

The Department of Homeland Security (DHS)
Notice of Funding Opportunity (NOFO)
DHS Science and Technology Directorate (S&T) Center of Excellence (COE)
Center for Homeland Security Quantitative Analysis – Center Partner

NOTE: If you are going to apply for this funding opportunity and have not obtained a Data Universal Numbering System (DUNS) number and/or are not currently registered in the System for Award Management (SAM), please take immediate action to obtain a DUNS Number, if applicable, and then to register immediately in SAM. It may take 4 weeks or more after you submit your SAM registration before your registration is active in SAM, then an additional 24 hours for Grants.gov to recognize your information. Information on obtaining a DUNS number and registering in SAM is available from Grants.gov at: <http://www.grants.gov/web/grants/register.html> Detailed information regarding DUNS and SAM is also provided in Section D of this NOFO, subsection, Content and Form of Application Submission.

Table of Contents

A.	Notice of Funding Opportunity (NOFO) Description	4
	Program Overview, Objectives, and Priorities.....	4
	I. Program Overview	4
	II. Application Project Narrative	9
	III. Research and Workforce and Professional Development Themes, Topics, and Questions	13
B.	Federal Award Information	29
	Award Amounts, Important Dates, and Extensions.....	29
	Funding Instrument	29
C.	Eligibility Information.....	30
	Eligible Applicants.....	30
	Eligibility Criteria.....	31
	Cost Share or Match	32
D.	Application and Submission Information	32
	Submission Date and Other Key Dates and Times	32
	Address to Request Application Package	33
	Informational Webinar.....	33
	Optional Forms.....	36
	Other Submission Requirements.....	36
	Funding Restrictions.....	38
	Indirect (Facilities & Administrative (F&A)) Costs	38
E.	Application Review Information.....	38
	Review and Selection Process.....	38
	I. Scientific Quality Review (External Review).....	39
	II. DHS Relevancy Review (Internal DHS SMEs)	41
	Application Evaluation Criteria.....	42
	I. Evaluation Criteria.....	43
F.	Federal Award Administration Information	48
	Notice of Award.....	48
	I. Work Plan Development Workshop	48
	Administrative and National Policy Requirements	48
	Reporting.....	49
G.	DHS Awarding Agency Contact Information	49
	Contact and Resource Information	49
H.	Additional Information	50

Extensions	50
APPENDIX A: Terms and Conditions	51
APPENDIX B: Acronyms	84
APPENDIX C: References for Themes, Topics and Questions	85

A. Notice of Funding Opportunity (NOFO) Description

Issued By

U.S. Department of Homeland Security (DHS) Science and Technology Directorate (S&T)

Catalog of Federal Domestic Assistance (CFDA) Number

97.061

CFDA Title

Centers for Homeland Security

Notice of Funding Opportunity Title

DHS S&T Center of Excellence for Homeland Security Quantitative Analysis – Center Partner

NOFO Number

DHS-16-ST-061-HSQA-Partner

Authorizing Authority for Program

Homeland Security Act of 2002, Section 308, as amended, P.L. 107-296. codified at 6 U.S.C. 188

Appropriation Authority for Program

Department of Homeland Security Appropriations Act, P.L. 114-4, Title IV, Science and Technology, Research, Development, Acquisition and Operations.

Program Type

New

Program Overview, Objectives, and Priorities

I. Program Overview

The Department of Homeland Security (DHS) Science and Technology Directorate (S&T) Office of University Programs (OUP) is requesting applications from U.S. colleges and universities to serve as a partner institution for the Center for Homeland Security Quantitative Analysis (CHSQA). OUP is also posting a separate NOFO for eligible applicants to submit lead proposals for consideration. Please see NOFO Number DHS-16-ST-061-HSQA-Partner or 97.061 on <http://www.grants.gov> for directions on how to submit single project

proposals. DHS will select qualified individual projects from applications received for either the Center Lead NOFO or the Center Partner NOFO, regardless of the institution that is awarded as lead institution. Principal Investigators that are already Partners under a Center Lead application may not submit the same application under this Partner NOFO.

The DHS COEs are university consortia that work closely with DHS Components and their partners to conduct research, develop and transition mission-relevant science and technology, educate the next generation of homeland security technical experts, and train the current workforce in the latest scientific applications. Each COE is led by a U.S. college or university and involves multiple partners for varying lengths of time. COE partners include other academic institutions, industry, DHS Components, Department of Energy National Laboratories and other Federally-Funded Research and Development Centers (FFRDCs), other federal agencies that have homeland security-relevant missions, state/local/tribal governments, non-profits, and first responder organizations. DHS envisions the COEs as long-term trusted academic partners that provide an array of resources to help DHS and its partners achieve their missions, and improve their operations. OUP maintains both financial assistance and contract mechanisms for DHS to access COE capabilities. The COEs that make up the COE network are listed at <https://www.dhs.gov/st-centers-excellence>. The new Center will be a fully-integrated component of the COE network and will take advantage of the network's resources to develop mission-critical research, education, and technology transition programs.

Process for Establishing a New COE

Before DHS posts a COE NOFO on grants.gov, DHS subject matter experts (SMEs) identify priority research and workforce development themes, topics, and questions that will be the focus of the COE. Proposals responding to the NOFO are screened for eligibility (see “Eligibility Information”). Ineligible or non-responsive proposals receive no further consideration. Eligible and responsive proposals are reviewed by three separate review panels (see “Application Review Information,” for a full description of how COE applicants are reviewed, rated and selected). Each panel provides ratings that determine which, if any, proposals are forwarded to the subsequent review panel. DHS may combine elements from several highly-rated proposals to create a new COE.

Priorities and Expectations for a COE

OUP expects selected COE Partners to become fully integrated into the COE. Partner applicants should understand DHS's expectations for a COE. The DHS Centers of Excellence (COEs) are university consortia that work closely with each other and with DHS Offices and Components and their partners to conduct research, develop and transition mission-relevant science and technology, educate the next generation of homeland security technical experts, and train the current

workforce in the latest scientific applications. DHS COEs operate using a unique research management approach where researchers work alongside operational and decision-making personnel to explore opportunities to use science and technology to enhance capabilities in line with DHS' mission. The skill sets required to make a COE successful are more extensive than research expertise alone. COEs need to have an ability and a commitment to communicate frequently with a variety of actors from federal staff, to attorneys, to university administrators. COE teams should include experts in finance, project management, education, training, outreach and marketing, intellectual property management, technology development, and technology transfer. Applicants should also have an understanding of how to translate research to practice including licensing, the ability to work with transition partners, and an understanding of federal acquisition. The COE team must demonstrate their commitment to develop a long-term trust-based partnership between universities and federal agencies; to do that, this wide range of skills is essential.

The DHS COEs are different than many other federally funded university centers, and DHS expects a lot more from them. Each COE must:

- Work closely with DHS and others to identify the most critical knowledge and technology gaps that a COE can address, on an on-going basis
- Place faculty and students (U.S. citizens eligible for clearances) in operational agencies early and often, in order to develop solutions appropriate to complex homeland security problems
- Build a nation-wide or world-wide network of academic and other SMEs in order to be able to access the best experts for each problem in short order
- Develop contingency plans for replacing researchers whose projects are not progressing as planned and a process to hold competitions to replace projects that have come to an end
- Develop detailed plans for transitioning research results into end use
- Work with DHS and other operational end users to identify projects with a high potential of generating usable knowledge or technologies, and developing a plan to implement operationally

DHS funds the COEs through cooperative agreements, which provide support for research for general public purposes, yet enable substantial federal agency involvement in COE activities and research (for details on the agreement, please refer to APPENDIX A: Terms and Conditions, Programmatic Involvement). On a regular basis, OUP facilitates interactions between researchers, DHS SMEs, and end users from the public and private sectors (i.e., homeland security practitioners). The goal of this hands-on management is to develop a trusting, sustained relationship between universities and homeland security operational agencies.

The COEs are expected to develop relationships and partnerships with DHS Components and the larger first responder community to provide targeted research and education resources. OUP will work with COE management to formulate the COE's research and education projects, and to develop communication and transition strategies. Interactions commonly include COE-sponsored workshops that bring together diverse SMEs, industry representatives, and federal managers. DHS believes this frequent interaction is the most effective way to get the federal government's research investments into operational use by security, intelligence, and emergency response personnel. Only academic institutions that can embrace this type of close working relationship should apply for this funding opportunity.

The DHS mission requires that its operational Components [e.g., U.S. Citizenship and Immigration Services (USCIS), Transportation Security Administration (TSA), U.S. Customs and Border Protection (CBP), U.S. Coast Guard (USCG), Federal Emergency Management Agency (FEMA), Immigration and Customs Enforcement (ICE), U.S. Secret Service (USSS)] be responsive to a wide range of constantly evolving homeland security challenges and threats, both natural and manmade. As a result, DHS priorities and operational challenges may change over the course of a COE's performance period. Therefore, COE research programs should be flexible enough to adapt to new homeland security challenges and priorities, while at the same time maintaining focus on their core research areas. DHS looks to COE leadership to maintain situational awareness of cutting edge research to inform the HSE of research futures, and to identify potential threats arising from, or to be mitigated by, novel technology.

Overarching Vision of the Center

The Center for Homeland Security Quantitative Analysis (CHSQA) will conduct end user-focused research to enhance the application of analytic tools that support real-time decision making to address homeland security-related threats and hazards. This Center of Excellence (COE) will also provide education and professional development to improve data management and analysis, to facilitate operations research and systems analysis, to identify the economic impact of security threats and hazards, and to critically assess future risks posed to the DHS mission set. The overarching goal of the Center will be to develop the next generation of mathematical, computational, and statistical theories (including algorithms, methods, and tools) to advance quantitative analysis capabilities of the homeland security enterprise (HSE).

The HSQA Center aligns with the DHS Quadrennial Homeland Security Review (QHSR) goals of Preventing Terrorism and Enhancing Security, Securing and Managing Our Borders, Enforcing and Administering Immigration Laws, Safeguarding and Securing Cyberspace, and Strengthening National Preparedness and Resilience. CHSQA will work with state, local, tribal and territorial (SLTT)

law enforcement, DHS Component agencies [e.g., Customs and Border Protection (CBP), Federal Emergency Management Agency (FEMA), Intelligence and Analysis (I&A), Immigration and Customs Enforcement (ICE), National Protection and Programs Directorate (NPPD), Policy (PLCY), Transportation Security Administration (TSA), U.S. Coast Guard (USCG), and U.S. Secret Service (USSS)], as well as DHS Science and Technology (S&T) offices such as the Homeland Security Advanced Research Projects Agency (HSARPA), the First Responders Group (FRG), and the Capability Development Support group (CDS). This COE will focus on major and cross-cutting DHS mission areas in a way previous COEs have not yet addressed. For more information about DHS S&T and its organizational structure, visit <http://www.dhs.gov/st-organization>. For more information about the COEs, visit: <http://www.hsuniversityprograms.org>.

DHS envisions that multi-disciplinary research teams working closely with DHS and other SMEs will develop successful innovations to confront the future challenges DHS faces. The teams will need various combinations of academic disciplines, including engineering, scientific and mathematics sub-disciplines.

Expected Outcomes

Homeland security enterprise (HSE) challenges require customized and innovative products that can provide a competitive advantage in operational settings. Research-based solutions generated by this Center must be intuitive, insightful, timely, and innovative. CHSQA's research will be based on HSE needs, as expressed by its practitioners in this NOFO. Research outcomes will include analytical tools, technologies, and knowledge products, e.g., best practices, resource guides, and case studies, which can be transitioned effectively to the workforce. It is DHS's intent to produce new capabilities and work with partners and stakeholders at all levels to test these capabilities in operational and strategic settings, and then take steps to make these solutions available and useful to agencies at all levels.

CHSQA researchers, faculty and students must work closely with DHS Components and other federal, state, local, territorial, and tribal law enforcement and emergency management partners to develop and deploy tools and methods to support homeland security decision makers. The Center will provide tools to administrators, investigators, personnel, and planners to create competitive strategies and tactics that advance the qualitative analysis capabilities of the HSE.

The Center portfolio must address each of the major categories of critical knowledge gaps described in the research theme areas of this funding announcement using new and innovative projects that build on and complement existing work. In order to avoid duplication of existing work, applicants must demonstrate a working knowledge of existing studies, quantitative methods, policies, and findings relevant to this NOFO.

Access to Data

Researchers and analysts should be able to obtain access to needed analytical products, relevant data, and open source and publicly available information. They also should anticipate interacting with homeland security partners and stakeholders, and other SMEs. Applicants must discuss any needs for unique or sensitive data, testing, or laboratory facilities that will be required to conduct the research, and how the applicant will ensure its researchers can access the data and facilities. See Data Acquisition and Management Plan in Appendix A.

II. Application Project Narrative

This section outlines requirements for the Project Narrative portion of the application package.

S&T expects any Partner institution awarded under this NOFO to become a fully integrated component of the COE. **Partner applicants must select and clearly identify if their proposed project aligns with the Research Program or the Workforce Development Program. Applicants may only propose 1 project per proposal; however they may submit more than 1 proposal.**

Applicants may propose projects lasting up to 2 years, with total budgets up to \$500,000. However, Center projects are funded in 1-year increments. Subsequent to the first year, Center and project funding is dependent on successful performance in prior years, the relevance of project outcomes to current homeland security research priorities, and availability of funds. Multi-year project proposals should provide a summary of their long-term vision, timeframe, research and education outcomes, and potential real-world applications.

Applicants must also summarize a results communication and transition plan that outlines how the Partner will implement its project(s) and how they will be transitioned to user groups. Elements of the plan may include: project milestones; career development programs for research staff and students; identification of potential user groups; and a description of how the research results will be transitioned to DHS and other federal and state agencies.

Note: While not all Center projects will result in a final product that transitions to actual use by an end user, even earlier phase or exploratory research should still include a plan for disseminating results to end users/stakeholders in a form that enables end users/stakeholders to understand the potential applicability of the work and leverage outcomes to the maximum extent possible.

The following two sections outlines requirements for 1) a Research project or 2) and Workforce and Professional Development project. Please select and clearly identify one area to propose a project.

1. Research Project (5 pages)

Applicants should identify multidisciplinary, comprehensive approaches to address one of the research themes and topics outlined below in Section VIII “Research and Workforce and Professional Development Themes, Topics, and Questions”. Applicants should explain why they selected these topics or questions, and describe a proposed method, metrics and outcomes to answer the relevant questions.

Applicants should consider the maturity and state-of-the-art of the respective theories, technologies, and applications of the proposed areas of study when formulating their research portfolios.

Applicants must include the following elements for each project:

1. Title
2. Principal investigator (name, title, school)
3. Specifically identify which theme area and topic the project addresses - *if a proposed project falls under multiple themes/topics, identify those as primary, secondary, tertiary, etc.*
4. Project Abstract
5. Goals and objectives of the research
6. Significant partners and their roles
7. How the work builds upon the state-of-the-art of the respective theories, technologies, and applications of the proposed areas of study
8. How the work is innovative
9. Significance of the proposed project to homeland security
10. Capability or knowledge gap this project addresses
11. Theoretical approach, hypothesis to be tested
12. Methods for data collection and analysis
13. Identify end users, and how the research team will partner with them
14. Expected outputs and outcomes and how they would be used
15. Performance metrics for success
16. A year-by-year description of key milestones for the project for the first two years
17. Transition pathway from lab to field
18. Total projected costs per year for five years
19. If relevant, any unique data, testing, or laboratory facilities that will be required to conduct the research and how the applicant will ensure its researchers can access the data and facilities

2. Workforce and Professional Development Project (5 pages)

The CHSQA workforce and professional development program should include innovative initiatives to educate students in both theoretical and

methodological underpinnings of the relevant disciplines, as well as practical applications for homeland security operations. As part of this, applicants should describe how they would embed their students and faculty, individually or in teams, with homeland security practitioners to conduct research, and foster opportunities for students to gain practical experience in homeland security-related professions. Applicants should also describe how they would integrate homeland security-related courses of study into existing science, technology, engineering, and mathematics (STEM) degree programs. Additionally, applicants should describe how their Center would provide and enhance technical education and training programs for HSE and DHS professionals, for example, at the Federal Law Enforcement Training Center, the Emergency Management Institute or other federal training centers.

The overarching goals of a COE's workforce and professional development program are to:

- Build universities' capacity in science, engineering, mathematics and analysis. Analysis includes business administration and policy analysis, as applied to homeland security-related challenges
- Strengthen the science, engineering, and analytical capabilities of the homeland security workforce, both current (professional development) and future (workforce development)
- Diversify the homeland security technical workforce by building homeland security science, engineering, and analysis capacity at Minority Serving Institutions (MSIs)
- Link students and researchers to practitioners in operational settings to develop more robust tools and technologies
- Develop and train existing homeland security professionals in science, engineering, and business administration disciplines for the current and future workforce.

Applicants must propose a project to align with Section A.III "Research and Workforce and Professional Development Themes, Topics, and Questions." DHS encourages proposals that include plans to integrate workforce development initiatives with DHS Components, other federal or state government agencies, and FFRDCs that have homeland security missions.

Prescribed education program activities include:

- Developing undergraduate, graduate or professional career enhancing programs that support the COE's research program
- Applying existing disciplines to homeland security through development of curricula, concentrations, minors, and certificates within established degree programs

- Building homeland security capacity at MSIs. Please visit the following link for a list of accredited U.S. post-secondary institutions that meet the statutory criteria for identification as MSIs:
<http://www2.ed.gov/about/offices/list/ocr/edlite-minorityinst.html>
- Offering continuing education opportunities for first responders and homeland security professionals
- Offering student internship, scholarship, or fellowship programs that provide homeland security research experience
- Developing community college partnership programs to attract a diverse population of students and teachers into homeland security
- Offering homeland security related research opportunities to students
- Embedding students and faculty in research projects at DHS or other operational agencies within the homeland security enterprise.

Applicants must include the following elements for each project:

- Title
- Principal investigator (name, title, school)
- Specifically identify which theme area and topic the project addresses - *if a proposed project falls under multiple themes/topics, identify those as primary, secondary, tertiary, etc.*
- Project Abstract
- Goals and objectives of the project
- Significance of the proposed project to homeland security
- Capability or knowledge gap this project addresses
- Significant partners and their roles
- A description of how the project aligns with and integrates into the Center's research program
- A description of how to track specific measures of success, i.e., the number of students who graduate with homeland security relevant degrees; the number of students that participated in homeland security-related internships or research activities; the number of students that successfully obtained homeland security-related employment; the number of homeland security-related conference presentations given; the number of homeland security-related papers published; and/or, the number of homeland security-related awards or prizes received
- A year-by-year description of key milestones for the project
- Total projected costs per year
- If relevant, applicants must discuss any unique data, testing, or laboratory facilities that will be required to conduct the project and how the applicant will ensure it can access the data and facilities.

III. Research and Workforce and Professional Development Themes, Topics, and Questions

The Center for Homeland Security Quantitative Analysis (CHSQA) shall develop the next generation of mathematical, computational, and statistical theories, as well as algorithms, methods, and tools to advance the quantitative analysis capabilities of the Homeland Security Enterprise (HSE). CHSQA shall aim to inculcate analytic rigor throughout the Department to support decision-making (see Figure 1).

The Homeland Security vision is a homeland that is safe, secure, and resilient against terrorism and other hazards. The DHS has a **five-mission** structure:

- Prevent Terrorism and Enhance Security
- Secure and Manage our Borders
- Enforce and Administer Our Immigration Laws
- Safeguard and Secure Cyberspace
- Strengthen National Preparedness and Resilience

Accomplishing these missions requires unity of effort across every area of DHS activity and among the numerous homeland security partners and stakeholders.

The Department will accomplish unity of effort not by centralizing the decision making authority...but rather by transparently incorporating DHS Components into unified decision making processes and the analytic efforts that inform decision making.

-Homeland Security FY2014-2018 Strategic Plan, p.6

Figure 1

DHS seeks Center projects that include four broad themes within its research portfolio. The matrix below lists the theme areas and associated topics. DHS seeks a portfolio of projects addressing these theme/ topic areas. The Center's proposal may include proposed projects focusing on one or more topic areas. These projects are deep dive exploratory research in an academic discipline and shall strive for breakthrough technological advances. The Center proposal shall also include projects that exhibit a combination of themes and topics. DHS encourages this multifaceted approach with a portfolio of projects for CHSQA given the complex environment and range of issues included in the DHS mission set.

Center for Homeland Security Quantitative Analysis (CHSQA)	
Themes	Topics
(1) Data Analytics	1A. Data Integrity
	1B. Data Integration
	1C. Data Visualization
	1D. Predictive Analytics
	1E. Big Data Ethics & Privacy
(2) Operations Research/ Systems Analysis	2A. Optimization of Homeland Security Operations
	2B. Creating Innovative Simulations & Modeling
	2C. Improving Decision Analysis
(3) Economic Analysis	3A. Consequences and Costs of Homeland Security Threats and Hazards
	3B. Benefit Estimation for Addressing Homeland Security Threats and Hazards
	3C. Economic & Decision Models of Terrorist Enterprises
(4) Homeland Security Risk Sciences	4A. Risk Analysis & Risk Management
	4B. Risk Perception & Communication
	4C. Management of Risk from Intelligent, Adaptive Adversaries

The objective of the CHSQA is to gain efficiencies by applying advanced analytical tools and processes to support decision-making throughout the mission set. Successful proposals shall develop projects with multi-disciplinary research teams and concepts. Figure 2, a visual illustration, provides a conceptual framework to aid proposal development. Beginning at the top, left-hand side of figure 2, the project must address a problem or challenge related to homeland security missions. For CHSQA, these problems or challenges shall relate to the application of analytic tools and rigor in real time to support decision making. The problems or challenges are likely to relate to constantly changing information requirements that require dynamic and adaptable tools and processes.

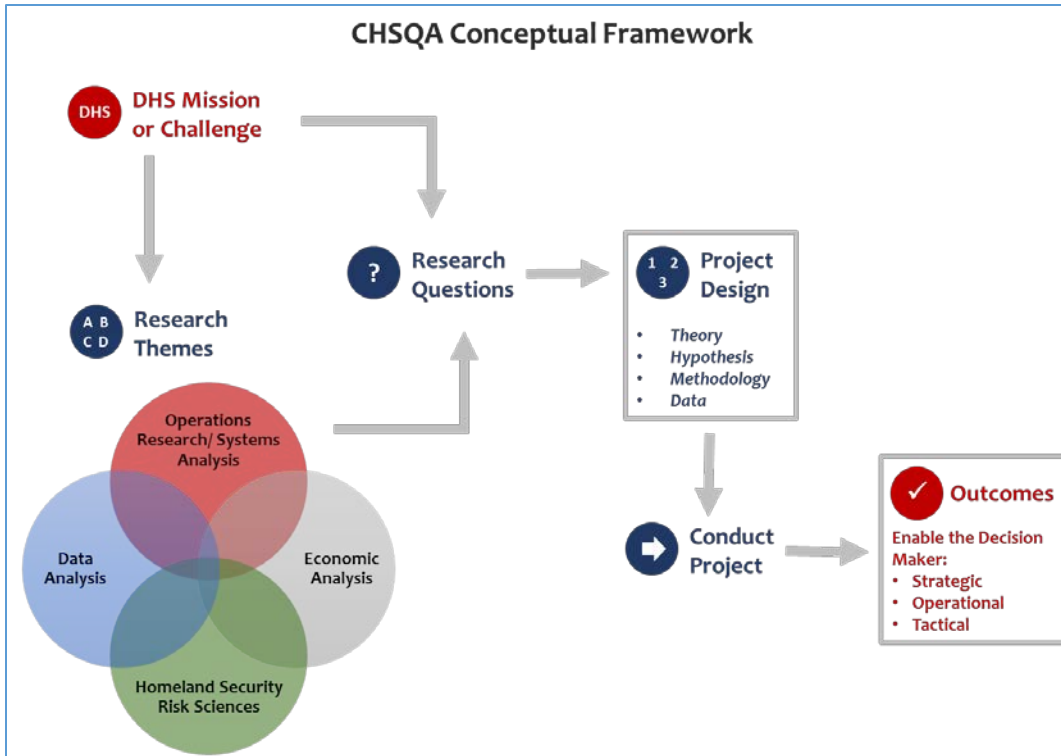


Figure 2

After the Center identifies the DHS problem or challenge they will address, the next step is to develop initial research questions and consider the applicability to the CHSQA themes and topics (Figure 2 depicts the CHSQA themes in a Venn diagram, to illustrate DHS’s recognition of overlap among the themes and topics). The Center must then refine the initial research questions for the project in terms of the CHSQA themes and topics. Successful proposals shall ensure that the link between the anticipated outcomes of the research question will support homeland security decision-makers by designing a comprehensive project approach. The project design shall include theory, hypothesis, methodology, and data elements. The next step is to conduct the research project and shall include a combination of scientific, technological and procedural advances in analysis that transform data into insights. The insights are the outcomes of the project and will “Enable the Decision Maker” – that is, to make smarter decisions in areas such as better resource management, increased productivity, increased security or more efficient operation. Since DHS missions involve decisions by numerous homeland security partners and stakeholders, the outcomes will support decisions at strategic, operational, and/or tactical levels. Case studies, following this

conceptual framework (insets in the NOFO) are exemplary of the types of project proposals that CHSQA shall develop.

Case Study Example #1: Port of Entry Wait Times Study

Background

Inspection and screening people and vehicles at U.S. border crossings are vital to homeland security. Among the benefits of these activities are avoided losses resulting from a terrorist attack. At the same time, inspections incur various types of costs. Among the costs there are personnel operation costs (incurred by the federal government). Also, inspections generate various spillover effects relating to the delays in the flows of passenger and cargo across U.S. borders. Reducing wait times at Ports of Entry (POEs) will reduce these negative spillover effects, though it will at the same time incur demands on the federal budget.

Problem

There is no independent, academically rigorous study that quantifies the impact on the U.S. economy of decreasing wait times at POEs.



Applicability of the CHSQA Themes/Topics to the Problem

1. Data Analysis

- Data Integrity. Ensure accuracy of the data.
- Data Integration. Determine how a variety of data can be used to address the research challenges, including publicly available data from CBP and commercial vendors.

2. Operations Research/ System Analysis

- Optimization of Homeland Security Operations. Develop a baseline of existing operations and compare with changes in staffing. Perform logistical analysis of the inspection process to estimate the effect of the explicit transportation costs.
- Creating Innovative Simulations & Modeling. Use computable general equilibrium model (CGE) Global Trade Analysis Project (GTAP) and Input-Output analysis to evaluate the regional and national impacts of changes in tourist and business spending.

3. Economic Analysis

- Benefit Estimation for Addressing Homeland Security Threats & Hazards Determine costs, including secondary and tertiary effects of inspection wait times to the U.S. economy. Need methodologies/ algorithms that translate the dollar value of the opportunity costs of lost time to passengers.

? Research Questions

“What are the economic impacts of changes in wait times at U.S. border crossings due to changes in CBP staffing (both increases & decreases)?”

1 2 3 Project Design

(Example includes Methodology component)

- Analyze operations at major POEs (identified by CBP): 17 passenger land crossing, 12 freight crossing POEs and 4 passenger airports.
- Microeconomic level analysis
 - Determine the degree to which wait times fall/ rise as extra processing capacity is applied.
 - Conduct logistical analysis of the inspection process to estimate the effect of transportation costs.
- Macroeconomic analysis
 - Use input-output (I-O) analysis to evaluate the regional and national impacts of increased tourist and business spending associated with reduced wait times.
 - Use CGE model to estimate the impact of reduced wait times on freight transportation.

✓ Outcomes

Enabling the Decision Maker

Provide DHS/ CBP leadership independent academically rigorous analysis showing that the impact per CBP officer to primary screening adds \$2million to U.S. GDP and 33 new jobs to U.S. economy.

Theme 1: Data Analytics

Data collection and analysis are used in almost every facet of daily life. We use data to explain natural phenomena, solve problems, improve human health, and generate economic prosperity (“Big Data,” 2014, p. 1). The tools to collect and analyze data – including sensors, cameras, and geospatial technology – along with drastically reduced collection, storage, and processing costs have facilitated the velocity, ease, and diversity of our data use. However, data’s challenge is to extract what is pertinent from what is peripheral, and to derive value from voluminous data sets that leads to actionable insights (Stanovich, 2006, p. 4). DHS seeks emerging data management and analysis tools and techniques that help DHS to secure the homeland, foster a thriving economy, and protect civil rights, liberties, and privacy (Gandomi and Haider, 2015). DHS is interested in research to help answer the questions posed in each of this theme’s topic areas.

Topic 1A. Data Integrity

The increasing prevalence of data-intensive science and the application of analytical methods to explain large amounts of data – even when they are not completely understood – brings about the need for data reliability and integrity. We have entered a new era of “Big Data” that strains our notions of credible science. We need to understand how to evaluate the trust, fitness of use, and provenance of data sets, and their sources. DHS seeks innovative approaches to evaluate and ensure data integrity and credibility, so that questionable data do not corrupt analytical efforts, lead to significantly erroneous conclusions, decrease efficiency or increase vulnerability

Representative research questions of interest to DHS (not listed in priority order):

- What tools, techniques, and methodologies can be used to validate the integrity of data sources in a credible and scalable manner?
- How can we detect unintended changes to data as a result of storage, retrieval, or processing operations (e.g. malicious intent, unexpected hardware failure, human error)?
- Is it possible to generate data quality indication labels to rate sources and content based on various factors such as reliability, credibility, uncertainty, and confidence?
- How can we provide better improvements to the human systems interface to improve data integrity (e.g. reducing human error, increasing confidence levels)?
- How can we ensure information delivered to and used by homeland security practitioners remains up-to-date, trustworthy, and complete throughout the decision-making processes?

Topic 1B. Data Integration

Data integration refers to combining multiple sources and types of data to improve knowledge discovery and decision-making. Homeland security practitioners at the federal, tribal, state, local and international organization are

challenged with making use of massive flows of data. They need to deal with the overwhelming volume, speed and variety of information regarding disasters and emergencies; border security or transportation security operation; terrorist attack, or similar incidents. DHS seeks university-led research within the data integration topic to provide the homeland security practitioners with data analytics tools and techniques that will ensure they have reliable, relevant, timely and useful data.

Representative research questions of interest to DHS (not listed in priority order):

- How can we develop tools to extract and aggregate information from disparate data sources and provide timely actionable information to homeland security practitioners to support mission operations?
- How do we structure large datasets to facilitate protection of (sensitive) data to use for testing?
- What is the optimal way for DHS to integrate data that delivers actionable insights or analysis to provide decision support?
- How can we use technology to extract specific information from unstructured text?

Topic 1C. Data Visualization

Adding data visualization tools and techniques to big data analysis helps operators and policy makers discern patterns, detect anomalies, understand trends, and pinpoint opportunities and risk. DHS finds visual analytics to be a critical component in removing the complexities of data sources and to create rapid comprehension for nontechnical users. To that end, DHS seeks innovative research and applications that will provide the public, policymakers, and the homeland security enterprise tools for effective and efficient displays of quantitative information from a variety of datasets.

Representative research questions of interest to DHS (not listed in priority order):

- What advanced technologies will be applied to produce the next generation of data visualization tools (e.g. the next generation of Tableau)?
- How can we visually detect relevant patterns with small sample sizes (or no data)?
- How do we manage rapid flows of data and how can we adapt existing analytical and application infrastructure to reflect this trend?
- How can historical and current data be clustered to arm decision makers with optimal solutions?
- How can the homeland security enterprise use data to discern relationships, detect anomalies, and display trends that might mitigate terrorist actions, threats public safety, pandemics, and potential natural or manmade disasters?

Topic 1D. Predictive Analytics

Predictive analytics can expose patterns and capture relationships in current and historical data through a variety of techniques based on statistical methods. These methods highlight the interaction between outcome and explanatory variables, or isolate the determinants of outcomes to extrapolate future scenarios. While these methods were effective in the past using small data sets, they can no longer be generalized with big data. Issues of scalability, heterogeneity, statistical significance, and computational efficiency challenge the existing predictive analytics process. DHS therefore seeks research projects that will engage with techniques more readily adept with big data samples, while remaining sensitive to its unique characteristics.

Representative research questions of interest to DHS (not listed in priority order):

- What techniques (i.e. moving averages, linear regressions) are best suited to predict unanticipated situations using large datasets?
- How can predictive analytics be used in the world of big data when considering issues of statistical significance, scale, and heterogeneity?
- How can we combine varied characteristics and indicators of events to predict and improve our understanding of risk over the 96-hour horizon?
- Are there reliable techniques for determining how more or different data or both contribute to the problem of allocating assets and resources for uses such as emergency response, search and rescue, border crossings, pandemics?
- How does a first responder organization gauge future demand for services? Is it valid to base decision on current trends in or more factors? For example, are demographics, climate, economics, the tax base, organization viability or simply past experience sufficient?

1E. Big Data Ethics and Privacy

Big data technologies have reached a level of sophistication and capability never seen before in the modern era. Surpassing expectation, large datasets are now adept to revealing insights and deriving value beyond rational organization and process. Data analytics have improved our ability to find intentional or unintentional anomalies or patterns and DHS wants to improve its ability to understand these patterns to protect the country. Big data technology holds tremendous power to manage the needs and demands of society and improve quality of life. It also has the power to create potential harm and threaten individual privacy.

DHS wants to improve its ability to balance the opportunity to understand patterns in data with social and ethical considerations that protect data sources and individuals. Based on recommendations from President Obama's Council of Advisors on Science and Technology (PCAST), DHS seeks to use big data analytics to strengthen privacy-related technologies. Potential research projects must focus on how the DHS mission can gain efficiency and effectiveness without

compromising individual privacy. This challenge requires multi-disciplinary solutions.

DHS also encourages applicants to submit novel proposals identifying, and where possible, evaluating the effectiveness of innovative remedies when data are compromised.

Representative research questions of interest to DHS (not listed in priority order):

- How can we perform computations on an encrypted dataset while remaining encrypted?
- How can we assess the impact of government applications related to big data analytics on existing communications, legal, and regulatory systems?
- How can we balance tomorrow's threats against tomorrow's platforms (e.g. new hardware, software, new data, new algorithms)?
- At what point do private individuals accept biometrics and data collection as an accepted social process?
- How can the HSE integrate public blockchain technology to provide a distributed, scalable approach to identity management, while respecting classic information security and privacy concepts (i.e. confidentiality, integrity, availability, non-repudiation and provenance, pseudonymity, selective disclosure of information)?¹

Theme 2: Operations Research/System Analysis

Operations research (OR) is a discipline that applies advanced analytical methods to facilitate better decisions and encompasses a wide array of problem-solving techniques and methods to improve decision-making and efficiency.

Correspondingly, system analysis (SA) is a problem-solving process, involving scientists of relevant disciplines, stakeholders, and decision makers alike. The central purpose of SA is to help decision makers and policymakers resolve problems in the short-, medium-, and long-term. DHS seeks research projects that apply these OR and SA principles to DHS's complex and diverse mission set. Proposed projects should also emphasize project scalability – that is, how research methodologies and/or results can be transferable to various DHS Components, including state, local, and tribal organizations within various geographic locations.

Topic 2A. Optimizing of Homeland Security Operations

DHS seeks innovative approaches to balancing and managing the complex and competing requirements, interests, and incentives associated with the U.S. homeland security environment. Homeland Security operations involve many stakeholders- federal, state, tribal, territorial, local, industry, and individuals- all with their own optimal solutions that may be contradictory. Also. Homeland

¹ See DHS SBIR Solicitation #: HSHQDC-16-R-00012 for details related to this research question.

Security operations may also have legal requirements that provide additional constraints. DHS may be required to prioritize and/or weight these constraints.

Representative research questions of interest to DHS (not listed in priority order):

- How to provide decision makers a transparent, repetitive process to distinguish various choices and prioritize competing requirements?
- How can we improve our forecasts of workforce and staffing needs for managing immigration applications and petitions?
- How can decision makers be informed of the impact of different policies that optimize trade and/or economic benefits?
- What are some appropriate methods to analyze unintended side effects of innovative policy (e.g. reverberation impacts)?

Topic 2B. Creating Innovative Simulation & Modeling

DHS has myriad challenges in managing complex systems. Characteristics of DHS challenges include unpredictable and rare events (i.e. natural disasters), individual motivations (i.e. terrorists or anthropogenic disasters), separation of cause and effects in space and time, and other attributes which cannot be fully studied using conventional simulation and modeling techniques. DHS seeks research that will create innovative simulation & modeling to understand the performance of these systems. These models may also be used to develop datasets purely hypothetical in nature, or otherwise nonexistent due to complexity of collection or financial constraints.

Representative research questions of interest to DHS (not listed in priority order):

- What policies can DHS implement to safeguard against current threat, while mitigating potential or existing dangers?
- How can we deter attacks and minimize the adverse effect on any disruption in operations?
- Which modeling tools are the most simple, yet effective, to use? Which are the most sophisticated (e.g., complex adaptive system approaches; modeling approaches that consider cascading effects, interdependencies, economic impacts, and resource allocation)?
- Which modeling and simulation tools are most appropriate for different stakeholders to use (i.e., federal, tribal, territorial, state, local) and how can the tools be designed to make them sustainable?
- How can DHS be confident that the policy enacted will result in the desired outcome? (e.g. estimating counterfactual values)

Topic 2C. Improving Decision Analysis

DHS is responsible for the homeland security strategy to manage resources to prevent and respond to a wide range of threats and hazards. DHS also manages initiatives to mitigate and recover from the potential consequences should these threats occur. DHS seeks to improve decision analysis by developing innovative tools, methodologies and processes that will provide transparent, repeatable and

systematic assessment for comparison and prioritization of single, multiple and competing objectives.

Representative research questions of interest to DHS (not listed in priority order):

- How to solve problems in dynamic environments where information is not always complete and different stakeholders have conflicting goals and constraints that impact clear-cut optimization?
- How can we better understand the competing interest of homeland security stakeholders so that we can anticipate unrecognized risk and cost transfers to identify ways to align incentives to achieve common good?
- What methodology can be applied to identify and weigh goals and objectives of a program and assess how well that program meets those goals?

Case Study Example #2: Boat Allocation Model

Background

In the past decade, the U.S. Coast Guard has spent a tremendous amount of effort to model and understand its operations in the offshore environment across the modeling spectrum, from tactical to campaign. The USCG has not applied this coordinated analytical to the coastal area of responsibility (AOR).

Problem

USCG seeks to acquire enterprise tools to support campaign or strategic level operations analysis within the coastal AOR.



Applicability of the CHSQA Themes/Topics to the Problem

1. Operations Research/Systems Analysis

- Optimization of Homeland Security Operations. Create flexible and powerful decision support technologies to meet USCG needs in boat allocation planning and related activities.
- Improving Decision Analysis. Provide novel optimization models that recognize the multi-objective nature of the decision-making in the USCG operational environments.

? Research Questions

“What analytical capabilities are needed by the United States Coast Guard to support campaign and strategic level analysis within the coastal AOR across all districts and missions?”

1 2 3 Project Design

(Case Study only includes Methodology component)

- An Operations Research Optimization Model was developed. Objectives of the model include:
 - (1) Minimize Unmet Mission Hours
 - (2) Minimize the Budget
- Development and implement a Verification, Validation and Accreditation (VV&A) plan for the tools.
- Use to maximum extent possible web-enabled, public, open-source technologies.

✓ Outcomes

Enabling the Decision Maker

Support USCG Office of Requirements & Analysis/ operational analysis group by providing analytical tools that identify alternate solutions to their planning activities and thus allow them to use their expertise to select the best options (e.g., tools support ROI analysis to improve mission and budget efficiencies).

Theme 3: Economic Analysis

DHS seeks innovative research projects using economic analysis in both traditional and non-traditional ways. CHSQA projects shall apply modern quantitative techniques to provide a deeper understanding of the dynamics related to homeland security missions. The open market economy provides certain benefits, but also creates considerable vulnerability in terms of system shocks due to environmental, political, or social events. Terrorist networks are opportunistic in this regard, seeking maximum impact to disrupt the global economy and compromise socio-economic conditions within the host or target country. Identifying determinants of terrorist activity (e.g. level of democratization, fatality impacts, attack type, weapons available) and attack consequences (e.g. growth of output and its components, investment and consumption trends, capital shocks, return on investment) are critical to the DHS mission to understand terrorist adversaries and generate the appropriate tools to respond effectively.

Topic 3A. Consequences and Costs of Homeland Security Threats and Hazards

DHS recognizes the need for innovative and improved methods to measure and predict the direct and indirect effects of terrorist attacks and natural disasters.² Both events overlap in terms of macro- and microeconomic outcomes, variations in intensity, and fluctuation in the welfare state of individuals pre- and post-event. DHS seeks comparison of these incidents with predictive tools/methods to assess overall economic cost, emergency management, and likelihood for repeat occurrences. Ultimately, DHS aims to establish dual-use planning and incident response mechanisms to address the economic consequence and risk of these events.

Representative research questions of interest to DHS (not listed in priority order):

- What are scientific methods to measure indirect losses attributed to business interruption?
- How can we improve and expedite estimates of direct and indirect costs of a disaster?
- How can we measure and predict the direct and indirect effects of terrorist attacks and natural disasters?
- What is the effect of illegal immigration on economic growth and employment?

Topic 3B. Benefit Estimation for Addressing Homeland Security Threats and Hazards

Decision makers require analysis support to quantify complex policy problems. This involves providing a consistent methodology for identifying options.

² DHS conceptualizes direct costs and consequences of terrorist attacks to include property damage, business, and consumer losses, as well as fatalities and traumatic or psychological injuries. DHS conceptualizes indirect costs to include substitution effects, persistent behavioral changes resulting in economic loss, supply chain impacts, loss of confidence in government, and social or political upheaval at the local or national level.

Decision makers should be able to see how the options align with objectives and the feasibility of each option. DHS seeks research projects that will aim to actively embed benefit analysis and other approaches within homeland security operations, tools and methods to assess whether the policy, technology or process improvement is effective. The effectiveness of the process improvement should also be quantified so that options can be compared consistently.

Representative research questions of interest to DHS (not listed in priority order):

- What are clever ways to measure or estimate the monetary value of considerations in understanding the costs and benefits of a decision?
- How can we assess whether the benefits of a proposed security policy, meant to reduce the probability of attack, will equal or exceed its costs?
- What is the minimum threat probability required for the risk reduction benefits of the security policy to exceed the costs?
- How can we estimate the economic and employment impact of immigrant investor programs (e.g. EB-5 Visa Program)?
- How can valid and reliable methodologies (e.g. economically and statistically valid forecasting tools) be applied to DHS initiatives to report program outcomes and overall economic benefits?

Topic 3C. Economic & