs to support dismounted infantry patrols. The experiment, titled IED Detector Dog (IDD), demonstrated success in preparing the dog to be a low-cost, high-benefit capability widely accepted by the Warfighter. ONR seeks to build on this experience to further develop and expand the IDD concept and to optimize the general use of dogs in support of the warfighter. Initially ONR will incorporate current lessons-learned to increase IDD effectiveness as a counter-IED solution for the current mission, threat and environment. Ultimately, the IDD concept will evolve into an integrated system of dogs, humans, and sensor subsystems designed to detect a wider range of threats and to work in future environments. As such, ONR seeks novel approaches to:

- Conducting research to better understand and facilitate the mental and physical preparedness of dogs.
- Developing advances in technology and procedures to optimize dog and human training.
- Developing technology advances in the human- canine interface and canine capability enhancements.

The Office of Naval Research (ONR) is interested in receiving proposals for work in one or more of the following areas:

(1) Canine Sciences. ONR is seeking proposals to investigate the canine olfaction-cognition link and novel applications of operant conditioning to advance the science of using dogs for detection. The body of knowledge created concerning the use of dogs for detection of military munitions and explosives is fairly robust – no similar body of knowledge exists for the detection of home-made explosives (HME). An immediate critical need concerns understanding the scent picture and cognition process associated with multiple component odors and compounds/mixtures that have a high level of variation such as is encountered in the detection of HME. The effects of environmental context, variation in types and amount of target odor, and odor discrimination training procedures on subsequent detection performance in operational scenarios should be investigated. Tasks in the canine sciences area are likely to include:

- Identifying the most effective imprinting and training methods for canine detection of HME.
- Measuring and mitigating the impact of environmental context on detection task performance.
- Investigating cognitive demand variance between response selection and response inhibition and developing methods to enhance priority of response selection even in high stimulus environments.

- Investigating and mitigating the effect of human variance in deliberate practices on canine performance.
- Developing reliable methods to identify untrained physical indicators of canines' response to novel or trained odors and to reliably discriminate between the two responses.

Some basic research questions to be investigated include:

- Can rats, and thus canines, be trained to detect chemical and biological agents using precursors and degenerates as training aids?
- Do dogs use vapor emanating from the source, ground-based particulate matter or a combination of the two to track back to the source of an odor?
- Is the maximum amount of source quantity used for training final response related to the ability to detect greater amounts of the same substance?
- What is the effect of substrate variance (substrate type, depth, time) on detection performance?

(2) Elevated stress levels caused by environmental factors can be counterproductive to canine performance and challenge our ability to provide the best quality of life for these valuable living assets. ONR is seeking proposals to explore methods to measure, predict, and mitigate stress in canines in deploy environments. Understanding the factors that influence dogs' susceptibility to stress-induced health and performance effects and the causes and course of progression (and/or regression) of such effects will allow for preventative and restorative procedures to be developed. Efforts can include literature reviews and novel applications of research from zoos, humane societies, and laboratory animal welfare associations. Areas of interest include screening methods for emotional resilience, environmental conditioning, habituation, and field-expedient stress reducing activities. Tasks are likely to include:

- Determining efficient methods on non-invasively monitoring canine stress levels in operational environments.
- Developing techniques to predict resilience to stress through genetics, behavioral traits or screening methods.
- Investigating best practices to build stress resilience.
- Investigating field-expedient stress mitigation methods including socializations, foraging and environmental modification.

(3) ONR is seeking proposals to improve the physical conditioning and sustainment of canines in extreme battlefield environments. Physical and nutritional conditioning (including hydration) of working dogs for mission- and theater-specific working conditions, such as high heat, high altitude, and long working duty cycles, will be addressed. Military working dogs deployed to theater must be able to move efficiently over various terrains and obstacles; operate in various climates; have good posture, balance, stability, agility, coordination, speed, power, flexibility, and superior muscular and cardiovascular endurance; and not become fatigued or injured. A fatigued working dog is more likely to become

injured or ineffective. Maximizing performance attributes and assuring optimal performance can be achieved via conditioning (i.e., just as all human athletes and soldiers are conditioned), which, over time, strengthens the physical, psychological, and physiological systems. Research in this area shall be aimed at investigating the effects of conditioning and nutrition on the physical, physiological, and detection performance of working dogs, which shall lead to recommended processes and procedures for optimizing the performance of those dogs. Tasks are likely to include:

- Determining methods to tailor physical conditioning to operating use, be it heat stress environments, at high altitudes, and/or on specific substrates.
- Developing innovative nutrition delivery methods to ensure operational performance is maintained or enhanced.
- Developing innovative methods to ensure canine hydration requirements are mte while minimizing any additional weight carried by the handler.

(4) Customized Training. ONR is seeking proposals to develop customized training routines to increase canine training effectiveness by increasing consistency of learning, reducing training time, increasing duration of training retention or variations of those goals. The agency is also seeking proposals to develop customized training in a range of modalities to effectively train and maintain handlers' skills and reduce the adverse effects of handler performance on canine learning. Potential tasks may include:

- Developing virtual reality training for handlers that trains and validates understanding of dog cognitive and olfactory processes, increases realistic training in an environment where users can learn without adversely affecting dog performance and increases understanding of potential techniques/tactics/practices for individual and squad level use of detector dogs.
- Developing online selection methods to identify handlers most likely to be successful based on defined knowledge, skill, and ability traits.

(5) Technology Enhancements. ONR is seeking proposals to research and develop technology enhancements to improve the human-canine interface and to support the use of dogs for detection beyond line of sight. Additionally, the traditional use of auditory and visual cues for directional control commands increase user risk so alternate methods of communication, including technology-assisted directional control and autonomous navigation/guidance systems, will be addressed. All technology development must consider the constraints of operational canine/user form factor requirements, bandwidth limitations, and energy limitations inherent to the battlespace. Tasks are likely to include:

- Developing technical solutions for fully autonomous canine searches.
- Developing technical solutions for semi-autonomous canine searches, including means for technology-assisted feedback.

- Developing methods to acquire technology-based interpretation of canine untrained response to novel or trained odor that allows the user to positively identify the category of response either real-time or after the fact.

(6) Animal Welfare. Whether an academic organization acts alone or in partnership with a commercial organization, any recipient performing research, experimentation, or testing involving the use of animals shall comply with the rules on animal acquisitions, transport, care, handling, and use as described within the "Animal Use" Section of this BAA.

h. Expeditionary Logistics. ONR seeks to provide Marines of the future with a precisely tailored level of sustained logistic support from sea-based platforms to rapidly maneuver forces ashore. Logistic delivery systems of the future will be more responsive and flexible, enabling Marines to out-pace rapidly changing operational scenarios. Likewise, delivered logistic commodities will provide more operational value per unit weight, enhancing combat unit self-sufficiency and maneuverability. Finally, operational units will benefit from technologies that maximize equipment readiness by minimizing both down-time and maintenance requirements. Areas of investment include:

(1) Handling and Transport of Supplies in Austere Environments. Future expeditionary warfare concepts will require novel, weight-effective approaches for small, dispersed units to more effectively handle and transport supplies without the benefit of conventional forklifts, cranes, or vehicles. This applies to both the immediate movement/distribution of heavy bulk supplies/equipment delivered to remote, austere fixed site locations as well as the longer term transport of supplies during the course of dismounted operations. Performance in both situations is currently dependent upon, as well as limited by, human muscle power. This requires heavy supply deliveries to be disassembled prior to movement or storage. Deliveries of bulk fuel and water are particularly problematic. As for the dismounted transport of logistics, the load typically carried in backpacks is already excessive. *Novel alternative solutions are sought that minimize the potential for injury while preserving the ability to negotiate narrow trails over terrain impassible to vehicular traffic.* Possible solutions may include simple mechanical devices (unpowered or power-assisted), devices that utilize hybridized combinations of human, recoverable, and stored energy, or devices capable of autonomously following dismounted combatants (provided they are capable of carrying 200 lbs of supplies and sufficient fuel/energy to provide a 50 mile range without compromising the detection avoidance or maneuverability of the dismounted unit to which they are assigned). Devices may be self propelled and/or towed, and may be rolling or walking in nature. In all instances concepts which minimize any imposed logistic burden such as fuel, energy, maintenance, training, etc. are preferred.

(2) Lightweight, Energy Efficient Structures in Support of Forward Operating Bases. Expeditionary warfare has frequent use for temporary infrastructure including

buildings, shelters, fortifications, roadways, barriers, bridges, piers, and aircraft landing surfaces. While partially acceptable solutions exist for some such applications, weight minimization and energy efficiency remain continuing areas of interest for further progress. *Solutions are sought toward any of the above applications that would significantly reduce the weight of materials that need to be stored and transported, or would reduce the energy cost of utilization. Novel concepts that emphasize multi-purpose, multi-scale assembly using modular structural design, structures that utilize advanced lightweight materials, or technologies that minimize transportation needs by incorporating naturally available resources are of interest, as are innovative concepts that facilitate mobility by accelerating the speed of deployment or retrieval of structures.* Examples of advanced shelter material technologies of interest may include, but are not necessarily limited to, innovative energy conserving and/or energy scavenging surfaces as well as versatile structural concepts that facilitate assembly of a diverse assortment of shelters from a small number of readily transportable basic modular building blocks.

(3) Fuel Efficient Electric Power Generation. Tactical reality frequently requires military field generators to operate at only a small percentage of their designed capacity. Unfortunately when existing military generators are used at less than their full capacity, fuel consumption does not decrease proportionally. For example, a generator servicing only 20% of its design load can consume twice as much fuel per delivered kilowatt-hour as one that is loaded for peak efficiency. Since the cost of delivering fuel to remote forward operating bases can easily run 10 to 100 times the original purchase price, generator efficiency has become a significant issue. Less than optimal loading tends to be more prevalent for generators rated at 10kW or less. *Innovative concepts applicable toward this output level are of primary interest.* It is well recognized that linking multiple generators in a power sharing grid is one way to improve overall fuel utilization; however this particular solicitation seeks to avoid the complexity of installing power distribution cables between multiple generator sites, by enabling each individual generator to independently deliver fuel efficient electrical power over its full load range. Examples of potential approaches may include, but are not limited to, the use of variable speed generators, energy storage buffers, partial generator shutdown facilitated by segmented design, or various combinations of the above. Equally important to the minimization of fuel consumption is the capability of future generators to interface seamlessly with alternative energy sources (solar for example) whenever the operational situation permits. *Innovative ideas in support of the concepts above are desired.*

(4) Enhanced Self Sufficiency for Water. *Novel concepts are sought for energy efficient small scale water treatment and purification at the individual or squad level.* Typical water sources encountered during expeditionary operations include seawater, rivers, streams, lakes, ponds, ground water, indigenous wells, or sub-standard municipal water. *Of particular interest are novel concepts for lightweight, hand carried, low power water purification devices with capabilities ranging from 1 to 10 gallons per hour.* The capability to remove suspended

solids, dissolved salts, and micro-organisms is desirable so as to be useful over the full range of potential water sources. Other related items of interest include micro-filtration materials or concepts that are resistant to freeze damage as well as novel pre-filtration technologies for reverse osmosis (RO) systems that avoid complex back-flushing procedures or large quantities of disposable filters.

(i) Maneuver. The Maneuver Program develops advanced technologies to increase the capabilities and effectiveness of the Marine Corps Air Ground Task Force (MAGTF) and aids in the execution of the Global War on Terrorism. Innovative technologies are pursued that address the entire fleet of USMC ground assets in the areas of survivability, mobility, fuel efficiency and unmanned systems. Specifically, there is interest in technologies in the following areas: (1) advanced power plants, power generation & distribution, (2) advanced drive trains, suspensions, and vehicle stability technologies, (3) advanced materials and survivability technology to enhance the performance and survivability of tactical and combat vehicles, (4) advanced autonomous robotic technologies and systems, and (5) other far-reaching innovative concepts or technologies that would lead to leap-ahead gains in survivability or mobility of USMC ground assets or dismounted Marines (e.g., anti-gravity, force fields, cloaking devices).

Marines will maneuver from the seabase in a family of high-speed connectors that include amphibious vehicles, tilt-rotor and rotary bladed aircraft, and high-speed surface craft. Once ashore, Marines will maneuver to and within the objective area with speed and precision. They will utilize a family of assets to include highly mobile and survivable manned and unmanned combat and tactical vehicles, as well as systems to enable enhanced mobility of the individual marine. Specific areas of interest for this BAA include:

(1) Autonomy and Unmanned Technologies

(A) Localization under Dense Canopies. This includes: (i) development of absolute and relative localization techniques for an autonomous unmanned ground vehicle (AUGV) employing electro-optical (EO) sensing augmented with the other forms of low cost sensing in a GPS-denied scenario under dense canopies that prevent the visible viewing of landmarks and the horizon; (ii) methods that exploit local information including but not limited to the local magnetic field, lighting cues, local geology, odometry, near-field optical flow, or local slop information; and (iii) methods that require modification of the behavior of the autonomous vehicle to aid this localization process such as *zero-velocity resets*. This topic seeks to apply these methods to systems that have full access to a priori information as necessary to include a solar ephemeris, terrain elevation databases, and earth magnetic field databases.

