



Homeland  
Security

**Exploratory Research  
in  
Preventing Nuclear and Radiological  
Terrorism**

**Broad Agency Announcement No.**

**HSHQDN-16-R-0002**

**for**

**Domestic Nuclear Detection Office**

**(DNDO)**

**Transformational and Applied Research Directorate**

**(TAR)**

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# 1 INTRODUCTION

The Department of Homeland Security (DHS), Office of Procurement Operations (OPO) is soliciting proposals for the Domestic Nuclear Detection Office (DNDO) under this Broad Agency Announcement (BAA) for Exploratory Research (ER) that directly supports the DNDO mission. This BAA solicits first white papers and then proposals in the area of Preventing Nuclear and Radiological Terrorism that may lead to a dramatic improvement in national capabilities in nuclear/radiological threat detection and interdiction and in nuclear forensics capabilities.

For this BAA, the Government encourages proposals from the following types of organizations which could serve as the prime contractor: private industry, academic institutions, and non-profit organizations. Prohibited from serving as prime but encouraged to participate as sub-contractors for this BAA are National Laboratories, Federal Government Laboratories, Federally Funded Research and Development Centers (FFRDCs), Federal Government Activities, Federal Agencies, and Government-Sponsored University Affiliated Research Centers (UARCs).

This BAA is issued under paragraphs 6.102(d)(2) and 35.016 of the Federal Acquisition Regulation (FAR), which provides for the competitive selection, as stated in Section 6, of basic and applied research and/or development not related to a specific system or hardware. Proposals submitted in response to this BAA that are selected for award are considered to be the result of full and open competition and in compliance with the provision of Public Law 98-369, “The Competition in Contracting Act of 1984” and subsequent amendments.

The tentative award schedule for this BAA is as follows:

Date	EVENT
14 June 2016	Pre-solicitation Notice Posted
28 July 2016	BAA Solicitation Posted and Open for White Paper Submission
18 August 2016	Question Submission Deadline for White Papers, 12:00 PM (Noon) ET
14 September 2016	White Paper Submission Deadline, 4:00 PM ET
23 November 2016	DNDO: Responses for White Papers Provided to Offerors and Open for Proposal Submission
5 December 2016	Question Submission Deadline for Proposals, 12:00 PM (Noon) ET
7 December 2016	DNDO: Responses for Proposal Questions Provided to Offerors
27 January 2017	Proposal Submission Deadline, 12:00 PM (Noon) ET
By July 2017	Anticipated Award Date

## 1.1 Background

The Department of Homeland Security has been tasked to ensure that the United States remains safe from the illicit importation, development, or procurement of a nuclear or radiological device. In recognition of the catastrophic risk posed by the use of a nuclear weapon within the United States, DHS has integrated all nuclear detection research, development, testing, evaluation, acquisition, and operational support into a single office: the Domestic Nuclear Detection Office. DNDO develops the global nuclear detection architecture; conducts research and development; and acquires and supports the deployment of domestic nuclear detection and forensics systems.

The Transformational and Applied Research Directorate (TAR) was established during the foundation of DNDO in 2005 to develop breakthrough technologies that will have a dramatic impact on the capabilities to prevent nuclear and radiological terrorism through an aggressive and expedited R&D program. This R&D focuses on technology to detect threat Special Nuclear Material (SNM) or radiological material out of regulatory control and technology to attribute this material back to its sources through nuclear forensics. The R&D identifies, explores, develops, and demonstrates scientific and technological approaches that address gaps in the Global Nuclear Detection Architecture (GNDA); dramatically improves the performance of domestic radiological and nuclear (RN) detection and forensics systems and enabling technologies; or significantly reduces the operational burden for domestic stakeholders such as U.S. Customs and Border Protection (CBP), United States Coast Guard (USCG), Transportation and Security Administration (TSA), Federal Bureau of Investigation (FBI), and state and local law enforcement. The Exploratory Research Program specifically focuses on innovative, high risk, early-stage applied research that is expected to have transformational impact and conducted with a clear and well supported technical approach. Research under this program is expected to culminate in a Proof-of-Concept (PoC) demonstration, that will then serve to support transitioning to an advanced technology demonstration program or supporting direct commercialization of the technology..

DNDO coordinates and consults with other Government agencies (intra-DHS, Department of Energy (DOE), Department of Defense (DoD), *etc.*) to reduce duplication of effort, leverage related R&D efforts, and encourage collaboration across the R&D community.

## 1.2 Global Nuclear Detection Architecture

The GNDA is a framework for detecting (through technical and non-technical means), analyzing, and reporting on nuclear and other radioactive materials that are out of regulatory control. The term “out of regulatory control” refers to materials that are being imported, possessed, stored, transported, developed, or used without authorization by the appropriate regulatory authority, either inadvertently or deliberately. This framework is often presented as having layers associated with the main domains through which detection, analyzing, and reporting may occur, to include the exterior (to the United States) layer, trans-border layer, and interior (within the United States) layer. Analysis of this framework finds technology advancement is required in the following areas:

- There is a need to significantly increase the ability to detect threat objects at greater distances
- There is a need to significantly increase the ability to detect threats with low signatures or when shielded
- There is a need for technology that can be deployed in the non-regulated, non-official air, sea, and land border entries into the U.S.
- The entire cost of ownership (e.g., procurement, operations and maintenance, etc.) needs to be considered when developing new technologies, particularly in “technology pushes.”
- There is a need for integrated, multi-purpose detection technologies and supporting equipment.

In conjunction with intelligence and law enforcement information, nuclear forensics supports the nation’s ability to identify or exclude the origination of interdicted nuclear materials, interdicted nuclear devices, or nuclear detonations. Nuclear forensics is an emerging discipline that aims to become a robust capability similar to traditional forensics science that may provide defensible measurements to both inform intelligence activities and law enforcement investigations, supporting attribution. Analysis of current and desired capabilities has led to gaps in the following areas: signature identification, predictive models, model validation, data mining algorithms, and quantitative decision making analysis. DNDO reviewed these areas for technology advancement identified by the GNDA and nuclear forensics and identified the following “Grand Challenges” that must be considered:

- Cost-effective equipment with sufficient technical performance to ensure widespread deployment;
- Detection of special nuclear material even when heavily shielded;
- Enhanced wide-area monitoring and search in a variety of scenarios to include urban and highly cluttered environments;
- Monitoring along challenging GNDA pathways, to include scanning of general aviation and small maritime vessels, and in between ports of entry; and
- Linking nuclear forensics signatures of interdicted material to specific processing history and origin through characterization and predictive modeling.

Technological solutions to these grand challenges and others required to improve the GNDA will require sustained, long-term support to develop the fundamental scientific and technological foundation necessary to make such detection capabilities effective and affordable. The topics in this solicitation are tied to this objective, and aligned with these grand challenges. Major advances in capabilities that support the GNDA can be achieved through focused research in areas ranging from the sensor materials, front-end-electronics, advanced algorithms, modeling, sensor fusion and other research supporting development of passive, active, and ancillary detection systems. Advances in one or more of these areas in-turn can provide new and improved capabilities for screening, scanning or searching for nuclear and radiological materials of concern, improved identification of these materials and reduced or simplified operations for end-users. The many challenges in developing the GNDA illustrate the need for a well-supported transformational and applied research program to fully explore the limits and potential of physics, engineering, mathematics and computation to counter the radiological and nuclear threat.

### 1.3 Strategic Approach

The DNDO approach to transformational and applied research is intended to stimulate the R&D community in academia, private industry, non-profit organizations, federally funded research and development centers (FFRDCs), university affiliated research centers (UARCs) and other Federally-funded Government activities. To this end, the overall TAR research and development program is organized into four primary initiatives: Exploratory Research, Advanced Technology Demonstrations, an Academic Research Initiative, and Small Business Innovation Research. A description of each of these follows:

- ***Exploratory Research (ER)*** – this BAA is intended to support innovative, high risk, early-stage applied research for nuclear detection technology and supporting fields. Innovative concepts that successfully complete the exploratory R&D phases are typically brought to a Proof-of-Concept (PoC) demonstration – a minimal, but functional, realization of the technology for testing and demonstration, typically in a laboratory environment. DNDO anticipates releasing future Exploratory Research BAAs on an annual schedule.

The present BAA covers only Exploratory Research. However, the following initiatives may be announced as separate solicitation announcements. The following is for informational purposes only. Proposals for Advanced Technology Demonstrations, the Academic Research Initiative and Small Business Innovation Research must await the issuance of their respective solicitation announcements. Solicitation announcements for the following initiatives are anticipated sometime in FY16 or FY17.

- ***Advanced Technology Demonstrations (ATDs)*** are the final stage of development and evaluation of proven (PoC) technology in the DNDO Transformational Research program. The purpose of an ATD is to develop a mature prototype capable of providing reliable performance measurements in a challenging and realistic, albeit simulated, operational environment, replicating the concept of operations and employment relevant to the technologies intended use. ATDs may also include a limited demonstration of the technology in an operational environment. Data generated during technology demonstration and characterization (TD&C) will be analyzed to formulate recommendations on technology maturity, support a cost-benefit analysis of the technology and aid in determining next-steps in development to include potential commercial system development and acquisition.
- ***The Academic Research Initiative (ARI)*** is intended to support a research community in nuclear detection and related sciences within academia that will conduct fundamental and early applied research supporting the DNDO mission. The ARI is also intended to address the human capital crisis in scientists and engineers who can support the next generation of researchers in these fields. Research grants cover a wide breadth of research activities, emphasize collaborative and interdisciplinary approaches to research, and encourage robust student engagement at both the graduate and undergraduate levels. Successful ARI research endeavors may support exploratory research efforts and small business research projects.

- *Small Business Innovation Research (SBIR)* program supports technological innovation that can lead to rapid prototyping and commercialization of concepts by small businesses, to include socially and economically disadvantaged small business concerns.

#### **1.4 Scope and Funding**

DNDO anticipates making multiple awards under this BAA. DNDO reserves the right to fund all, parts, or none of the proposals received and will fund awards by phases as options under this BAA. The actual number and size of awards under this BAA will be at the discretion of DNDO, based on a review of submitted proposals against the criteria listed in Section 6, and the availability of funds.



## 2 EXPLORATORY RESEARCH TOPICS

DNDO is interested in technologies or methodologies that can dramatically improve the national capability to detect and report attempts to import or transport a nuclear device, SNM, or radiological material outside of regulatory control. For this BAA, the technologies and methodologies are divided into three Research Topic Areas (RTA) as follows:

- RTA-01: Approaches for Advanced Continuous Monitoring of R/N Threats by Law Enforcement Vehicles
- RTA-02: Development of Accelerators with Applications to Homeland Security
- RTA-03: Plastic Scintillators: Low cost, Large Volume, Spectroscopic and Long-Term Stable, Plastic Scintillators for Gamma Detection
- RTA-04: Modeling to Improve Risk Assessment and Encounter Dynamics in Challenging (non-Port/Point of Entry) Pathways
- RTA-05: Development of Materials to Support Fundamental Nuclear Data Targets and Nuclear Forensics Reference Materials

Each RTA description below contains a summary of the research area of interest with examples of intended research and overall performance objectives, as appropriate. **Offerors must propose to a specific RTA.** It is anticipated that the topics will change in future exploratory research solicitations, which are scheduled to be released on a yearly basis. Offerors must emphasize the extent to which their proposal provides transformational capability in support of the DNDO mission and compare to current solutions, as applicable. **White papers that are non-responsive to a specific RTA will be not encouraged for proposal submission and proposals that are non-responsive will not be selected for award.**

DNDO prefers comprehensive programs that may include elements of scientific theory, modeling, simulation, experimental investigations, algorithm development, and other elements of applied research and development. All exploratory research efforts should lead to a formal proof-of-concept demonstration. Note that the intended scope of exploratory research excludes large scale, integrated systems development efforts that are the focus of advanced technology demonstrations and other developmental programs and projects.

Proposals should provide a phased technical approach (see Section 3.1), starting with a feasibility demonstration and evaluation in Phase I to address all critical technical issues; leading to a PoC prototype demonstration in Phase V. A program can enter into a phase later than feasibility if the proposal can show that feasibility has already been demonstrated. Supporting documentation, data, simulations, analytic calculations, and references need to be provided to support the proposed approach. **For this BAA, DNDO is only considering offerings addressing solutions for areas described in the following Research Topic Areas (RTAs).**

## 2.1 RTA-01: Advancements in Low-Cost Plastic Scintillators for Gamma Detection

One of the technical Grand Challenges for the DNDO mission is “cost-effective equipment with sufficient performance to ensure widespread deployment.” Performance is often gauged by sensitivity in detecting radiation (efficiency), particle discrimination (neutrons versus gamma-rays), and energy resolution. One route to addressing this challenge at the extreme end of cost and energy resolution is with plastic scintillators.

Plastic scintillators offer the possibility of very low cost (dollars per cm<sup>3</sup> or gram) and very large size gamma radiation detectors. The larger sizes (approximately 14 inch wide x 68 inch high x 3 inch thick) are often used in radiation portal monitors (RPMs) at ports of entry along the nation’s borders and overseas. The basic starting polymer matrix material for these portals is usually either polyvinyl toluene (PVT) or polystyrene (PS), to which are added fluors to provide scintillation properties. Current plastics are low cost but also have poor energy resolution. Further, these plastics can exhibit degraded performance over time (reduced sensitivity, fogging) when subjected to extreme environmental conditions (high humidity and a wide ranging temperatures).

Recent R&D in plastics technology has resulted in a number of advances, including improved efficiency for detection of gammas, improved pulse shape discrimination (PSD) to distinguish gammas from neutrons, and improved energy resolution. Performance enhancements are achieved with the right mix of additives, including primary and secondary fluors (dyes), cross-linkers, initiators, metals, and/or organometallic complexes.

This topic area is composed of two sub-topics. Sub-topic A ventures to demonstrate scale-up of the more promising spectroscopic plastics compositions. Sub-topic B seeks to gain a better understanding of the stability of standard scintillator plastics and will explore sensitivity degradation mechanisms and their dependence on material properties and composition. Offerors should submit separate proposals in response to either of these sub-topics (i.e., do not submit a single proposal addressing both).

### **Sub-Topic A: Size Scale-Up of High Efficiency Spectroscopic Plastics**

This sub-topic starts by first seeking proof of concept in relatively small size plastic samples of a high energy resolution plastic (matrix together with the requisite additives). These samples have to demonstrate minimum requirements for energy resolution and light output, as well as reasonable mechanical and chemical properties (hardness, non-reactive). Samples should be evaluated as to scalability to large size, by including measurements of transparency, self-absorption and uniformity of the bulk. Initial testing should be performed to also explore stability of the plastic to challenging long term environmental conditions (such as cycles of high humidity and large changes in temperature) via accelerated life testing.

If acceptable results are achieved in small samples, the effort would progress to rapidly scale sample size and volume of the candidate composition, with repetition of the performance and stability testing that was performed for the smaller samples. Each proposal shall propose only one composition. With continued success, the effort would ultimately produce several full size

plastic panels. Successful completion of the effort would include technology transfer to industry for commercialization.

- Proposals submitted under this sub-topic area shall provide compelling evidence that a sample of 1.5” diameter x 1” thickness can achieve
  - 8% (objective) and 11% (threshold) efficiency at 662 keV
  - 15% efficiency at 662 keV relative to NaI for equivalent volume.
  - Light Yield (LY) of greater than 7,000 photons/MeV
  - Pulse Shape Discrimination with FOM equal or greater than 1.5
    - $FOM \equiv (\text{Energy of neutron peak} - \text{Energy of gamma peak}) / (\text{Neutron FWHM} + \text{Gamma FWHM})$ .

This evidence can be provided by either presenting actual experimental results, or providing sufficient and compelling evidence that such a result can be achieved in Phase I, which can include modeling and simulation supported by experimental results. The exact size indicated above does not need to be achieved if sufficient scaling from another size can be justified.

- Proposals submitted under this sub-topic area shall provide evidence that a sample of 1.5” diameter x 1” thickness can within this effort ultimately be scaled up to full portal sizes.
- Proposals submitted under this sub-topic area shall provide evidence that ultimate costs of the proposed plastics should be comparable or slightly higher (within factor of 3) of current COTS panels used in portals. Proposals shall provide a cost-model to justify ultimate costs.
- Proposals submitted under this sub-topic area shall provide a path forward to transfer the technology to industrial commercialization.

#### Phase Expectations:

- Phase I (9 months):
  - Experimentally demonstrate a sample of at least a size of 1.5” diameter x 1” thickness can simultaneously achieve at least 11% energy resolution at 662 keV, 15% efficiency relative to NaI, Light Yield (LY) of at least 7,000 photons/MeV, and an FOM of at least 1.5.
  - If this performance level has already been demonstrated, the Offeror can proceed directly into Phase II.
  - Perform initial measurements on mechanical properties (hardness), transparency, self-absorption, and uniformity.
  - Perform initial accelerated life tests to quantify degradation to challenging long term environmental conditions.
  - In Phase I, contractors should start outreach to identify and commit technology transition partner for commercialization.
- Phase II (12 months):

- Scale up sample size to 8" x 8" x 3" and achieve comparable performance to that in Phase I. Intermediate sizes can be demonstrated before achieving the 8"x8"x3" (e.g., 4"x4"x3").
  - Phase II shall include demonstration of reliable, existing sources of all precursors required for material production (e.g., organometallics, monomers, primary and secondary fluors, cross-linkers, initiators), or shall develop the capability to synthesize large quantities of requisite additives sufficient for large (14"x68"x3") panel production.
  - Perform measurements on mechanical and chemical properties (hardness, inertness), transparency, self-absorption, and non-uniformity.
  - Modeling should be provided to show performance extrapolation expectations to full size portal plastic devices.
  - Perform additional accelerated life tests to quantify degradation to challenging long term environmental conditions.
  - Develop initial plans to transition technology to commercialization organization.
- Phase III (18 months):
    - Scale-up to a size of 14"x68"x3" samples.
    - Demonstrate performance characteristics as denoted in Phases I and II.
    - Perform accelerated life tests to quantify degradation to challenging long term environmental conditions.
    - Transfer of technology to industry and commercialization.

The proposal submitted under this sub-topic area should provide a phased technical approach (see Section 3.1.1): starting with a feasibility demonstration and evaluation in Phase I to address all critical technical issues, leading to a demonstration of a scalable solution in Phase III to the sizes indicated above. The program may begin in a phase later than feasibility if the proposal can show that feasibility has already been demonstrated.

**Sub-Topic B: Fundamental Understanding of Long Term Stability of Polystyrene (PS) and Poly Vinyl Toluene (PVT) [and other relevant compositions] – based plastics**

PVT and to a lesser extent PS are presently the work horse gamma detection materials used in large size portal detectors. In addition, there is presently much ongoing research into new plastics as they offer the potential for very low cost and very large detectors with improved energy resolution as well as dual neutron-gamma detection.

Sub-topic B seeks to gain a better understanding of the long term stability of scintillator plastics and will explore sensitivity degradation mechanisms and their dependence on material properties and composition. Plastics in general are known to degrade over time, with the rate and extent of reduced performance being affected by a range of factors. This topic area seeks to gain a comprehensive understanding of the degradation processes (mechanics, chemistry and physics) for PVT (polyvinyl toluene) and PS (polystyrene) in particular, but could also consider and other COTS scintillating plastics as well as those plastics presently under consideration for advanced spectroscopic, low cost and or dual particle (neutron and gamma) plastics for rad/nuc detection.

There is much collected data that characterizes the degradation behavior, as documented in reports (see References below). Data suggests that PVT degrades due to particular sequences of exposure to humidity and temperature cycling, with some of the degradation being reversible and some being irreversible and residual. Degradation of the plastic exhibits itself as a variety of defects which can form on the surface, in the near surface region, or in the bulk. One type of phenomenon which is particularly evident is a fogging of the bulk caused by point like defects. It is observed that these defects occur even in virgin (pure PVT or PS) plastics, without any additives.

Humidity and temperature swings seem to be correlated with the observation of these defects, and may contribute to the cause. This sub-topic area seeks to understand and document:

- The numerous types of defects
- The root cause of the defects
- The dependence of the defects on the base matrix material
- The dependence of the defects on the various additives (primary and secondary fluors (dyes), cross-linkers, initiators, heavy metals, and/or organometallic complexes, excess monomers)
  - This would require investigation into pure versions of the PVT and PS matrices
- The correlation of these defects with the various material properties of the plastics
- The evolution of these defects from initiation to maturity
- The effect of these defects in degrading performance.

The effort should relate basic properties and characteristics of specific lots of different plastics with their susceptibility to degradation including COTS plastics as well as those presently undergoing R&D development.

- The ultimate goal is to explain all of the observed phenomena regarding the various defects and degradation of plastic scintillators, and to develop a full and detailed description of the degradation process(es) time evolution. This effort shall list all possible degradation mechanisms and rank them as to their contributions to degradation and fogging for all possible environmental scenarios.

This effort will require significant efforts on accelerated life testing in environmental chambers (high humidity, temperature ranges of -40F to +50F). Also, as it is observed that the size of samples is a factor in the degradation processes, it is necessary that testing be performed on samples as large as possible (preferably 8"x8"x1.5" or greater).

Proposals should detail the approach to be used to perform the investigation, the diagnostics to be used to characterize the defects as well as the time evolution of the defects under different environmental conditions, the capability of obtaining or producing the various plastics, the access to environmental test chambers, and any modeling or simulations which will be performed in conjunction with the experimental tests.

The proposal submitted under this sub-topic area should provide a phased technical approach (see Section 3.1.1): starting with a feasibility demonstration and evaluation in Phase I to address all critical technical issues; leading to a PoC prototype demonstration in Phase III. The program

may begin in a phase later than feasibility if the proposal can show that feasibility has already been demonstrated.

### **REFERENCES:**

1. R.J. Cameron, B.G. Fritz, C. Hurlbut, R.T. Kouzes, R. Ramey, R. Smola; "Fogging in polyvinyl toluene," Transactions on Nuclear Physics, 62:1-4 (February 2015)

## **2.2 RTA-02: Approaches for Advanced Continuous Monitoring of Radiological/Nuclear Threats by Law Enforcement Vehicles**

Whether conducting preventative radiological/nuclear (R/N) detection operations in steady state or enhanced steady state, it is important to increase the probability of encounter by having RN detectors operating continuously and sampling the widest area possible. Law enforcement (LE) personnel are already over-burdened with a wide range of missions and employing a wide range of personal equipment. Wide-area RN monitoring would be enabled if detection systems were seamlessly integrated with LE vehicles, and were enhanced through utilization of ancillary sensor data already generated by these vehicles. These sensors include on-board GPS, dash-cams and other vehicle mounted video systems, and other sensors being integrated in modern vehicles supporting semi-autonomous driving, to include LIDAR, stereo camera and short and long-range radars. With sufficient fusion approaches, a patrol car could provide an advanced R/N detection capability with heightened situational awareness both in motion and while conducting vehicle stops. Other benefits of sensor enhanced RN vehicular monitoring are improved R/N detection performance and the ability to quantify the dynamics of vehicle-based encounters providing improved abilities to detect, localize and track threats. This topic is seeking applied research in novel approaches to the following areas:

1. Concepts for low cost, high sensitivity ( $>30 \text{ cm}^2/\%$  total\*), compact size, weight and power (SWaP), good resolution ( $<6\%$  at 1132 keV) gamma radiation detectors that can be readily integratable with modern law enforcement vehicles (e.g. Ford Police Interceptor (sedan and utility), Dodge Charger Pursuit, Chevy Impala or Tahoe, etc.). Neutron detection is desirable, but not mandatory. The approach will need to consider low-operational impact, precise gain control ( $<1\%$  across full energy range), emplacement options that enable the below areas, and protection from the physical and environmental conditions typically experienced by law enforcement.
2. Utilization of vehicle cameras (e.g. dash cams or in-car video cameras) to provide situational awareness and context for the radiation detectors integrated on the vehicle. Video analytics applied to this video data may enable such capabilities as tagging and tracking suspect conveyances carrying radioactive materials, or aid in the identification of specific conveyance characteristics, such as make and model for vehicles, or at least class or type (e.g. small boats, pedestrians with large bags, parked cars). This data may also support improved detection performance through adaptation of detector integration times, or compensate for background suppression caused by a conveyance.

3. Advanced algorithms that can fuse video and other vehicle generated sensor data (LIDAR, radar, etc) with radiation sensor data to provide broader R/N situational awareness capabilities around the vehicle. This may include providing more reliable means for determining spatial/temporal correlations between detectors and sources to enable improved detection/localization/tracking of threats. It may also help inform the nature and characteristics of the naturally occurring and expected man-made radiation environments to improve anomaly detection.
4. Advanced messaging and communications capabilities that afford sharing large amounts of radiation detection and other vehicle sensor data in real-time to command posts, fusion centers or other domain awareness capabilities to support cloud-based analyses and improved command and control of detection assets to improve wide-area search and monitoring performance.

Technical approaches ideally will address multiple areas, but focusing on a single area is acceptable if it is readily accessible and extensible to developmental efforts in the other areas. Integrated approaches that support high degrees of fused situational awareness (e.g. consider the Google Maps Street View, but with radiation data overlay) will also support modeling and simulation applications where threats may be injected into data that could then be used for training, CONOPs development, and developing operational models of conveyance encounters. Emphasis will be on approaches that show greatest potential for improved search and monitoring operations and that can be readily be transitioned to law enforcement operations. Partnerships with law enforcement organizations that have interest in this mission are encouraged to support this objective. Any software developed under this effort must be open-source and support open architectures.

The proposal must provide a phased technical approach (see Section 3.1.2): starting with a feasibility demonstration and evaluation in Phase I to address all critical technical issues; leading to a proof-of-concept prototype demonstration in Phase V. The program may begin in a phase later than feasibility if the proposal can show that feasibility has already been demonstrated.

\*  $A\epsilon_p/R$  for gamma detection where  $A$  is the area of the largest face of a rectangular detector with a square cross-section,  $\epsilon_p$  the photo-peak efficiency for 1.17 MeV gammas normally and uniformly incident to that face, and  $R$  the detector FWHM resolution at 1.17 MeV in percent. See Defense Advanced Research Agency SIGMA Solicitation at [https://www.fbo.gov/?s=opportunity&mode=form&id=6f2233f3afccdaa77f0378ea301d1632&tab=core&\\_cview=0](https://www.fbo.gov/?s=opportunity&mode=form&id=6f2233f3afccdaa77f0378ea301d1632&tab=core&_cview=0) for additional details.

### **2.3 RTA-03: Development of Accelerators with Applications to Homeland Security**

A longstanding technical Grand Challenge for the DNDO mission is the detection of nuclear threat materials even when shielded. The Transformational and Applied Research Directorate (TAR) within DNDO has been sponsored a range of research and development efforts that utilize active detection approaches (e.g., radiography, induced fission) to overcome this challenge. These applications require the use of a radiation source of penetrating particles capable of inspecting large cargo containers, conveyances or objects, and providing information in either

the transmitted beam or from induced signatures on the presence of high atomic number or nuclear materials.

Historically, the requirements for development of these types of radiation sources have been driven by medical and industrial applications. Demand for Homeland Security applications is relatively small by comparison. Currently only a handful radiation sources can be used for Homeland Security applications because of such factors as cost, performance or required operational footprint. For example, sources used in non-intrusive inspection (NII) systems that are capable of achieving high performance have a trade-off of being large in size; alternatively, compact sources exist but achieve limited penetration performance. Therefore, there is a need for high performance, compact sources that enable NII and active interrogation (AI) systems that specifically support Homeland Security requirements.

This topic is seeking proposals for development of accelerators with improved performance for Homeland Security applications for pulsed (Sub-Topic 1A) and continuous wave (Sub-Topic 1B) operation. The proposals should include:

- 1) Description of presently employed accelerators in systems (state-of-the-art) that the proposed technology would replace;
- 2) A performance comparison between the proposed accelerator technology and the current state-of-the-art detailing which metrics are not met, which are met, and which are exceeded;
- 3) A comparison of suitability factors to include weight, power, and size projections, to include likely operating footprint, compared to current state-of-art, as well as likely cost of the approach;
- 4) Expected challenges and risks in developing the proposed accelerator technology and their mitigation plans;
- 5) Description of the types of NII/AI systems the source can be used for; and
- 6) Expected duration of the development effort needed to make the accelerator available for testing.
- 7) Commercialization or technology transfer plan if applicable

Furthermore, all sources should meet the following requirements:

- 1) Either fan or pencil beam;
- 2) Minimized photoneutron production for primary application; and
- 3) Durable, reliable, and require low maintenance.

Proposed approaches can include improvements to currently deployed systems addressing the requirements indicated below. The proposal would be best informed from teams consisting of NII/AI systems designers and integrators and accelerator developers.

**Sub-Topic 1a: Accelerators for Pulsed Operation** Proposed approaches submitted under this sub-topic area must achieve or exceed all of the following performance metrics:

- High duty factor (> few %)
- >1 kHz rep rate



- Pulse width of 5-50 microsec
- Interlaced or single energy up to 10 MeV
- Energy stability and pulse by pulse variation of <0.1%
- Average electron beam current up to 2 mA
- Low cost (<\$300k)
- Compact in size (<3000 lbs including shielding and necessary components)
- No cryogenic liquids required for operation

Accelerator technologies capable of meeting the requirements indicated above in addition to energy modulation (2, 4, 6, 9 MeV switching within 0.1 msec) and/or current modulation (range from 0.1 microA to 1 mA) are also of interest.

**Sub-Topic 1b: Accelerators for Continuous Wave Operation** Proposed approaches submitted under this sub-topic area must achieve or exceed all of the following performance metrics:

- Interlaced or single energy up to 10 MeV energy operation
- <10 kW average power
- Low cost (<\$750k)
- Compact in size (<5000 lbs including shielding and necessary components)
- Current modulation (0.1 microA to 1 mA)
- No cryogenic liquids required for operation

Accelerator technologies capable of meeting the requirements indicated above in addition to energy modulation (2,4,6,9 MeV within 0.1 msec) are also of interest.

The proposal must provide a phased technical approach (see Section 3.1.2): starting with a feasibility demonstration and evaluation in Phase I to address all critical technical issues; leading to a proof-of-concept prototype demonstration in Phase V. The program may begin in a phase later than feasibility if the proposal can show that feasibility has already been demonstrated.

## **2.4 RTA-04: Modeling to Improve Risk Assessment and Encounter Dynamics in Challenging (non-Port/Point of Entry) Pathways**

The Domestic Nuclear Detection Office is seeking to enhance detection and interdiction capabilities of radiological/nuclear (RN) material trafficking in between primary Ports and Points of Entry (POEs) into the United States. These challenging pathways are often characterized by expansive geographic regions, a lack of suitable chokepoints for radiation measurement, and highly variable routes. Examples of these pathways include general aviation, small maritime vessels used for recreational and/or commercial purposes, and the northern and southern land borders between POEs. This topic area seeks proposals to develop modeling and simulation tools that can enhance the probability of encounter of law enforcement assets (e.g. US Border Patrol, US Coast Guard) with persons or conveyances that may carry illicit RN material or threat devices through these pathways.

Proposals are sought to develop modules that enhance modeling and simulation capabilities within the following sub-topics, capable of being integrated into existing modeling and

simulation capabilities. Note that proposers are specifically encouraged to focus on only one or two of the following research directions, rather than attempting to address all topics.

- Pattern-of-Life Analysis: Enhancing and/or incorporating existing pattern-of-life models of normal population movement/migration patterns across any of these challenging pathways through additional/novel data streams and/or analysis of the effects of geographic/building terrain features. Proposals should clearly identify the data streams and/or intelligence sources that will be used to improve existing models.
- Trafficking Behavior Indicators: Incorporate observables derived from persistent monitoring capabilities to identify indicators of elevated activity or anomalous behavior related specifically to RN material trafficking. Proposals should clearly identify the motivations behind any chosen secondary indicators, and the proposed data streams (e.g. video data, geospatial intelligence) that will be used to develop and validate these models.
- Adversary Behavior Modeling within Agent-based Models: Explore methods of developing agent-based models of potential adversaries to improve both probabilities of encounter and risk assessment. Possible research efforts may explore developing libraries of verified and validated standard behavioral patterns for both law enforcement and adversaries, in order to produce a baseline probability of encounter dynamics, and assessing the secondary technical capabilities (e.g. acquiring or transporting RN material) of an existing list of adversaries to improve DNDO's risk modeling capabilities.

Any research effort should seek to integrate with existing modeling and simulation capabilities, which may include current force-on-force tools, agent-behavior tools, geospatial analysis tools incorporating land or building geography, and/or risk modeling tools. Proposals should clearly identify which tools the effort will support, and how their existing capabilities will be enhanced or adapted by the proposed effort.

It is recommended that this topic area have the modified phase structure described below. Each phase would be approximately 6 months in length. An alternate phase structure can be proposed with justification.

Phase 1 – Feasibility: The vendor will develop a preliminary modeling and simulation algorithm to address the chosen subtopic. The purpose of this phase is to test the basic feasibility of the proposed concept.

Phase 2 – Preliminary Simulations: The vendor will develop one or two test cases of their algorithm and submit findings to the Government.

Phase 3 – Critical Simulations: The vendor will verify and validate their test cases and submit findings to the Government.

Phase 4 – Integration: The vendor will work to integrate their validated module into an existing modeling and simulation software capability, to be provided by the Government.

## 2.5 RTA-05: Development of Materials to Support Fundamental Nuclear Data Targets and Nuclear Forensics Reference Materials

Many materials needed for fundamental nuclear data targets and nuclear forensics reference or well-pedigreed materials are not available and difficult to obtain because they originate in a nuclear reactor or accelerator and must then be carefully processed. In many cases, the desired materials require advanced chemical and/or isotopic separation methods for purification. Therefore, innovative techniques are sought to generate targets and reference or well-pedigreed materials of sufficient size and with controlled material properties, including isotopic and elemental purity, chemical speciation, and material form. Specifically, novel techniques are sought in one or both areas below:

1. **High Purity Targets and Fundamental Nuclear Data:** Before nuclear data experiments can be run, high purity targets must be prepared so that experimental data can be accurately generated, interpreted and achieve needed uncertainties. Research is needed both in the precision production of high purity target materials, particularly actinide isotopes, and acquisition of fundamental nuclear data essential to nuclear detection and nuclear forensics. Isotopic purity, target evenness, mass and chemical/physical form greatly impact the quality of data determined from nuclear data experimentation. Examples of needed improvements in nuclear data include activation product cross-sections (especially for short-lived nuclides), refinement of independent and cumulative fission product yields, lifetime measurements, particle energy emissions, and determination of energy dependencies, among other phenomena. Further, there is need to develop novel processes and techniques, to include but not limited to vacuum vapor deposition for producing and processing needed isotopic material ranging from 10s of milligrams to up gram scale. As a result of the lifetime or volatility of the desired material for target production, efficient separation and expedited deposition may be needed to address the needs for these fundamental nuclear data experiments. Proposed research should emphasize techniques, targets and data that directly support nuclear detection and forensics applications.
2. **Reference Material Development:** Nuclear forensics needs several certified reference materials for reliable quantitation of elements and isotopes of interest. In particular, there is a need for production, separation, purification, and quantification of  $^{236g}\text{Np}$  along with documented estimates of its analytical uncertainty. Fundamental research involving neutron or particle bombardment is needed for production of isotopically pure  $^{236g}\text{Np}$ , and development of methods is needed for efficient isotopic and chemical micro-separation and certification of ultra-low level spikes. In addition to  $^{236g}\text{Np}$ , research is needed to produce high purity  $^{243}\text{Am}$  spike,  $^{244}\text{Pu}$  spike,  $^{241/243}\text{Am}$  ratio standard, and other isotope ratio standards. Yield and purity estimates must be provided for both the production and separation steps. Proposed research on other radionuclides should provide a clear justification on their role in nuclear forensics and summarize current limits in state-of-art reference material development.

The proposal submitted under this sub-topic area should provide a phased technical approach (see Section 3.1.1): starting with a feasibility demonstration and evaluation in Phase I to address all critical technical issues; leading to a PoC prototype demonstration in Phase III.

The program may begin in a phase later than feasibility if the proposal can show that feasibility has already been demonstrated.

### **3 MANAGEMENT APPROACH**

#### **3.1 Program Milestone Structure**

When responding to the topic descriptions, all Offerors should choose one of the two research and development approaches detailed below, unless otherwise noted in the topic description. These two approaches are: 1) General Research approach, or 2) Applied Development Leading to Proof-of-Concept Demonstration approach. If the Offeror chooses to propose a management plan that does not follow the phased approaches described herein, they must provide a justification for their own approach, including a discussion of the benefits to the Government of their approach.

Regardless of the approach chosen, all proposals must be submitted with a detailed master plan and schedule describing the phases of execution to successfully achieve research objectives and must provide costing information for each phase corresponding to the proposed research structure. Selection for award constitutes commitment of funding for the initial phase, while funding for the subsequent phases will depend on the performance of the preceding phase and availability of funds. Be advised that although up to five phases may be proposed for each approach, previous experience indicates most selected efforts have an actual period of performance from one to three years.

The two approaches are as follows:

##### ***3.1.1 General Research:***

Proposals dealing with more basic research for which phased systems engineering approaches and detailed milestones are difficult to apply should propose the following phased approach:

- Phase I: Conduct research and development needed to demonstrate the proof-of-principle or feasibility of a hypothesis, theory or premise with focus on those aspects that involve the greatest scientific or technological risk. These efforts will lead to a Feasibility Evaluation Review (FER). Phase I efforts will generally be no longer than 6-9 months, and represent no more than one quarter of the full intended effort. Phase I efforts longer than 9 months require justification. Generally, funding for phase I efforts are limited, and should be less than \$300K.
- Phase II – IV: Following a successful FER, succeeding phases will be negotiated based on research results of phase I, and a proposed master plan and schedule that describes specific accomplishments and milestones to be achieved by phase, with the ultimate goal to demonstrate a scalable solution to a given technical challenge or capability gap.

##### ***3.1.2 Applied Development Leading to Proof-of-Concept Demonstration:***

Proposals that lead to a Proof-of-Concept (PoC) prototype demonstration with final testing and demonstration (T&D) shall follow the phased approach below. Projects that were previously funded by the Government or other funding source may enter at an advanced Phase provided that justification is included in the proposal.

- Phase I: Conduct necessary research and development focused on addressing all critical scientific and technical issues and risks, leading to a conceptual design and concluding in a Feasibility Evaluation Review (FER) and report. Phase I efforts will generally be no longer than 6 – 9 months, and represent no more than one quarter of the full intended effort. However, any duration longer than 9 months would require full justification. Generally, funding for phase I efforts are limited, and should be less than \$300K.
- Phase II: Following a successful FER, conduct the necessary research and development (experiments, modeling, analysis, and trade studies) to validate the final PoC prototype design choice, culminating in a Preliminary Design Review (PDR) and report;
- Phase III: Following a successful PDR, conduct the necessary engineering and development to present a Critical Design Review (CDR) and report;
- Phase IV: Following a successful CDR, proceed to develop, fabricate, and assemble a prototype component, device, or algorithm, culminating in a Test Readiness Review (TRR) and report. Submit T&D plan for the PoC demonstration for DNDO approval; and,
- Phase V: With participation of DNDO, execute the T&D plan and generate a comprehensive final report for the entire effort.

## **3.2 Deliverables and Review Cycles**

The number and types of reviews and deliverables will be specified in the award document, but is anticipated to include reports and reviews described in this section. The reports shall be prepared and submitted in accordance with the award document and mutually agreed on before award. A Final Report that summarizes the project and tasks will be required at the conclusion of the performance period for the award. All reports, briefings, and other documents described below shall be electronically submitted to both the DNDO Program Manager (PM) and either the DHS Contracting Officer or Grants Officer, as appropriate.

The following reports are anticipated in managing funded efforts:

### ***3.2.1 Project Plan, Milestones and Schedule***

The project plan includes a task and event-driven plan that documents the significant activities and accomplishments necessary to complete each phase of the project, with greatest detail provided for the initial phase of the effort. The plan should include major milestones for each phase that can be used to assess research progress, and potentially as go/no-go criteria for latter phases of the effort. The plan also includes a detailed spend plan for all tasks necessary to complete the work. The project plan, milestones and schedule should be delivered during the kick-off activities following contract award and should be updated as necessary for each phase of the effort.

### ***3.2.2 Quad Chart and Project White Papers or Summaries***

Quad charts are one page documents that provide a very concise summary of the overall effort and are generally updated annually or when significant changes occur within an effort. The quad chart should include a picture, graphic or artist's conception of the effort in the top left, a summary of technical approach and risks in the bottom left, a summary of relevance and goals on the top right, and a summary of schedule, budget and team in the bottom right. A template is provided in Section 8. The project summaries are one or two page narratives that are usually used to communicate the nature, scope and impact of a research effort to persons or audiences internal or external to DNDO. Specific templates will be provided for any required white paper or project summary.

### ***3.2.3 Monthly Progress Report (MR)***

Brief narrative reports shall be submitted within two weeks after the last day of each month. These reports will include:

- A summary of the previous month's activity,
- Progress achieved against planned goals and milestones,
- A summary of technical challenges and risks, and risk mitigation strategies (as necessary)
- Details of research planned for the next month,
- An account of all funds expended by task to date, and
- Any additional information required by the DNDO Program Manager.

Monthly reports generally should follow a standardized template format that will be provided by DNDO.

### ***3.2.4 Performance Reviews***

Performance Reviews (PRs) will be held every three to six months or as needed depending on the project risk and duration. A kickoff meeting will take the place of the initial PR, and shall be held within the first three (3) months after contract or grant award. The PR briefing is due one week prior to the PR, for which a suggested presentation outline will be provided by DNDO. A PR briefing will be comprehensive in nature and must include, where appropriate:

- Review of the prior quarter's activity,
- Review of the overall technical progress,
- A summary of technical challenges and risks, and risk mitigation strategies,
- A comprehensive account of all funds expended by task to date,
- Explicit plans for the next quarter including an updated Gantt chart for the current phase, and
- Any additional information required by the DNDO Program Manager.

Meeting minutes shall be generated within one week after the PR. The PR does not replace the monthly progress report, unless agreed upon in advance with the DNDO Program Manager.

### ***3.2.5 End of Phase Performance Evaluation & Report***

Each phase concludes with submission of an End of Phase Report, and may also include a performance evaluation in the case of research following the phased structure in 3.1.2. If a performance evaluation is required, the briefing material is due one week prior to the evaluation. The performance evaluation will be the basis for determining continued funding for the follow-on phase. The End of Phase Report does not replace the monthly technical report. The evaluation must include, where appropriate:

- Technical progress achieved against phase goals,
- A summary of technical challenges and risks, and risk mitigation strategies,
- A comprehensive account of all funds by program, project, and tasks expended during the phase along with a comparison of these figures with projections from the start of the contract,
- If follow on work is proposed, updates as required to the project plan, milestones and schedule, statement of work (SOW) and cost breakdown for the next phase,
- Lessons learned and their impact on future R&D, and
- Any additional information required by the DNDO Program Manager.

The End of Phase Report and meeting minutes are due two weeks after the evaluation or end of phase, whichever is soonest, and it should address issues raised during the evaluation.

### ***3.2.6 Final Report***

A Final Report shall be due at the end of the final phase of the effort. The final report will be a cumulative, stand-alone document that describes the work of the entire program and project. The final report shall also include “lessons learned” from the effort, recommendations for future research in this area, and a comprehensive accounting of all funds expended. A final report will be due within 60 days of the end of the final phase's period of performance.



## 4 PROCUREMENT OVERVIEW

### 4.1 Eligible Offerors

Private industry, non-profit organizations, and academic institutions are invited to submit proposals to this BAA, and may team/subcontract with other companies, organizations, and institutions to include FFRDCs, UARCs and other Federally-funded Government activities, as appropriate, to best utilize their individual strengths.

Historically Black Colleges and Universities (HBCU), Minority Institutions (MI), Small and Disadvantaged Businesses (SDB), women-owned businesses, and HUB-zone enterprises are encouraged to submit proposals, and to join others as team members/subcontractors in submitting proposals. However, no portion of the BAA will be set-aside for these special entities pursuant to FAR Part 19.502-2.

FFRDCs, UARCs and other Federally-funded Government activities may not propose directly as prime contractors to this BAA. However, they may collaborate with eligible Offerors by providing explicitly identified supporting capabilities. It is the responsibility of the providing laboratory (not DNDO) to identify which supporting capabilities are available. DNDO will neither encourage nor discourage eligible Offerors from utilizing FFRDCs, UARCs and other Federally-funded Government activities. This is at the sole discretion of eligible Offerors. All members of the proposed team may participate in proposal preparation and fully participate in the execution of the program. UARCs must include as part of a proposal a statement of permission to participate from the Center's Federal sponsoring activity.

Foreign participants and/or individuals may participate to the extent that such participants comply with any necessary Non-Disclosure Agreements, Security Regulations, Export Laws, and other governing statutes applicable under the circumstances.

Offerors must be registered at [www.SAM.gov](http://www.SAM.gov) in order to be eligible for a contract under this BAA.

**Note:** Pursuant to FAR 25.701, except as authorized by the Office of Foreign Assets Control (OFAC) in the Department of the Treasury, no contracts shall be awarded as a result of this BAA if any proclamation, Executive Order, or statute administered by OFAC, or OFAC's implementing regulations at 31 CFR Chapter V, would prohibit such a transaction. Except as authorized by OFAC, most transactions involving Cuba, Iran, and Sudan are prohibited, as are most imports from North Korea into the United States or its outlying areas. More information about these restrictions, as well as updates, is available in OFAC's regulations at 31 CFR Chapter V and/or on OFAC's website at <http://www.treas.gov/offices/enforcement/ofac>.

**Note:** FAR 52.225-13, Restrictions on Certain Foreign Purchases, is applicable to this solicitation and will be included in any resulting contract.

Organizational Conflict of Interest issues will be evaluated on a case-by-case basis as outlined below. Offerors who have existing contract(s) to provide scientific, engineering, technical and/or administrative support directly to DHS DNDO will receive particular scrutiny.

**Organizational Conflict of Interest:**

(a) **Disclosure.** The Offeror must represent, as part of its proposal and to the best of its knowledge that: (1) It is not aware of any facts which create any actual or potential organizational conflicts of interest relating to the award of this contract; or (2) It has included information in its proposal, providing all current information bearing on the existence of any actual or potential organizational conflicts of interest, and has included the mitigation plan in accordance with paragraph (d) of this provision.

(b) **Determination.** The Contracting Officer may determine that this effort may result in an actual or potential conflict of interest, or may provide one or more Offerors with the potential to attain an unfair competitive advantage based on the information provided or based on knowledge of the Contracting Officer.

(c) If any such conflict of interest is found to exist, the Contracting Officer may (1) disqualify the Offeror, or (2) determine that it is otherwise in the best interest of the United States to contract with the Offeror and include the appropriate provisions to mitigate or avoid such conflict in the contract awarded. After discussion with the Offeror, the Contracting Officer may determine that the actual conflict cannot be avoided, neutralized, mitigated, or otherwise resolved to the satisfaction of the Government, and the Offeror may be found ineligible for award.

(d) **Mitigation/Waiver.** If an Offeror with a potential or actual conflict of interest or unfair competitive advantage believes it can be mitigated, neutralized, or avoided, the Offeror may submit a mitigation plan to the Contracting Officer for review. Award of a contract where an actual or potential conflict of interest exists shall not occur before Government approval of the mitigation plan.

(e) **Other Relevant Information.** In addition to the mitigation plan, the Contracting Officer may require further relevant information from the Offeror. The Contracting Officer will use all information submitted by the Offeror, and any other relevant information known to DHS, to determine whether an award to the Offeror may take place, and whether the mitigation plan adequately neutralizes or mitigates the conflict.

(f) **Corporation Change.** The successful Offeror shall inform the Contracting Officer within thirty (30) calendar days of the effective date of any corporate mergers, acquisitions, and/or divestures that may affect this provision.

(g) **Flow-down.** The contractor shall insert the substance of this clause in each first tier subcontract that exceeds the simplified acquisition threshold.

**4.2 Review and Evaluation Process**

It is the policy of DHS/DNDO to ensure an impartial, equitable, and comprehensive evaluation of all proposals and to select the source (or combination of sources) whose offer is most advantageous to the Government. Evaluation criteria for proposals are stated in Section 6 and include the potential for transformational impact, technical approach, team capability and

experience, management approach, and cost/price realism and reasonableness. See Section 6 for evaluation criteria and proposal evaluation details.

The review process for white papers and proposals will be different. White papers will go through an informal review process instead of a formal evaluation as described above and in Section 6. There will be no rating or ranking of white papers – rather companies will either be “encouraged” or “discouraged” to submit a proposal. See Section 5.1 for more details.

White papers may be reviewed by subject matter experts that are Federal employees. The reviewers can also seek the assistance of system engineering and technical assistant (SETA) support contractors, who have signed appropriate non-disclosure agreements. Additional information about the use of non-federal advisors in the evaluation process see Section 5.2.6.

The Contracting Officer will notify all unsuccessful Offerors in writing at the time of award. Post-award debriefs may be conducted and specifics regarding debriefs will be included in the notice of award letters and letters to unsuccessful Offerors.

### **4.3 Award Instruments**

The Government anticipates multiple Cost-Plus-Fixed-Fee contracts or Cooperative Agreements resulting from this BAA. Although multiple awards are anticipated, they are not guaranteed. Contracts and Other Transactions will be administered by the cognizant DNDO program office.

Academic institutions may request Cooperative Agreement (CA) instead of a contract. Institutions requesting a CA will be forwarded, evaluated, and awarded by the Office of Procurement Operations, Grants and Financial Assistance Division. All applicable CA terms and conditions will apply to such awards.

### **4.4 Period of Performance**

DNDO anticipates awarding contracts or CAs with a base period and up to four option periods. No individual phase shall exceed 12 months so that the maximum total period of performance is five years. Be advised that although up to five phases may be proposed for each approach, previous experience indicates most selected efforts have an actual period of performance from one to three years.

## 5 PROPOSAL PREPARATION AND CONTENT

DNDO will not reimburse Offerors for any white paper or proposal preparation costs.

### 5.1 White Paper Preparation: Format and Content

Offerors are **STRONGLY ENCOURAGED**, but not required, to submit a white paper in advance of a proposal (see Section 7.1.1 for instructions regarding the submission of white papers). White papers should capture the essence of a complete proposal and are designed to permit Offerors an opportunity to obtain feedback from DNDO on their project without having to go to the expense and effort of writing a proposal. A white paper shall consist of a *maximum of four (4) pages*, including all pictures, figures, tables, and charts in legible size. The Quad Chart described below is included in the four page limit. The cover sheet will not be included in the four page limit.

A white paper is a single electronic file in PDF format, viewable by Microsoft Windows-7 compatible machines. The individual white paper file size must be no more than 5 MB. White papers shall not exceed four pages (standard size: 8.5” by 11”) using 1” margins and 12-point fonts or larger for text and 9-point fonts or larger for pictures, figures, tables and charts. The white paper should contain the following information in the following order:

- Cover Sheet (see Section 8 for format);
- Quad Chart (see Section 8 for format);
- Proposal title, Offeror, total cost and first phase/year cost;
- Executive Summary (including statement of Transformation Impact and anticipated performance relative to BAA goals and state-of-the-art solutions);
- Technical Approach and Implementation
- Capability and Experience, and Management Approach; and
- Cost/Price Summary

There will be no rating or ranking of white papers. White papers will go through an informal review process instead of a formal evaluation as described in Section 6. White papers will be reviewed by subject matter experts that are Federal employees. The reviewers can also seek the assistance of system engineering and technical assistant (SETA) support contractors, who have signed appropriate non-disclosure agreements.

Additional information about the use of non-federal advisors in the evaluation process see Section 5.2.6, Notification to Offerors of Contractors Support Services for Proposal Evaluation Process.

After the review, DNDO will promptly notify Offerors, either encouraging or discouraging submission of a proposal. If a proposal submission is discouraged, no additional information will be provided. If a proposal submission is encouraged, comments and questions regarding the white paper submission will be provided.

Offerors may submit proposals without submitting white papers. Similarly, Offerors that submit white papers and who are subsequently discouraged from submitting proposals may still submit

proposals. Either decision should be weighed carefully by prospective Offerors relating to the effort required in developing such a proposal.

### ***5.1.1 File Name for White Paper Submission***

In the subject line: Please use “ERBAA16 White Paper Submission for <organization>”

Each proposal file name will include the following:

ERBAA16-##-WP-0##-XXXX

## = research topic number

0## = number of white paper submission.

XXXX = four letter character shortcut for organization name

**Example:** Company A, Inc.’s submission for one white paper to RTA-01 comprised of one (1) file in the attached email:

**Subject:** ERBAA16 White Paper Submission for Company A, Inc.

The email submission should at least include the following information:

- **Organization:** Company A, Inc.
- **Submitted by:** <first last name>, <title>, <email of submitter>
- **Attached file for submission:**
  1. White Paper: *ERBAA16-01-WP-001-COMA.pdf*
- **Request for receipt confirmation?** (YES or NO)

### ***5.1.2 Quad Chart***

The Quad Chart shall contain a title bar and the four quadrants as described below. A template is also provided in Section 8.

- Title Bar: Proposal Title, Lead Organization, and Exploratory Research Topic Area.
- (Upper Left): A clear photograph, drawing, or diagram of concept.
  - Provide a simple, legible, but sufficiently detailed graphic to convey the main concept or idea of the research effort and/or development prototype.
- (Upper Right): Relevance and Goals
  - Research goal and desired end state including performance targets
  - Transformational impact or uniqueness over existing techniques and state-of-art
  - Relevance to and specific contribution in addressing a specified research topic area
  - Other broader impacts of the research
- (Lower Left): Technical Approach
  - Hypothesis or theory supporting the approach, as appropriate.
  - Specify how the problem will be addressed
  - Describe current status of the proposed effort and the first phase
  - Describe the key technical challenges and/or risks
- (Lower Right): Cost/Price, Schedule, and Team
  - Provide milestones, primary deliverables, and task durations for the current phase
  - Provide duration for future phases (if applicable)

- Provide estimated cost per phase
- List the prime organization, principal investigator, and program manager
- List subcontractors and main team members

### ***5.1.3 Title & Vendor***

Provide the title of the proposed effort, the name and address of the vendor, the name and contact information of the principal investigator and program manager (if different), the names and addresses of key team member organizations and key personnel. Clearly identify the Research Topic Area number to which you are responding.

### ***5.1.4 Executive Summary (to include statement of Transformational Impact)***

Provide a brief summary of your concept's anticipated performance relative to the research topic goals and current state-of-the-art solutions, and why, if the research is successful, could have a transformational impact in preventing nuclear or radiological terrorism. Describe what is unique about this proposed technology, how it fits within the topic area, and how it would, if successfully realized, have a significant impact on the DNDO mission objectives and supporting the GNDA. Provide a concise description of the scientific, technical, and/or engineering approach you propose to pursue and address in this effort. Describe the key aspects, core concepts or components and/or prototype device proposed and relevant details about how they will function or perform. This summary should contain enough information to fully capture the program concept/intent and should completely describe the overall program in its entirety without relying on other sections of the white paper.

Note: When submitting white papers, entry of cover page material will include submission of an abstract (see Section 8, Attachments). It is highly recommended the abstract be different than the executive summary, emphasizing the main research objective(s) and technical approach (as discussed below), and excluding any proprietary information.

### ***5.1.5 Technical Approach and Implementation***

Describe the basic scientific/technical concepts or methodology (if applicable) that will be used in each component, subsystem, or stage comprising the proposed research effort that addresses the relevant research topic area. This section should contain the following information:

- **Concept Description:** Describe the basic scientific or technical concepts.
- **Novel Approach:** What is unique about the approach and the advantages it might afford compared to alternate approaches other vendors in this field have taken or are taking?
- **Performance Potential:** Explain the performance your proposed solution can be expected to achieve in as quantifiable a manner as possible. If a topic has specific technical attributes or metrics, explain the potential performance of your technical solution against those attributes or metrics. Be as quantitative as possible.
- **Current State-of-the-Art:** Describe the current state-of-the-art for this proposed technology and who/what achieved this capability.
- **Technical Approach and Critical Path:** Describe the main research goals, and main tasks and methodologies to be employed to achieve these goals. Point out the critical research

path to the proposed investigation, to include what will specifically be accomplished during the initial phase(s) of the effort to achieve research objectives.

- Key Issues: What key scientific, technical and/or engineering issues or challenges need to be addressed and resolved in the initial phase to demonstrate feasibility? What are the foreseen technical risks in the research effort, how significant are these risks, and what is the mitigation strategy for these risks.

### ***5.1.6 Capability and Experience, and Management Approach***

List and describe the extent of your team's past experience and current capabilities to successfully execute the proposed research project. Provide a summary description of the management structure and approach for the effort. Include a summary Gantt chart for the effort, including major milestones and phase durations.

### ***5.1.7 Cost/Price Summary***

Provide a brief summary of the estimated cost and schedule to execute your proposal by Phase. Itemize any unusual or large cost items.

## **5.2 Proposal Preparation: Format and Content**

**Offerors may submit proposals, irrespective of the review and recommendation from the white paper process.** Offerors may choose to alter their ideas, concepts, technical approaches, etc. or expand on their original ideas between their submission of a white paper and their submission of the proposal. Discussions, suggestions, or advice between the Government and Offerors based on white papers is not binding. Offerors are free to submit a proposal regardless of whether they submitted a white paper or not, and regardless of any feedback or advice about white papers that they may have received. Even if the feedback from the Government, in response to the white paper, is that a proposal is discouraged, a proposal may still be submitted and will be evaluated in accordance with the requirements of this BAA. Although it is highly recommended, a white paper does not have to be submitted in order to submit a proposal.

Proposals shall remain valid from the date of submission for six (6) months.

Proposals consist of three separate documents described in detail below:

- Volume I: Technical and Management Proposal (Not to exceed 16 pages);
- Volume II: Supplemental Data (Not to exceed 30 pages);
- Volume III: Cost Proposal (no page limit).

**Volume I is the primary document to be evaluated by the technical reviewers, with Volumes II and III providing supporting information. Note that Volume I should be a stand-alone document.** The supplemental material in Volumes II and III are to be used **at the discretion of the technical reviewers, and may not be reviewed.** Although Volumes II and III may not be used by reviewers, they will be evaluated by the Contracting Officer to ensure compliance with the solicitation. Volume III will serve as the formal costing submission for future contracting discussions should the proposal be recommended for award.

### 5.2.1 File Name for Proposal Submission

In the subject line: Please use “ERBAA16 Proposal Submission for <organization>”

Each proposal file name will include the following:

ERBAA16-VOL#-##-FP-0##-XXXX

VOL# = volume number

## = research topic area0## = number of proposal submission

XXXX = four letter character shortcut for organization name

**Example:** Company A, Inc.’s submission for one proposal to RTA-01 comprised of the three separate files in the attached email:

**Subject:** ERBAA16 Proposal Submission for Company A

- Volume I file name: *ERBAA16-VOL1-01-FP-001-COMA* (.pdf file)
- Volume II file name: *ERBAA16-VOL2-01-FP-001-COMA* (.pdf file)
- Volume III file name: *ERBAA16-VOL3-01-FP-001-COMA* (.xls or .xlsx file)

The email submission should at least include the following information:

- **Organization:** Company A, Inc.
- **Submitted by:** <first last name>, <project title>, <email of submitter>
- **Attached Files for Submissions:**
  1. Volume 1 – ERBAA16-VOL1-01-FP-001-COMA.pdf
  2. Volume 2 – ERBAA16-VOL2-01-FP-001-COMA.pdf
  3. Volume 3 – ERBAA16-VOL3-01-FP-001-COMA.xls (or .xlsx)
- **Request for receipt confirmation?** (YES or NO)

### 5.2.2 Format and Size Limitations

The three-volumes consist of three separate electronic files. Volumes I and II will only be accepted in PDF format. Volume III will only be accepted in Microsoft Excel format (only .xls and .xlsx files are acceptable). The **maximum file size for each volume is 10 MB**. Memory sizes of graphic images should be minimized before insertion into any of the files and should support clear display and document printing. **Non-conforming proposals may be rejected without review.**

Volume I, the Core Technical and Management Proposal, shall not exceed sixteen (16) pages of standard size (8.5” by 11”) in 12 pt fonts or larger for text and 9-point fonts or larger for pictures, figures, tables and charts for all Research Topic Areas. **Proposals for which Volume I exceeds the 16 page limit will have any pages above the 16 page limit removed and those pages will not be reviewed or evaluated.**

Volume II, the Supplemental Data Proposal, may not exceed thirty (30) pages of standard size (8.5” by 11”) in 12 pt fonts or larger. Only the Resumes and Statement of Work are required,



with the remaining sections optional. These remaining sections are used at the discretion of reviewers and may not be reviewed.

Volume III, the Cost/Price Proposal, has no page limit and **must show the costs/price for the entire effort**.

### ***5.2.3 Volume I, Technical and Management Proposal***

Volume I shall provide the primary technical and management description of the proposal. **Volume I is the primary document to be evaluated by the technical reviewers**, with Volumes II and III used as supplementary material at the discretion of individual reviewers. Volume I shall include the sections described below. The section headings below are mandatory, the page limits for each section are suggestions, and only the **overall limit of 16 pages** will be considered during compliance checks. Pages after the 16 page limit will be removed during the compliance check and will not be reviewed or evaluated.

#### ***5.2.3.1 Official Transmittal Letter (1 page) (see Section 8. Attachments)***

An official transmittal letter with authorizing official signature shall include the proposal title, the Offerors' addresses, and the exploratory research topic area the proposal is for. This page shall also serve as the title page.

#### ***5.2.3.2 Executive Summary (0.5 page or less than 2500 characters w/ spaces)***

Provide a brief summary of your concept's anticipated performance relative to the Topic goals and current state-of-the-art solutions, and why, if the research is successful, could have a transformational impact in preventing nuclear or radiological terrorism. Describe what is unique about this proposed technology, how it addresses the topic area if not self-evident, and how it would, if successfully realized, have a significant impact on the DNDO mission objectives and supporting the GNDA. Provide a concise description of the scientific, technical, and/or engineering approach you propose to pursue and address in this effort. Describe the key aspects, core concepts or components and/or prototype device proposed and relevant details about how they will function or perform. This summary should contain enough information to fully capture the program concept/intent and should completely describe the overall program in its entirety without relying on other sections of the proposal.

Note: When submitting proposals, entry of cover page material will include submission of an abstract. It is highly recommended the abstract be different than the executive summary, emphasizing the main research objective(s) and technical approach (as discussed below), and excluding any proprietary information.

#### ***5.2.3.3 Table of Contents (0.5 page)***

#### ***5.2.3.4 Quad Chart (1 page)***

The general Quad Chart is described in Section 5.1.2, and Section 8. The proposal Quad Chart content does not have to be the same as the white paper Quad Chart, but should be in a similar format.

### **5.2.3.5 Transformational Impact (1 Page)**

Describe how the intended research will provide a transformational impact in GNDA capabilities.

- What innovation or discovery is expected?
- How will this discovery provide transformational capabilities to support the GNDA? (Section 1.2)
- What is the expected performance of the technology or system with respect to the research topic objectives and/or current-state-of-art? How will this performance dramatically reduce the technical, performance or cost risks in achieving DNDO mission objectives?

### **5.2.3.6 Technical Approach and Implementation (6 Pages)**

#### **Technical Approach (2.5 pages)**

This narrative section should describe in detail what is intended to be accomplished and the premise or theory justifying the approach taken. It should describe the fundamental principle, premise or theory that the work will explore, the scientific approach being pursued to explore this premise, and how the results or data from the effort will be analyzed and/or evaluated. This section should also provide some detail as to why this particular approach was taken, and an estimate of the risk in achieving research goals. In developing the technical approach, the following should be considered:

- Is there a clear understanding of the research objectives and driving goals?
- Are the research objectives/goals clearly supported by appropriate performance modeling, analysis or existing literature, and are quantitative performance metrics defined, as appropriate?
- What technological choices were made and why, including trade-studies which were made and alternate technologies/approaches which were considered?
- What is the likelihood the research goals are achievable as proposed in pursuit of the stated research objectives?

#### **Technical Implementation (3.5 Pages)**

This section should provide a detailed outline of the plans and rationale for technical implementation including a summary of proposed tasks (work breakdown structure) for each phase of the effort. The discussion of Phase I tasks is expected to be more comprehensive than those of the follow-on phases. The narrative should answer the following questions:

- What key research or development tasks are needed to execute the effort?
- Is the technical plan clear, detailed and complete so as to fully explain how research objectives will be met?
- Have likely risks in the proposed technical approach been identified and is there a risk mitigation strategy?

- What is the critical path and milestones for the effort. Have methods been proposed for assessing technical progress?

#### ***5.2.3.7 Capability and Experience (2.5 Pages)***

This section should provide an overview of the team composition and experience, and must include short biographies of all key personnel. This section should address the following:

- Teams understanding of past scientific and technical accomplishments and the current state-of-the art of knowledge or technology;
- Prior experience and performance of the team (to include history of subcontractor performance, if applicable) in related efforts demonstrating an ability to perform innovative research and deliver results/products within proposed budgets/schedules.
- Completeness of the proposed team. That is, are key personnel and partners identified who have the required range of competencies to execute this effort?
- 1-2 paragraph biographies for each key team member to include education, relevant experience and proposed roles; and
- Ongoing related efforts of each team member, with source and level of funding. Explain, as appropriate, how ongoing or relatively recent efforts relate to the proposed work.

#### ***5.2.3.8 Management Approach (2 Pages)***

This section should provide an overview of the proposed management approach, tools, and management processes to be used to execute the project. This section must provide:

- Delineation of schedule, phasing and milestones via integrated master plan and schedule (including all hardware deliverables and reviews). The schedule shall be presented in a Gantt chart.
- Delineation of roles, responsibilities and coordination among all team members and organizations, to include description of subcontractors (if applicable) will be managed;
- Approach for project management including management experience of the team and use of appropriate management tools, as applicable
- If necessary, a brief summary of required information, facilities, equipment, materials and data which must be provided by the Government to support the proposed work;
- If necessary, a security plan that describes the rationale for what aspects of the work need to be protected, at what level, and proposed strategy for doing so.

#### ***5.2.3.9 Cost/Price (1.5 Pages)***

This section should provide an overview of the total cost of the proposed work. This section must provide:

- The type of award vehicle proposed.
- A narrative description of the cost and cost-estimation approach.
- Cost allocation among team members summed over all phases.
- An itemized description of any individual material and supplies or capital equipment item that exceeds \$10K.

- A listing costs per task for Phase I, itemized as shown in the table below.

<b>Task</b>	<b>Labor (\$)</b>	<b>Materials and Supplies (\$)</b>	<b>Capital Equipment (\$)</b>	<b>Travel (\$)</b>	<b>Subcontracts (\$)</b>	<b>Total (\$)</b>
1						
...						
N						
Total						

- A listing of costs per phase, over the entire project, itemized as shown in the table below.

<b>Phase</b>	<b>Labor (\$)</b>	<b>Materials and Supplies (\$)</b>	<b>Capital Equipment (\$)</b>	<b>Travel (\$)</b>	<b>Subcontracts (\$)</b>	<b>Total (\$)</b>
I						
...						
V						
Total						

Note 1 – For each Subcontractor and Consultant cost, the prime Offeror must submit a detailed breakdown by labor, materials, equipment, travel and other costs.

### ***5.2.4 Volume II, Supplemental Data Proposal***

This volume is used **at the discretion** of the technical reviewers and will be used by the Government Contracting Officer to ensure the proposal guidelines have been met. The first two sections are mandatory (Resumes, and Statement of Work); the other sections are optional. Volume II shall not exceed 30 pages.

#### ***5.2.4.1 Resumes***

Provide a resume for each key personnel listed in Volume I. Each resume shall be no more than two (2) pages.

#### ***5.2.4.2 Statement of Work***

Provide a detailed statement of work (SOW), by task, for the proposed Phase I work. Provide a draft SOW for all of the follow-on phases. Tasks and sub-tasks up to three levels are recommended for efforts of high complexity. Describe all deliverables proposed under this effort, including data, software, and reports, material or systems consistent with objectives of the work involved. One of the deliverables for each phase shall be a detailed SOW for its follow-on phase.

#### **5.2.4.3 *Technical Approach***

Provide additional or supplemental technical information and data not included in Volume I.

#### **5.2.4.4 *Management Approach***

Provide additional or supplemental information describing how the overall effort will be managed.

#### **5.2.4.5 *Small Business Considerations***

Proposals that exceed \$700,000, except for those submitted by small business concerns, must include a Small Business Subcontracting Plan in accordance with FAR 19.7 and FAR 52.219-9. The Small Business Subcontracting Plan is included in the 40 page limit. This is a requirement of the proposal, but not an evaluated factor.

Regardless of the proposed dollar value, all Offerors shall indicate their business size status and list all subcontractors and their business size statuses. All Offerors are encouraged to offer subcontracting opportunities to small businesses to the maximum extent practicable.

#### **5.2.4.6 *Employment Eligibility Verification***

Include a statement specifying compliance with FAR Clause 52.222-54.

#### **5.2.4.7 *Assertion of Data Rights***

Include a summary of any assertions of rights to any technical data or computer software that will be developed or delivered under any resultant award. This includes any assertions to pre-existing results, prototypes, or systems supporting or necessary for the use of the research, results, or prototype. Any rights asserted in other parts of the proposal that would impact the rights in this section must be cross-referenced. If less than unlimited rights in any data delivered under the resultant award are asserted, the Offeror must explain how these rights in the data will affect its ability to deliver research data, subsystems, and toolkits for integration as set forth below. Additionally, the Offeror must explain how the program goals are achievable in light of these proprietary and/or restrictive limitations. If there are no claims of proprietary rights in pre-existing data, this section shall consist of a statement to that effect.

Proposals submitted in response to this Announcement shall identify all technical data or computer software that the Offeror asserts will be furnished to the Government with restrictions on access, use, modification, reproduction, release, performance, display, or disclosure. Offeror's pre-award identification shall be submitted as an attachment to its offer and shall contain the following information:

- (1) *Statement of Assertion* Include the following statement: "The Offeror asserts for itself, or the persons identified below, that the Government's rights to access, use, modify, reproduce, release, perform, display, or disclose only the following technical data or computer software should be restricted."

- (2) *Identification of the technical data or computer software to be furnished with restrictions.* For technical data (other than computer software documentation) pertaining to items, components, or processes developed at private expense, identify both the deliverable technical data and each such item, component, or process as specifically as possible (e.g., by referencing specific sections of the proposal or specific technology or components). For computer software or computer software documentation, identify the software or documentation by specific name or module or item number.
- (3) *Detailed description of the asserted restrictions.* For each of the technical data or computer software identified above in paragraph (2), identify the following information:
- (i) Asserted rights. Identify the asserted rights for the technical data or computer software.
  - (ii) Copies of negotiated, commercial, and other non-standard licenses. Offeror shall attach to its offer for each listed item copies of all proposed negotiated license(s), Offeror's standard commercial license(s), and any other asserted restrictions other than Government purpose rights; limited rights; restricted rights; rights under prior Government contracts, including SBIR data rights for which the protection period has not expired; or Government's minimum rights.
  - (iii) Specific basis for assertion. Identify the specific basis for the assertion. For example:
    - Development at private expense, either exclusively or partially. For technical data, development refers to development of the item, component, or process to which the data pertains. For computer software, development refers to the development of the software. Indicate whether development was accomplished exclusively or partially at private expense.
    - Rights under a prior government contract, including SBIR data rights for which the protection period has not expired.
    - Standard commercial license customarily provided to the public.
    - Negotiated license rights.
  - (iv) Entity asserting restrictions. Identify the corporation, partnership, individual, or other person, as appropriate, asserting the restrictions.
- (4) *Previously delivered technical data or computer software.* The Offeror shall identify the technical data or computer software that are identical or substantially similar to technical data or computer software that the Offeror has produced for, delivered to, or is obligated to deliver to the Government under any contract or subcontract. The Offeror need not identify commercial technical data or computer software delivered subject to a standard commercial license.
- (5) *Estimated Cost of Development.* The estimated cost of development for that technical data or computer software to be delivered with less than Unlimited Rights.

- (6) *Supplemental information.* When requested by the Contracting Officer, the Offeror shall provide sufficient information to enable the Contracting Officer to evaluate the Offeror's assertions. Sufficient information must include, but is not limited to, the following:
- The contract number under which the data or software were produced;
  - The contract number under which, and the name and address of the organization to whom, the data or software were most recently delivered or will be delivered; and
  - Identification of the expiration date for any limitations on the Government's rights to access, use, modify, reproduce, release, perform, display, or disclose the data or software, when applicable.
- (7) *Ineligibility for award.* Failure to submit or complete the identifications and assertions required by this provision may render the Offeror ineligible for award.

**Please Note:** The section entitled "Assertion of Data Rights," must be severable, i.e. it must start on a new page. It is anticipated that the proposed Assertion of Data Rights section will be incorporated as an attachment to the resultant award instrument. Proposals must include a severable self-standing Assertion of Data Rights section without any proprietary restrictions, which can be used to make the contract or agreement award.

### ***5.2.5 Volume III, Cost Proposal***

The Cost Proposal shall consist of a cover page and two parts, Part 1 and Part 2. Part 1 will provide a detailed cost breakdown of all costs by cost category by period (base and all options) and Part 2 will provide a detailed cost breakdown by task/sub-task using the same task numbers in the Statement of Work. Options must be separately priced. The purpose of this volume is to provide detailed backup information for the summary costs provided in Volume 1. There should be a clear correlation between the information in these two volumes, including, but not limited to, total amounts proposed. Volume 3 has no page limitations.

Detailed Bases of Estimates (BOEs) are required for all tasks in the SOW. For the Government to determine the reasonableness, realism, and completeness of the cost proposal, the offeror shall submit Microsoft Excel spreadsheet(s) with a detailed cost breakdown of all proposed costs by cost categories, including quotes, receipts, historical pricing, payroll records, catalogue pricing, etc.

The cost of preparing proposals in response to this BAA is not considered an allowable direct charge to any resulting contract or any other award.

**Those who have not been audited by DCAA for a cost-type contract will be required to undergo an audit prior to a cost-type contract award.** The DCAA website at: <http://www.dcaa.mil/index.html> has been prepared by DCAA to assist contractors in understanding applicable requirements and to help ease the contract audit process.

### 5.2.5.1 *Cover Page*

The words “Cost Proposal” should appear on the cover page in addition to the following information:

- BAA number;
- Proposal ID of volume 1
- Title of proposal;
- Topic Area;
- Offeror’s name and address and complete list of subcontractors name and address, if applicable;
- Technical contact (name, address, phone/fax, electronic mail address)
- Administrative/business contact (name, address, phone/fax, electronic mail address);
- Duration of effort (separately price out the basic effort and any options) and;
- DUNS number and CAGE code.

### 5.2.5.2 *Cost Proposal, Part 1*

Detailed Bases of Estimates are required for all tasks in the SOW. For the Government to determine the reasonableness, realism, and completeness of the cost proposal, the Offeror shall submit Microsoft Excel spreadsheet(s) with the following sets of data:

**Labor:** Labor cost is defined as the number of direct labor hours multiplied by their respective hourly rates (unburdened). Labor cost shall be segmented by task for the initial phase. Provide a breakdown of labor hours and rates for each task by category of personnel. A labor cost summary is required by phase for ALL phases under this proposal.

**Direct Materials:** Total direct material that will be acquired and/or consumed during the project. Summary information shall be supplied for all material items. Provide detailed information only for all material items (e.g. how the estimated expense was derived) to include copies of price lists or quotes or price estimates for proposed materials. Material costs shall be assigned to specific work tasks.

**Subcontracts:** Describe the work in detail to be subcontracted, the source, the estimated cost, and the basis for this estimate. Subcontract labor and material shall be accounted for per the two paragraphs above. A summary chart showing each major subcontractor labor and material effort by work phase is required. For each subcontractor, provide the basis for selection, a narrative explaining why the price is reasonable and any adjustments the prime may have made to the subcontractor’s price.

**Travel:** Total proposed travel expenditures relating to the period of performance. Limit this information to the number of trips, location, duration, number of travelers, and purpose of each trip. Travel should include travel to Washington, DC for quarterly performance reviews. Travel costs must be itemized for each segment listed above, and then totaled.



**Indirect Costs:** Include current negotiated indirect rate agreements, letters, and the names of cognizant audit agencies. If no such agreements exist, provide a detailed listing and explanation of indirect costs and/or rates. DCAA or other audit organization's audited statements are required to support indirect cost rates. The proposal must list the name, telephone number and email address of the Offeror's DCAA contact person/office.

**Other Direct Costs:** Any direct costs not included above. List the item, the estimated costs, and the basis for the estimate with supporting documentation.

**Fee:** Any proposed fee/profit and appropriate justification.

### ***5.2.5.3 Cost Proposal, Part 2***

Cost breakdown by task/sub-task using the same task numbers in the Statement of Work. When phases/options are contemplated, phase/options must be separately identified and priced by task/sub-task.

**Note:** FAR 15.4 contains the basic requirements related to requiring certified cost or pricing data, including the procedural requirements for submitting certified cost or pricing data to the contracting officer. Certified cost and pricing data will be required, prior to contract award, for awards exceeding the dollar threshold outlined in FAR 15.403-4 (\$750,000). This applies to awards to UARCs and Federal Government activities.

**Note:** The Prime and Sub-contractors using exchange rates must include the exchange rate used and shall provide the origin/source of the exchange rate in their proposal.

### ***5.2.6 Notification to Offerors of Contractors Support Services for Proposal Evaluation Process***

(a) Offerors are advised that employees of the firms identified below may serve as advisors in the source selection process. These individuals will be authorized access to only those portions of proposal data and discussions that are necessary to enable them to perform their respective duties. Such firms are expressly prohibited from competing on the subject acquisition and from scoring or rating of proposals or recommending the selection of a source.

**Schafer Corporation**

3811 Fairfax Dr #400, Arlington, VA 22203

(703) 516-6000

[TAR\\_ERBAA\\_NDA\\_request@schafercorp.com](mailto:TAR_ERBAA_NDA_request@schafercorp.com)

**Noblis Inc**

3150 Fairview Park Dr., Falls Church, VA 22042

MS: F430

[TAR\\_ERBAA\\_NDA@noblis.org](mailto:TAR_ERBAA_NDA@noblis.org)

**ATTN: TAR ERBAA**

(b) In accomplishing their duties related to the source selection process, the aforementioned firms may require access to proprietary information contained in the Offerors' proposals.

Therefore, pursuant to FAR 9.505-4, these firms must execute an agreement with each Offeror that states that they will (1) protect the Offeror's information from unauthorized use or disclosure for as long as it remains proprietary, and (2) refrain from using the information for any purpose other than that for which it was furnished. **For all RTAs, each Offeror must contact both companies listed above via email at least four weeks prior to the white paper submission deadline to effect execution of such an agreement.**

**Each Offeror shall submit a copy of the agreements with white paper submission. If an Offeror chooses not to submit a white paper, but only a proposal, the companies shall be contacted at the email addresses above at least four weeks prior to the proposal submission deadline and shall submit copies of the agreement with its proposal.** DNDO recommends that Offerors use the standard one page NDA included in Section 8. Failure to execute such an agreement with the above companies will result in the Offeror's white paper/proposal submission being found non-compliant. Non-compliant submissions will not be reviewed or evaluated.

## 6 EVALUATION CRITERIA

Each proposal will be evaluated on the merit and relevance of the proposal as it relates to the specific exploratory research topic area, rather than against other proposals, since no common work statement exists. Awards will be made based on proposal evaluation against the below criteria and funds availability. Selection for award constitutes commitment of funding for the initial phase, while funding for the subsequent phases will depend on the performance of the preceding phase and availability of funds.

DNDO reserves the right to enter into exchanges with any Offeror through the CO, if needed, to (a) clarify our understanding of that Offeror's proposal, and/or (b) to address any areas of concern in an otherwise highly meritorious proposal. Such exchanges, if they occur, may result in amended proposals from the affected Offeror(s). However, if DNDO initiates exchanges with one Offeror, this does not obligate DNDO to conduct exchanges with or obtain amended proposals from other Offerors.

Proposals submitted under the Research Topic Areas (RTA) will be evaluated against the following criteria in descending order of relative importance:

- Transformational Impact,
- Technical Approach and Implementation,
- Capability and Experience,
- Management Approach, and
- Cost/Price Realism and Reasonableness

Evaluators will assess the strengths, weaknesses, and deficiencies and assign an adjectival ratings for each of the above criteria. The adjectival ratings are as follows: Excellent, Very Good, Good, Fair, and Unacceptable.

The following sections describe the evaluation criteria.

### 6.1 Criterion I: Transformational Impact

The following items will be considered and evaluated:

- How the proposed concept/methodology/approach/effort, if successfully executed and realized, is likely to enhance the Global Nuclear Detection Architecture (GNDA), National Technical Nuclear Forensics (NTNF) capabilities and/or capabilities relevant to the DNDO mission as intended by the relevant topic area;
- Likelihood of dramatically improving performance and/or reducing costs in achieving DNDO mission objectives relative to current state-of art. This will include how the proposed concept/methodology/approach addresses the goals and objectives of the research topic area; and

- Whether this effort is being duplicated or is redundant under funding from either DNDO or another government activity, and the risk and/or reward, if successful, does not warrant multiple efforts in the same area.

## **6.2 Criterion II: Technical Approach**

The following items will be considered and evaluated:

- Understanding of the research objectives and driving goals, to include appropriate performance modeling and analysis, and development of quantitative performance metrics and technical milestones for the project, as appropriate;
- Clarity, completeness, feasibility and achievability of the proposed technical plan (and supporting statement of work), with task descriptions and associated technical elements in a logical sequence with all proposed deliverables; Proposed trade studies, performance modeling, analyses and experiments required during the initial phase of the effort; Proposed methods for assessing technical progress to include milestones and go/no-go criteria; and Adequacy of initial identification of key technical risks and their associated mitigation strategies; and
- Likelihood the research is achievable as proposed in pursuit of the stated research objectives.

## **6.3 Criterion III: Capability and Experience**

The following items will be considered and evaluated:

- Completeness of the proposed team to perform the required research, to include identification of key team members and their qualifications/competencies;
- Prior experience and performance of the team (to include history of subcontractor performance, if applicable) in related efforts demonstrating an ability to 1) perform innovative research, 2) deliver results within proposed budgets and on schedule, and 3) successfully transition or commercially develop subsequent products; and
- Teams understanding of past scientific and technical accomplishments and the current state-of-the art of knowledge or technology. Similar efforts completed/ongoing by the Offeror in this area are fully described including identification of other Government sponsors.

## **6.4 Criterion IV: Management Approach**

The following items will be considered and evaluated:

- Delineation of schedule, phasing and milestones that is consistent with the proposed technical approach and the SOW. The proposed schedule identifies and mitigates any potential schedule risk;
- Delineation of roles, responsibilities and coordination among all team members and organizations; and
- Approach for project management including management experience of the team and use of appropriate project management tools, as applicable.

## 6.5 Criterion V: Cost/Price Realism and Reasonableness

Note that while cost/price realism and reasonableness is a criterion for award, it will not be analyzed or evaluated unless a proposal is recommended for an award. No cost/price feedback will be provided for those proposals not recommended for award.

The objective of this criterion is to establish that the proposed costs are reasonable and realistic for the technical and management approach offered, as well as to determine the proposer's practical understanding of the effort. The proposed costs should be based on realistic assumptions, reflect a sufficient understanding of the technical thresholds and objectives of the BAA, and are consistent with the proposer's technical approach (to include the proposed Statement of Work). The cost proposal should substantiate the proposed costs with the type and number of labor hours proposed per task, as well as the types and kinds of materials, equipment and fabrication costs proposed. This will be principally measured through an independent Government cost estimate consisting of cost per labor-hour and number of labor-hours proposed, by major capital expenditures and consumables in the early phase and evaluating the likelihood of completing the effort on time and at the proposed costs. Cost realism analyses shall be performed to determine the probable cost of performance for each Offeror that is recommended for award.

The Government recognizes that undue emphasis on cost may motivate proposers to offer low-risk ideas with minimum uncertainty and to staff the effort with junior personnel in order to be in a more competitive posture. DNDO **discourages** such cost strategies.

The following items will be considered and evaluated:

- Offeror's practical understanding of the effort. Realism of the scope of effort and the likely labor-hours and major capital expenditures required to execute;
- Realism and reasonableness of proposed costs as they relate to the technical and management effort for each phase; and
- Realism of the schedule for the completing the proposed effort on time at the proposed cost.

## 7 INSTRUCTIONS TO OFFERORS

### 7.1 Submission of White Papers and Proposals

#### 7.1.1 White Paper Submission

If prospective Offerors elect to submit white papers, white papers shall be submitted on or before the deadline listed in the award schedule table. Late white papers will not be reviewed. White papers shall be submitted in electronic format and emailed to the inbox – [DNDOERP@hq.dhs.gov](mailto:DNDOERP@hq.dhs.gov). Hard copy, facsimile, or hand delivered white papers will not be permitted or accepted, except for classified white papers (see Section 7.6).

White Paper submissions consist of one (1) attachment (see section 5 for white paper format and content) in the email submission. Any white paper submissions after the published date and time **will not** be accepted. It is highly encouraged that Offerors do not wait until the last minute to submit their white paper(s).

White papers should be submitted well in advance of closing time to ensure completion of the electronic submission process by the date and time of the deadline as stated in this BAA.

#### 7.1.2 Proposal Submission

Proposals shall be submitted on or before the deadline listed in the award schedule table. Proposals shall be submitted in electronic format and shall be submitted to the following [DNDOERP@hq.dhs.gov](mailto:DNDOERP@hq.dhs.gov). Late proposals will not be considered. Hard copy proposals, facsimile proposals or hand-delivery proposal will not be permitted or accepted, except for classified proposals (see Section 7.6).

Proposal submissions contain three (3) separate attachments for volumes I, II, and III (see section 5 for proposal format and content). Any proposal submissions after the published date and time **will not** be accepted.

It is highly encouraged that Offerors do not wait until the last minute to submit their proposals. Proposals should be submitted well in advance of closing time to ensure completion of the electronic submission process by the date and time of the deadline as stated in this BAA.

#### 7.1.3 Confirmation Receipt

White papers and proposals should be submitted well in advance of closing time to ensure completion of the electronic submission process by the date and time of the deadline as stated in this BAA. Receipts of proposals and white papers will be handled in accordance with FAR Part 15.208 and the clause at FAR 52.215-1.

### 7.2 Questions

All questions related to the submission of proposals or white papers shall be submitted in writing to the following email address: [DNDOERP@hq.dhs.gov](mailto:DNDOERP@hq.dhs.gov). Questions regarding white papers and

proposals shall be submitted by the deadlines provided in the award schedule table in Section 1 of this BAA. When submitting questions, place the word “Question” as the leading text in the subject line. Questions submitted through improper channels or those received after the dates and times specified will not be addressed. If necessary, DHS/OPO will post amendments to this BAA and/or questions and comments to FedBizOpps.

### 7.3 Safety Act

Congress enacted the Support Anti-terrorism by Fostering Effective Technologies Act of 2002 (the “SAFETY Act”) as part of the Homeland Security Act of 2002. The SAFETY Act provides limitations on the potential liability of those firms that develop and provide qualified anti-terrorism technologies. DHS encourages the development and deployment of anti-terrorism technologies by making available the SAFETY Act’s system of “risk management” and “liability management.” Offerors submitting proposals in response to this BAA may submit SAFETY Act applications on their existing technologies and are invited to contact the Office of SAFETY Act Implementation (OSAI) for more information at 1-866-788-9318 or [helpdesk@safetyact.gov](mailto:helpdesk@safetyact.gov) or visit OSAI’s website at [www.safetyact.gov](http://www.safetyact.gov).

### 7.4 Security/Classified White Papers/Proposals

The Government anticipates that white papers/proposals submitted under this BAA will be unclassified.

However, for work categorized For Official Use Only (FOUO), Offerors shall follow Department of Homeland Security procedures for processing, transmitting, and storing said material. These procedures are outlined in the Department of Homeland Security Management Directive System MD Number 11042, Issue Date: 5/11/2004, SAFEGUARDING SENSITIVE BUT UNCLASSIFIED (FOR OFFICIAL USE ONLY) INFORMATION, and can be found on the DHS website under the “Security” side-bullet.

Security classification guidance via a DD Form 254 will not be provided at this time since DNDO is soliciting ideas and concepts only. **Classification does not eliminate the requirement to comply with all other instructions and deadlines under this BAA.**

If a white paper or a proposal contains classified information up to the S/NSI (Secret/National Security Information) level, it may be submitted electronically via SIPRNET to the following address: [mark.wrobel@dhs.gov](mailto:mark.wrobel@dhs.gov). At the same time, an unclassified note must be sent to [mark.wrobel@hq.dhs.gov](mailto:mark.wrobel@hq.dhs.gov) and the contracting officer [Mandy.Wylie@hq.dhs.gov](mailto:Mandy.Wylie@hq.dhs.gov), to alert DNDO that a classified white paper or proposal has been sent.

If you choose to submit a classified white paper or proposal, you must first receive permission of the Original Classification Authority (OCA) to use their information in replying to this BAA and submit the applicable OCA classification guide(s) to ensure that the white paper or proposal is protected appropriately.

Classified submissions shall be in accordance with the following guidance:

Collateral Classified Data: Use classification and marking guidance provided by previously issued security classification guides, the Information Security Regulation (DoD 5200.1-R), and the National Industrial Security Program Operating Manual (DoD 5220.22-M) when marking and transmitting information previously classified by another original classification authority.

Classified white papers or proposals up to Top Secret may be faxed via STE on a classified line. Contact Trevor Whaley, the DNDO Security Liaison Officer, at [Trevor.Whaley@hq.dhs.gov](mailto:Trevor.Whaley@hq.dhs.gov), for up-to-date instructions.

Sensitive Compartmented Information (SCI) Data: Contact Trevor Whaley, the DNDO Security Liaison Officer, at [Trevor.Whaley@hq.dhs.gov](mailto:Trevor.Whaley@hq.dhs.gov), for the correct SCI courier address and instructions. All SCI should be transmitted through your servicing Special Security Officer (SSO) / Special Security Contact Officer (SSCO). All SCI data must be transmitted through SCI channels only (i.e., approved SCI Facility to SCI Facility via secure fax).

Offerors must have existing, and in-place prior to execution of an award, approved capabilities (personnel and facilities) to perform research and development at the classification level they propose.



## 8 ATTACHMENTS

### 8.1 White Paper/Proposal Cover Sheet

<b>BAA16 Cover Sheet for Exploratory Research</b>		
<b>Proposal <input type="checkbox"/> Contains <input type="checkbox"/> Does Not Contain Proprietary Information</b>		
<b>Proposal ID:</b>	<b>Topic Area: RTA-0X:</b>	<b>Solicitation: HSHQDN-16-R-0002</b>
<b>Proposed Amount:</b> \$ .	<b>Proposed Duration (in months):</b>	<b>Anticipated Start Date:</b> month/date/year
<b>Proposal Title:</b>		
<b>Abstract (500 words or less)</b>		
Concise description of main research concept, research objective(s) and technical approach, and excluding any proprietary information.		
<b>Organization Information</b>		
<b>Organization Name:</b>	<b>Organization Address 1:</b>	<b>Organization Address 2:</b>
<b>Organization City/Province:</b>	<b>Organization State (2 letter designation):</b>	<b>Organization ZIP + Four:</b> -
<b>Country:</b>		
<b>Principal Investigator (PI)/Project Leader Information</b>		
<b>PI First Name:</b>	<b>PI Middle Initial:</b>	<b>PI Last Name:</b>
<b>PI Address 1:</b>		<b>PI Address 2:</b>
<b>PI City/Province:</b>	<b>PI State (2 letter designation):</b>	<b>PI ZIP + Four:</b> -
<b>PI Phone (include area code):</b> - -	<b>PI Fax (include area code):</b> - -	<b>PI E-mail:</b>
<b>President/Company Officer/Technical Representative (For Business and Financial Matters)</b>		
<b>First Name:</b>	<b>Middle Initial:</b>	<b>Last Name:</b>
<b>Address 1:</b>		<b>Address 2:</b>
<b>City/Province:</b>	<b>State (2 letter designation):</b>	<b>ZIP + Four:</b> -
<b>Phone (including area code):</b> - -	<b>Fax (including area code):</b> - -	<b>E-mail:</b>
<b>DUNS:</b>	<b>TIN/EIN:</b>	

## 8.2 Sample Company-to-Company Agreement

<p>NON-DISCLOSURE AGREEMENT SOLICITATION HSHQDN-16-R-0002</p>	
<p>The Parties to this Agreement agree that <u>[Insert Name of Government Support Contractor]</u> may have access to proprietary information of <u>[Insert Name of Offeror]</u> contained within the technical and cost proposals, solely to perform technical advisory services for the Government, in evaluating proposals submitted in response to this Solicitation.</p>	
<p>The Parties agree to protect the proprietary information from unauthorized use or disclosure for as long as it remains proprietary, and to refrain from using the information for any purpose other than that for which it was furnished.</p>	
<hr/>	
Company Name (Offeror)	
<hr/>	
Name of Company Official, Printed	
<hr/>	
<hr/>	<hr/>
Signed	Dated
<hr/>	
Company Name (Government Support Contractor)	
<hr/>	
Name of Corporation Official, Printed	
<hr/>	
<hr/>	<hr/>
Signed	Dated

### 8.3 Quad Chart Template

**Title:** *Project Title*

**Org/Area:** *Lead Organization/Topic Area*

**Photograph or Artist's Conception**

Provide a simple, legible, but sufficiently detailed graphic to convey the main concept or idea of the research effort and/or development prototype.

**Relevance and Goals**

- Research goal and desired end state including performance targets
- Transformational impact or uniqueness over existing techniques and state-of-art
- Relevance to and specific contribution in addressing a specified research topic area
- Other broader impacts of the research

**Technical Approach**

- Hypothesis or theory supporting the approach, as appropriate.
- Specify how the problem will be addressed
- Describe current status of the proposed effort and the first phase
- Describe the key technical challenges and/or risks

**Schedule**

- Provide milestones, primary deliverables, and task durations for the current phase
- Provide duration for future phases (if applicable)
- Provide estimated cost per phase

**Team**

- List the prime organization, principal investigator, and program manager
- List subcontractors and main team members