(B) Electro-optical Performance Preservation in Degraded Environments. This includes: (i) low-cost technologies that ameliorate the effect of the environment on the optical performance of the lens or cover of an electro-optical sensor used by an autonomous unmanned ground vehicle (AUGV);

and (ii) counters to detrimental environmental effects such as water on the lens or cover, ice or snow on the lens or cover, or dust settled on the lens or cover. Solutions that counter more than one detrimental effect are of greatest interest as are solutions that are of solid-state nature. Concepts should not require outside (human or otherwise) intervention more frequently than typical maintenance activities.

(C) Passive Night Augmentation for Electro-optical Perception System. ONR seeks passive sensor systems that may augment a daylight electro-optical perception system for an autonomous unmanned ground vehicle (AUGV) for night operations and for operations in low visibility environmental conditions. Concepts for sensors or algorithmic data fusion methods are of interest.

(D) Open-Architecture Operating Systems for Autonomous Ground Vehicles. ONR seeks the development of open-architecture operating systems (OS) available for licensing for militarized unmanned autonomous ground vehicles (AUGVs), which includes the following features: (i) Government may enjoy substantive intellectual property rights in the OS, (ii) the OS will contain embedded information assurance (IA), (iii) enable hardware abstraction and lower-level device control, (iv) have interfaces designed to appropriate standards to allow third-party application development, (v) support dedicated and distributed process, and (vi) may be networked between other AUGVs using the same operating system and other government system employing AUGB appropriate standards.

(E) Low Cost LIDAR Augmentation for Electro-optical Perception System. ONR seeks the development of low-cost perception/classification methods for autonomous unmanned ground vehicle (AUGV) perception and localization that fuse the features that can be extracted in a low-cost visible multi-spectral (less than 10 bands) EO system with low-cost LIDAR developed sparse point clouds of distance and intensity information. The use of a fusion algorithm that reduces the required density of the LIDAR point cloud is expected to lower the cost of the combined EO/LIDAR perception system. Methods that allow night operations and for operations in low visibility environmental conditions are of particular interest.

(F) Cognitive Architectures for Complex Warfighting Behaviors. ONR seeks the development of cognitive architectures and algorithms for an autonomous unmanned ground vehicle (AUGV) that allow it to seamlessly collaborate with Marines executing Small Unit Tactics. The desired quality of the collaboration is for the individual Marines to see the AUGV as a trusted agent capable of providing support in warfighting and other scenarios by executing doctrinally complex and adaptive behaviors that engender trust.

(2) Propulsion, Drive Trains, Suspensions and Fuel Efficiency

(A) Develop technologies to improve fuel efficiency and reduce fuel consumption for JP8 fueled tactical and combat vehicles. These include the following:

- Controllable variable displacement/variable flow pump, compressor, and turbine technologies applicable for load dependent control of vehicle accessories and diesel intake augmentation.
- Technologies that support the electrification of front end auxiliary drive components, including fluid pumps, fans, and compressors.
- Waste heat recovery technologies applicable to military wheeled vehicles equipped with reciprocating engines operating in high ambient temperature environments. Technologies of interest include electric turbo-compounding and Rankine cycle based approaches.
- Vehicle auxiliary power management for drive and idle operation that allow for control of vehicle alternator output based on onboard vehicle power requirements.
- Variable valve lift and timing systems, variable cylinder displacement and compression ratio systems, high pressure, high frequency capable fuel injectors for common rail fuel systems, and cylinder deactivation systems for JP8 compression ignition engines.

(B) Develop diesel engine, electronics, and electric motor/generator thermal management systems for military wheeled vehicles and power-trains, including advanced radiator designs and materials, high performance fluid-to-fluid and fluid-to-gas heat exchanger designs, and whole vehicle thermal management and control strategies. Common cooling loop approaches and component technologies capable of cooling power electronics and electromagnetic machines such as motors and generators utilizing the internal combustion engine water/glycol cooling loop are desirable.

(C) Leap ahead mobility approaches such as advanced suspension control systems for terrain identification, advanced trajectory planning, predicting and reacting, and real-time terrain features sensing technologies that might provide tremendous gains in fuel efficiency or ground mobility are of interest.

(3) Ground Vehicle Survivability

(A) Combat and Tactical Vehicle Signature Management. ONR is seeking adaptive and passive systems to reduce the signature of Naval Ground Vehicles in the visible, IR & RF spectrum while stationary or moving, in day or night, and in all weather conditions.

(B) Lightweight Armor Technologies. ONR is seeking nano-grain ferrous and non-ferrous alloy solutions that exhibit strength and ductility at least three times conventionally processed pier alloys.

(C) Explosively Formed Penetrator (EFP) Armor Solutions. ONR is seeking lightweight spall liners with improved performance over Kevlar, Dyneema, S2 glass, etc.

(D) Rocket Propelled Grenade (RPG) and ATGM defeat solutions. ONR is seeking active and passive approaches for defeat of unitary and/or tandem warheads and ATGMs.

(E) Active Protection System Sensor systems. ONR is seeking sensor systems and control software to detect, classify, and handoff acquisition information to various kill mechanisms to protect Naval Ground Vehicles and small boats against RPGs and ATGMs.

(F) Combat and tactical vehicle seating systems with shock mitigating characteristics. ONR is seeking: (i) seating systems that reduce the incidence or severity of injuries during mine blast or IED events that result in both vertical and non-vertical accelerations/loads (i.e., underbody centerline and non-centerline events with a probability of less than 10% Average Injury Score [AIS] Level 2), and (ii) innovative seat restraint systems which allow occupants rapid ingress/egress, good visibility, and low probability of fouling on body armor or other combat equipment.

(G) ONR is seeking combat and tactical vehicle underbody IED/mine blast event active and passive mitigation technologies such as advanced energy absorbing materials, unique shaping/wave propagation deflection techniques, etc.

(H) ONR is seeking end-to-end modeling and simulation capability for combat and tactical vehicle underbody Improvised Explosive Device (IED) and mine blast events, including the capability to model blast/IED effects on platforms and translate that to loads into personnel for the purposes of determining crew incapacitation.

Work funded under a BAA may include basic research, applied research and some advanced technology development (ATD). With regard to any restrictions on the conduct or outcome of work funded under this BAA, ONR will follow the guidance on and definition of "contracted fundamental research" as provided in the Under Secretary of Defense (Acquisition, Technology and Logistics) Memorandum of 24 May 2010. As defined therein the definition of "contracted fundamental research", in a DoD contractual context, includes [research performed under] grants and contracts that are (a) funded by Research, Development, Test, and Evaluation Budget Activity 1 (Basic Research), whether performed by universities or industry or (b) funded by Budget Activity 2 (Applied Research) and performed on campus at a university. The research shall not be considered fundamental in those rare and exceptional circumstances where the applied research effort presents a high likelihood of disclosing performance characteristics of military systems or manufacturing technologies that are unique and critical to defense, and where agreement on restrictions have been recorded in the contract or grant.

Pursuant to DoD policy, research performed under grants and contracts that are a) funded by Budget Category 6.2 (Applied Research) and NOT performed on-campus at a university or b) funded by Budget Category 6.3 (Advanced Research) does not meet the definition of "contracted fundamental research." In conformance with the USD (AT&L) guidance and National Security Decision Direction 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. ATD is normally awarded under contracts and may require restrictions during the conduct of the research and DoD pre-publication review of research results due to subject matter sensitivity. As regards to the present BAA, the Research and Development efforts to be funded will consist of basic research, applied research, advanced technology development. The funds available to support awards are Budget Activities 1, 2, and 3.

7. Point(s) of Contact -

Questions of a technical nature shall be directed to the cognizant Technical Point of Contact, as specified below:

Science and Technology Point of Contact:

Point of Contact Name: Laura L. Worcester
Point of Contact Occupation Title: Deputy, Programming, Planning, and Operations
Department Title: Expeditionary Maneuver Warfare and Combating Terrorism S&T
Division Code: ONR30
Address: 875 N. Randolph Street, Room 1163, Arlington, VA 22203
Email Address: Laura.Worcester@navy.mil

Questions of a business nature shall be directed to the cognizant Contract Specialist, as specified below:

Business Point of Contact:

Point of Contact Name: Lynnette Desorcie
Point of Contact Occupation Title: Contracting Officer
Division Code: ONR255
Address: 875 N. Randolph St., Arlington, VA 22203
Email Address: Lynnette.desorcie@navy.mil

Questions of a security nature should be submitted to:

Diana Pacheco
Information Security Specialist
Office of Naval Research
Security Department, Code 43
One Liberty Center
875 North Randolph St.
Arlington, VA 22203-1995
Email Address: diana.pacheco@navy.mil

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

CLASSIFIED questions shall be handled through the ONR Security POC. Specifically, any entity wanting to ask a CLASSIFIED question shall send an email to the ONR Security POC with 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.

Questions submitted within 2 weeks prior to a deadline may not be answered, and the due date for submission of the white paper and/or full proposal will not be extended.

Amendments will be posted to one or more of the following webpages:

- Federal Business Opportunities (FEDBIZOPPS) Webpage – https://www.fbo.gov/
- Grants.gov Webpage – http://www.grants.gov/
- ONR Broad Agency Announcement (BAA) Webpage – http://www.onr.navy.mil/en/Contracts-Grants/Funding-Opportunities/Broad-Agency-Announcements.aspx

8. Instrument Type(s) -

Awards may take the form of contracts, grants, cooperative agreements, and other transaction agreements, as appropriate.

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

12.300

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

DOD Basic and Applied Scientific Research

11. Other Information -

FAR Part 35 restricts the use of the 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.

THIS ANNOUNCEMENT IS NOT FOR THE ACQUISITION OF TECHNICAL, ENGINEERING AND OTHER TYPES OF SUPPORT SERVICES.

II. AWARD INFORMATION

*Anticipated Range of Individual Award Amounts: $300K-$1M per fiscal year
*Anticipated Period of Performance: Typically up to 36 months

Awards may be funded with basic research appropriations and may be subject to a reimbursement limit on indirect costs similar to that set forth in Section 8101 of the Department of Defense Appropriations Act, 2010 (P.L. 111-118). Indirect costs for basic research may not exceed 35% of the total funds provided.

For the past three years Congress has placed limits on the percentage of indirect costs that can be paid by the government using basic research (6.1) funds. Currently indirect costs paid under contracts and grants for the performance of basic research may not exceed 35 percent. It is unknown at present whether a similar indirect cost restriction will apply to 6.1 funds in FY 2011 or thereafter.

In the case of funded proposals for the production and testing of prototypes, ONR may during the contract period add a contract line item or contract option for the provision of advanced component development or for the delivery of additional prototype units. However, such a contract addition shall be subject to the limitation contained in Section 819 of the National Defense Authorization Act for Fiscal Year 2010.

III. ELIGIBILITY INFORMATION

All responsible sources from academia and industry may submit proposals under this BAA. Historically Black Colleges and Universities (HBCUs) and Minority Institutions (MIs) are encouraged to submit proposals and join others in submitting proposals. However, no portion of this BAA will be set aside for HBCU and MI participation.

Federally Funded Research & Development Centers (FFRDCs), including Department of Energy National Laboratories, are not eligible to receive awards under this BAA. However, teaming arrangements between FFRDCs and eligible principal bidders are allowed so long as they are permitted under the sponsoring agreement between the Government and the specific FFRDC.

Navy laboratories and warfare centers as well as other Department of Defense and civilian agency laboratories are also not eligible to receive awards under this BAA and should not directly submit either white papers or full proposals in response to this BAA. If any such organization is interested in one or more of the programs described herein, the organization should contact an appropriate ONR 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 responsible sources from academia and industry that are submitting proposals under this BAA.

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.

Some topics cover export controlled technologies. Research in these areas is limited to "U.S. persons" as defined in the International Traffic in Arms Regulation (ITAR) – 22 CFR § 1201.1 et seq. (See Section VII, Other Information)

For Grant, Cooperative Agreement and Other Transaction Agreement applications:

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 170.110. Any company, non-profit agency or university that applies for financial assistance (either grants, cooperative agreements or 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 170.220 and Appendix A. An entity is **exempt** from this requirement **UNLESS** in the preceding fiscal year, it received: a) 80 percent or more of its annual gross revenue in Federal contracts (and subcontracts), loans, grants (and subgrants), and cooperative agreements; b) $25 million or more in annual gross revenue from Federal contracts (and subcontracts), loans, grants (and subgrants), and cooperative agreements; and c) the public does not have access to information about the compensation of the senior executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 or section 6104 of the Internal Revenue Code of 1986.

IV. APPLICATION AND SUBMISSION INFORMATION

1. Application and Submission Process -

White Papers are required prior to submitting a Full Proposal - The due date for White Papers is no later than 3 p.m. (Local Eastern Time) on 2/01/11. Initial Navy evaluations of the White Papers will be issued via email notification on or about 3/04/11. Detailed technical and cost proposals will be subsequently encouraged from those Offerors whose proposed technologies have been identified through the above-referenced email as being

of "particular value" to the Navy. However, any such encouragement does not assure a subsequent award. Any offeror may submit a full proposal even if its white paper was not identified as being of "particular value." Full Proposals will not be considered under this BAA unless a white paper was received before the white paper due date specified above.

Full Proposals - The due date for receipt of Full Proposals is 3 p.m. (EDT) on 5/6/11. It is anticipated that final selections will be made by 6/15/11. Proposals received after the published due date may be considered for funding at a later time, if funding is available. As soon as the final proposal evaluation process has been completed, the Offeror will be notified via email of its selection or non-selection for an award. Full proposals not in compliance with the prescribed template will not be evaluated.

2. Content and Format of White Papers/Full Proposals -

The Proposals submitted under this BAA are expected to be unclassified. However, confidential/classified proposals are permitted. Contracts or other instruments resulting from a classified proposal will be unclassified.

Unclassified Proposal Instructions:

Unclassified proposals shall be submitted in accordance with paragraphs 5 and 6 of Section IV.

Classified Proposal Instructions:

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

OUTSIDE ENVELOPE (no classification marking):
"Office of Naval Research
Attn: Document Control Unit
ONR Code 43
875 N. Randolph St.
Arlington, VA 22203-1995"

The inner wrapper of the classified White Paper and/or Full Proposal should be addressed to the attention of the TPOC, ONR Code30 and marked in the following manner:

Naval Expeditionary Maneuver Warfare and Combating Terrorism S&T BAA
Office of Naval Research
Attn: Laura L. Worcester
ONR Code: ONR30
875 N. Randolph St.
Arlington, VA 22203-1995

An 'unclassified' Statement of Work (SOW) must accompany any classified proposal.

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

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.

a. WHITE PAPERS

White Paper Format

- Paper Size – 8.5 x 11 inch paper
- Margins – 1 inch
- Spacing – single-spaced
- Font – Times New Roman, 12 point
- Number of Pages – No more than five (5) single-sided pages (excluding cover page and resumes). White Papers exceeding the page limit may not be evaluated.
- Copies – Electronic (email) submissions should be sent to the attention of the TPOC at: Laura.Worcester@navy.mil. The subject line of the email shall read "ONR BAA 11-007 White Paper Submission: [Title of the White Paper]." The white paper must be a Microsoft Word 2007 or .PDF format attachment to the email.

NOTE Failure to adhere to the following may result in the exclusion of your White Paper: 1) Do NOT send hardcopies of White Papers (including facsimiles) as only electronic submissions will be accepted and reviewed; 2) Do not send .ZIP files; 3) Do not send password protected files.

White Paper Content

- Cover Page – The Cover Page shall be labeled "WHITE PAPER", and shall include the BAA number, proposed title, Offeror's administrative and technical points of contact, with telephone numbers, facsimile numbers, and Internet addresses, and shall be signed by an authorized officer.

- 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.

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.

b. FULL PROPOSALS

INSTRUCTIONS FOR CONTRACTS, COOPERATIVE AGREEMENTS AND OTHER TRANSACTION AGREEMENTS (Does not include Grants)

NOTE: *Submission instructions for BAAs issued after FY2010 have changed significantly from previous requirements. Potential Offerors are advised to carefully read and follow the instructions below. The new format and requirements have been developed to streamline and ease both the submission and review of proposals. Both the Template and the Spreadsheet have instructions imbedded into them that will assist in completing the documents. Also, both the Template and the Spreadsheet require completion of cost-related information – both documents must be fully completed to constitute a valid proposal.*

All *proposals must use ONR's Technical and Cost Proposal Template and Cost Proposal Spreadsheet. The Template can be found by following this link: http://www.onr.navy.mil/en/Contracts-Grants/submit-proposal/contracts-proposal/cost-proposal.aspx. Please note that all the attachments listed in Section III.8 of the Template can be incorporated into the Template file for submission.*

The Cost Proposal Spreadsheet can be found by following this link: http://www.onr.navy.mil/Contracts-Grants/submit-proposal/contracts-proposal/cost-proposal.aspx. Click on the "proposal spreadsheet" link and save a copy of the spreadsheet. Instructions for completion have been embedded into the spreadsheet. Any proposed options that are identified in the Technical and Cost Proposal Template, but are not fully priced out in the Cost Proposal Spreadsheet, will not be included in any resulting contract or other transaction. If proposing options, they **must** be separately priced and separate spreadsheets should be provided for the base period and each option period.

For proposed subcontracts or interorganizational 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 email directly to both the Program Officer and the Business Point of Contact at the same time the prime proposal is submitted. The email 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 also familiarize themselves with the new subcontract reporting requirements set forth in Federal Acquisition Regulation (FAR) clause 52.204-10, Reporting Executive Compensation and First-Tier Subcontract Awards. From October 1, 2010 through February 28, 2011, any newly awarded subcontract must be reported if the prime contract award amount is $550,000 or more. Starting March 1, 2011, any newly awarded subcontract must be reported if the prime contract award amount was $25,000 or more. The pertinent requirements can be found in Section VII, Other Information, of this document.

Offerors should submit (1) original and one electronic copy on a DVD (in Microsoft® Word or Excel 2007 compatible format).

INSTRUCTIONS FOR GRANTS (Does not include contracts, cooperative agreements and other transaction agreements)

The following information must be completed as follows in the SF 424 to ensure that the application is directed to the correct individual for review: Block 4a, Federal Identifier: Enter the previous ONR award number, or N00014 if the application is not a renewal or expansion of an existing award; Block 4b, Agency Routing Number: Enter the three (3) digit Program Office Code (i.e., 331) and the Program Officer's name, last name first, in brackets (i.e., [Shifler, David]). Applicants who fail to provide a Department code identifier may receive a notice that their proposal will be rejected.

Please not that Volume I, Technical Proposal should be submitted as an attachment to the SF 424 rather than being inserted into Block 7, Project Narrative. Block 7 should be completed with a statement that Volume 1 is attached. To attach the Technical Proposal, open the Attachment Form in the Optional Documents box of the application package, scroll down to the Attachment page, and follow the instructions. The file should be titled "Volume I – Technical Proposal."

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

• Paper Size – 8.5 x 11 inch paper
• Margins – 1 inch
• Spacing – single-spaced
• Font – Times New Roman, 12 point
• Number of Pages – Volume 1 is limited to no more than *15* pages. Limitations within sections of the proposal, if any, are indicated in the individual descriptions shown below. The cover page, proposal checklist, table of contents, resumes and current and pending project and proposal submissions information are excluded from the page limitations. Full Proposals exceeding the page limit may not be evaluated. There are no page limitations to Volume 2.
• Copies – the full proposal should be submitted electronically at http://www.grants.gov/ as delineated in paragraph 5 below.

Volume 1: Technical Proposal

• Cover Page: This should include the words "Technical Proposal" and the following:

1) BAA number 11-007;
2) Title of Proposal;
3) Identity of prime Offeror and complete list of subawards, if applicable;
4) Technical contact (name, address, phone/fax, electronic mail address)
5) Administrative/business contact (name, address, phone/fax, electronic mail address) and;
6) 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 and Justification: The major portion of the proposal should consist of a clear description of the technical approach being proposed. This discussion should provide the technical foundation/justification for pursuing this particular approach/direction and why one could expect it to enable the objectives of the proposal to be met.

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.

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 data deliverables that are typically required under a research effort:

- Technical and Financial Progress Reports
- Final Report

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

• Management Approach: Identify which personnel and subcontractors/subrecipients (if any) will be involved. Include a description of the facilities that are required for the proposed effort, along with a description of any Government Furnished Equipment/Hardware/ Software/Information required, by version and/or configuration.

• 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).

The information must be provided for all proposals already submitted or submitted concurrently to other possible sponsors, including ONR. Concurrent submission of a proposal to other organizations will not prejudice its review by ONR:

1) Title of Proposal and Summary;
2) Source and amount of funding (annual direct costs; provide contract and/or grant numbers for current contracts/grants);
3) Percentage effort devoted to each project;
4) Identity of prime Offeror and complete list of subcontractors, if applicable;
5) Technical contact (name, address, phone/fax, electronic mail address)
6) Administrative/business contact (name, address, phone/fax, electronic mail address);
7) Period of performance (differentiate basic effort);
8) 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);
9) 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
10) State how projects are related to the proposed effort and indicate degree of overlap.

• 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.

Volume 2: Cost Proposal

The offeror must use the Grants.gov forms 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. Assume that performance will start no earlier than three (3) months after the date the cost proposal is submitted. 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.

Part 1: The itemized budget must include the following

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

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

- Fringe Benefits and Indirect Costs (i.e., 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.
- Travel – The proposed travel cost should 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 organization's 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.
- Subawards – Provide a description of the work to be performed by the subrecipients. For each subaward, a detailed cost proposal is required to

be submitted by the subrecipient(s). The subawardee's or subrecipient's cost proposal can be provided in a sealed envelope with the recipient's cost 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. A proposal and supporting documentation must be received and reviewed before the Government can complete its cost analysis of the proposal and enter negotiations. Fee/profit is not allowable on any subawards made through assistance agreements. Fee is allowable on subcontract awards.

- Consultants – Provide a breakdown of the consultant's hours, the hourly rate proposed, any other proposed consultant costs, a copy of the signed Consulting Agreement or other documentation supporting the proposed consultant rate/cost, and a copy of the consultant's proposed statement of work if it is not already separately identified in the prime contractor's proposal.
- Materials & Supplies – Provide an itemized list of all proposed materials and supplies including quantities, unit prices, proposed vendors (if known), 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 would be 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, office equipment and furnishings, etc.) 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 is for a conference, workshop, or symposium, the proposal should include the following statement: "The funds provided by ONR will not be used for food or beverages."
- Fee/Profit – Fee/profit is unallowable under assistance agreements at either the prime or subaward level but may be permitted on any subcontracts issued by the prime awardee.

Part 2: Cost breakdown by Government fiscal year and task/sub-task corresponding to the same task breakdown in the proposed Statement of Work. When options are contemplated, options must be separately identified and priced by task/subtask.

3. Significant Dates and Times -

Anticipated Schedule of Events		
Event	Date (MM/DD/YEAR)	Time (Local Eastern Time)
White Papers Due Date	02/01/11	3:00PM
Notification of Initial Navy Evaluations of White Papers *	03/04/11	
Full Proposals Due Date	05/06/11	3:00PM
Notification of Selection for Award *	06/15/11	
Contract Awards *	10/30/11	

***** These dates are estimates as of the date of this announcement.

NOTE: Due to changes in security procedures since September 11, 2001, the time required for hard-copy written materials to be received at the Office of Naval Research has increased. Materials submitted through the U.S. Postal Service, for example, may take seven days or more to be received, even when sent by Express Mail. Thus any hard-copy proposal should be submitted long enough before the deadline established in the solicitation so that it will not be received late and thus be ineligible for award consideration.

4. Submission of Late Proposals (Applicable to White Papers and Full Proposals)

Any proposal, modification, or revision, that is received at the designated Government office after the exact time specified for receipt of proposals is "late" and will not be considered unless it is received before award is made, the contracting officer determines that accepting the late proposal would not unduly delay the acquisition and

(a) If it was transmitted through an electronic commerce method authorized by the announcement, it was received at the initial point of entry to the Government infrastructure not later than 5:00 p.m. one working day prior to the date specified for receipt of proposals; or

(b) There is acceptable evidence to establish that it was received at the Government installation designated for receipt of proposals and was under the Government's control prior to the time set for receipt of proposals; or

(c) It was the only proposal received.

However, a late modification of an otherwise timely and successful proposal, that makes its terms more favorable to the Government will be considered at any time it is received and may be accepted.

Acceptable evidence to establish the time or receipt at the Government installation includes the time/date stamp of that installation on the proposal wrapper, other documentary evidence of receipt maintained by the installation, or oral testimony or statements of Government personnel.

If an emergency or unanticipated event interrupts normal Government processes so that proposals cannot be received at the Government office designated for receipt of proposals by the exact time specified in the announcement, and urgent Government requirements preclude amendment of the announcement closing date, the time specified for receipt of proposals will be deemed to be extend to the same time of day specified in the announcement on the first work day on which normal Government processes resume.

The contracting officer must promptly notify any offeror if its proposal, modifications, or revision was received late and must inform the offeror whether its proposal will be considered.

5. Submission of Grant Proposals through Grants.gov

(NOT APPLICABLE TO PROPOSALS FOR CONTRACTS, COOPERATIVE AGREEMENTS, AND OTHER TRANSACTION AGREEMENTS)

Detailed instructions entitled "Grants.gov Electronic Application and Submission Information" on how to submit a grant proposal through Grants.gov may be found at the ONR website listed under the 'Acquisition Department – Contracts & Grants Submitting a Proposal" link at: http://www.onr.navy.mil/Contracts-Grants/submit-proposal/grants-proposal/grants-gov.aspx.

As stated in Section IV.2, White Papers should not be submitted through the Grants.gov Apply process, but rather should be sent directly to ONR. White Papers should be e-mailed directly to the Technical Point of Contact. White Paper format requirements are found in Section IV, item 2a above.

By completing Block 17, the Grant Applicant is providing the certification on lobbying required by 32 CFR Part 28. Refer to Section VI, "Award Administration Information" entitled "Certifications" for further information.

For electronic submission of grant full proposals, several one-time actions must be completed in order to submit an application through Grants.gov. These include obtaining a Dun and Bradstreet Data Universal Numbering System (DUNS) number, registering with the Central Contract Registration (CCR), registering with the credential provider, and registering with Grants.gov. See http://www.grants.gov, specifically http://www.grants.gov/GetStarted.

Use the Grants.gov organization Registration Checklist at http://www.grants.gov/applicants/register_your_organziation.jsp which will provide guidance through the process. Designating an E-Business Point of Contact (EBiz POC) and obtaining a special password called "MPIN" are important steps in the CCR registration process. Applicants

who are not registered with CCR and Grant.gov should allow at least 21 days to complete these requirements. The process should be started as soon as possible. Any questions relating to the registration process, system requirement, how an application form works, or the submittal process **must** be directed to Grants.gov at 1-800-518-4726 or support@grants.gov.

Special Notices Relative to Grant Applications to be Submitted Through Grants.gov

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

Applicants who have registered with Grants.gov are urged to submit their proposals electronically *at least* three days before the date and time that proposals are due so that it will not be received late and be ineligible for award consideration.

Proposal Receipt Notices:

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

Number 1 – The applicant will receive a confirmation page upon completing the submission to Grants.gov.

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

Number 3 – The third notice is an acknowledgement of receipt in e-mail form from ONR within ten days from the proposal due date, if applicable. The e-mail is sent to the authorized representative for the institution. The e-mail for proposals notes that the proposal has been received and provides the assigned tracking number.

6. Address for the Submission of Full Proposals for Contracts, Cooperative Agreements, and Other Transaction Agreements.

Hard copies of Full Proposals for Contracts, Cooperative Agreements, and Other Transaction Agreements should be sent to the Office of Naval Research at the following address:

Office of Naval Research
Attn: Felicia Bush
ONR Department Code 30
875 North Randolph St.

Arlington, VA 22203-1995

Telephone Number: 703.588.0702

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

V. EVALUATION INFORMATION

1. Evaluation Criteria –

Award decisions will be based on a competitive selection of proposals resulting from a scientific and cost review. Evaluations will be conducted using the following evaluation criteria. Criteria 1 through 4 are significantly more important than Criterion 5, and Criteria 1 through 4 are of equal value.

1) Overall scientific and technical merits of the proposal;
2) Potential Naval relevance and contributions of the effort to the agency's specific mission;
3) The offeror's capabilities, related experience, facilities, techniques or unique combinations of these which are integral factors for achieving the proposal objectives;
4) The qualifications, capabilities and experience of the proposed Principal Investigator (PI), team leader and key personnel who are critical in achieving the proposal objectives; and
5) The realism of the proposed costs and availability of funds.

The degree of importance of cost will increase with the degree of equality of the proposals in relation to the other factors on which selection is to be based, or when the cost is so significantly high as to diminish the value of the proposal's technical superiority to the Government.

Commitment to Small Business: The Office of Naval Research is strongly committed to providing meaningful subcontracting opportunities for small businesses, small disadvantaged businesses, woman-owned small businesses, historically underutilized zone (HUBZone) small businesses, veteran-owned small business, service disabled veteran-owned small businesses, historically black colleges and universities, minority institutions and other concerns subject to socioeconomic considerations through its awards. For proposed awards to be made as contracts (that exceed $650,000) to other than small businesses, the Offeror is required to submit a Small Business Subcontracting Plan in accordance with FAR 52.219-9. For proposed awards made as contracts to small businesses at any value or to other than Small Businesses that are less than $650,000, the Offeror shall provide a statement which demonstrates how it intends to provide meaningful subcontracting opportunities to support this policy.

Industry-Academia Partnering – ONR highly encourages partnering among industry and academia with a view toward speeding the incorporation of new science and technology

into fielded systems. Proposals that utilize industry-academic partnering which enhances the development of novel S&T advances will be given favorable consideration

Industry-Government Partnering – ONR highly encourages partnering among industry and Government with a view toward speeding the incorporation of new science and technology into fielded systems. Proposals that utilize industry-Government partnering which enhances the development of novel S&T advances will be given favorable consideration

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 performance.

2. Evaluation Panel -

Technical and cost proposals submitted under this BAA will be protected from unauthorized disclosure in accordance with FAR 3.104-4 and 15.207. The cognizant Program Officer and other Government scientific experts will perform the evaluation of technical proposals. 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.

VI. AWARD ADMINISTRATION INFORMATION

1. Administrative Requirements –

- The North American Industry Classification System (NAICS) code – The NAICS code for this announcement is 541712 with a small business size standard of 500 employees.

- Central Contractor Registration: All Offerors submitting proposals or applications must:

  (a) be registered in the Central Contractor Registration (CCR) prior to submission;
  (b) maintain an active CCR 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.

Subcontracting Plans: All successful contract proposals, with the exception of small business concerns, that exceed $650,000 shall be required to submit subcontracting plans. Subcontracting Plans will be required prior to award in accordance with FAR 52.219-9.

Statement of Commitment to Small Business: For proposed awards made as contracts to small businesses at any value or to other than small businesses that are less than $650K, the offeror shall provide a statement which demonstrates how they intend to provide meaningful small business subcontracting opportunities.

NOTE: Central Contractor Registry (CCR), Subcontracting Plan requirements and Certification requirements are all set forth in the ONR Technical and Cost Proposal Template.

Grants, Cooperative Agreements and Normal Other Transaction Agreements (OTAs) Certification Requirements:

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

CERTIFICATION REGARDING LOBBYING ACTIVITIES

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

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

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

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

Grants not through Grants.gov
Proposers seeking grants who have received Grants.gov waiver approval for awards greater than $100,000 shall complete and submit electronic representations and certifications at the Contracts and Grants Section of the ONR Home Page at http://www.onr.navy.mil/Contracts-Grants/submit-proposal/~/media/BDBA1ACF9F534C10BE2A9C9AD9AA7F12.ashx.

VII. OTHER INFORMATION

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 submitting proposals for contracts, cooperative agreements and Other Transaction Agreements should indicate in the Technical and Cost Proposal Template, Section II, Blocks 8 and 9, which of these facilities are critical for the project's success. Offerors submitting proposals for grants should address the need for government-furnished facilities in their technical proposal.

2. Security Classification

In order to facilitate intra-program collaboration and technology transfer, the Government will attempt to enable technology developers to work at the unclassified level to the maximum extent possible. If access to classified material will be required at any point during performance, the Offeror must clearly identify such need by completing Section II, Block 11, DD 254 – Security Classification Specification, of the Technical and Cost Proposal Template.

Normally, work done under a grant does not require access to classified material.

3. Use of Animals and Human Subjects in Research

If animals are to be utilized in the research effort proposed, the Offeror must complete a DoD Animal Use Protocol with supporting documentation (copies of AAALAC accreditation and/or NIH assurance, IACUC approval, research literature database searches, and the two most recent USDA inspection reports) prior to award. For assistance with submission of animal research related documents, contact the ONR Animal Use Administrator at (703) 696-4046.

Similarly, for any proposal for research involving human subjects, the Offeror must submit or indicate an intention to submit prior to award: documentation of approval from an Institutional Review Board (IRB); IRB-approved research protocol; IRB-approved informed consent form; proof of completed human research training (e.g., training

certificate or institutional verification of training); an application for a DoD-Navy Addendum to the Offeror's DHHS-issued Federal wide Assurance (FWA) or the Offeror's DoD-Navy Addendum. In the event that an exemption criterion under 32 CFR.219.101 (b) is claimed, provide documentation of the determination by the Institutional Review Board (IRB) Chair, IRB vice Chair, designated IRB administrator or official of the human research protection program including the category of exemption and short rationale statement. This documentation must be submitted to the ONR Human Research Protection Official (HRPO), by way of the ONR Program Officer. Information about assurance applications and forms can be obtained by contacting ONR_343_contact@navy.mil. If the research is determined by the IRB to be greater than minimal risk, the Offeror also must provide the name and contact information for the independent medical monitor. For assistance with submission of human subject research related documentation, contact the ONR Human Research Protection Official at (703) 696-4046.

For contracts and orders, the award and execution of the contract, order, or modification to an existing contract or order serves as notification from the Contracting Officer to the Contractor that the HRPO has approved the assurance as appropriate for the research under the Statement of Work and also that the HRPO has reviewed the protocol and accepted the IRB approval or exemption determination for compliance with the DoD Component policies. See, DFARS 252.235-7004.

4. Recombinant DNA

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5. Department of Defense High Performance Computing Program

The DoD High Performance Computing Program (HPCMP) furnishes the DoD S&T and DT&E communities with use-access to very powerful high performance computing systems. Awardees of ONR contracts, grants, and assistance instruments may be eligible to use HPCMP assets in support of their funded activities if ONR Program Officer approval is obtained and if security/screening requirements are favorably completed. Additional information and an application may be found at http://www.hpcmo.hpc.mil/.

6. Organizational Conflicts of Interest

All Offerors and proposed subcontractors must affirm whether they are providing scientific, engineering, and technical assistance (SETA) or similar support to any ONR technical office(s) through an active contract or subcontract. All affirmations must state which office(s) the offeror supports and identify the prime contract numbers. Affirmations shall be furnished at the time of proposal submission. All facts relevant to the existence or potential existence of organizational conflicts of interest (FAR 9.5) must be disclosed. The disclosure shall include a description of the action the offeror has taken or proposes to take to avoid, neutralize, or mitigate such conflict. In accordance with FAR 9.503 and without prior approval, a contractor cannot simultaneously be a SETA and a research and development performer. Proposals that fail to fully disclose potential

conflicts of interests or do not have acceptable plans to mitigate identified conflicts will be rejected without technical evaluation and withdrawn from further consideration for award. If a prospective offeror believes that any conflict of interest exists or may exist (whether organizational or otherwise), the offeror should promptly raise the issue with ONR by sending his/her contact information and a summary of the potential conflict by e-mail to the Business Point of Contact in Section I, item 7 above, before time and effort are expended in preparing a proposal and mitigation plan. If, in the sole opinion of the Contracting Officer after full consideration of the circumstances, any conflict situation cannot be effectively avoided or mitigated, the proposal may be rejected without technical evaluation and withdrawn from further consideration for award under this BAA.

7. Project Meetings and Reviews

Individual program reviews between the ONR sponsor and the performer may be held as necessary. Program status reviews may also be held to provide a forum for reviews of the latest results from experiments and any other incremental progress towards the major demonstrations. These meetings will be held at various sites throughout the country. For costing purposes, offerors should assume that 40% of these meetings will be at or near ONR, Arlington, VA and 60% at other contractor or government facilities. Interim meetings are likely, but these will be accomplished via video telephone conferences, telephone conferences, or via web-based collaboration tools.

8. Executive Compensation and First-Tier Subcontract Reporting

Section 2(d) of the Federal Funding Accountability and Transparency Act of 2006 (Pub. L. No. 109-282), as amended by section 6202 of the Government Funding Transparency Act of 2008 (Pub. L. 110-252), requires the Contractor to report information on subcontract awards. The law requires all reported information be made public, therefore, the Contractor is responsible for notifying its subcontractors that the required information will be made public.

Unless otherwise directed by the Contracting Officer, by the end of the month following the month of award of a first-tier subcontract with a value of $25,000 or more, (and any modifications to these subcontracts that change previously reported data), the Contractor shall report the following information at http://www.fsrs.gov for each first-tier subcontract:

(a) Unique identifier (DUNS Number) for the subcontractor receiving the award and for the subcontractor's parent company, if the subcontractor has one.

(b) Name of the subcontractor.

(c) Amount of the subcontract award.

(d) Date of the subcontract award.

(e) A description of the products or services (including construction) being provided under the subcontract, including the overall purpose and expected outcomes or results of the subcontract.

(f) Subcontract number (the subcontract number assigned by the Contractor).

(g) Subcontractor's physical address including street address, city, state, and country. Also include the nine-digit zip code and congressional district.

(h) Subcontractor's primary performance location including street address, city, state, and country. Also include the nine-digit zip code and congressional district.

(i) The prime contract number, and order number if applicable.

(j) Awarding agency name and code.

(k) Funding agency name and code.

(l) Government contracting office code.

(m) Treasury account symbol (TAS) as reported in FPDS.

(n) The applicable North American Industry Classification System (NAICS) code.

By the end of the month following the month of a contract award, and annually thereafter, the Contractor shall report the names and total compensation of each of the five most highly compensated executives for the Contractor's preceding completed fiscal year at http://www.ccr.gov, if –

(a) In the Contractor's preceding fiscal year, the Contractor received –

(i) 80 percent or more of its annual gross revenues from Federal contracts (and subcontracts), loans, grants (and subgrants) and cooperative agreements; and

(ii) $25,000,000 or more in annual gross revenues from Federal contracts (and subcontracts), loans, grants (and subgrants) and cooperative agreements; and

(b) The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at http://www.sec.gov/answers/execomp.htm.).

Unless otherwise directed by the Contracting Officer, by the end of the month following the month of a first-tier subcontract with a value of $25,000 or more, and annually thereafter, the Contractor shall report the names and total compensation of each of the five most highly compensated executives for each first-tier subcontractor for the subcontractor's preceding completed fiscal year at http://www.fsrs.gov, if –

(a) In the subcontractor's preceding fiscal year, the subcontractor received –

(i) 80 percent or more of its annual gross revenues from Federal contracts (and subcontracts), loans, grants (and subgrants) and cooperative agreements; and

(ii) $25,000,000 or more in annual gross revenues from Federal contracts (and subcontracts), loans, grants (and subgrants) and cooperative agreements; and

(b) The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at http://www.sec.gov/answers/execomp.htm.).

If the Contractor in the previous tax year had gross income, from all sources, under $300,000, the Contractor is exempt from the requirement to report subcontractor awards. Likewise, if a subcontractor in the previous tax year had gross income from all sources under $300,000, the Contractor does not need to report awards to that subcontractor.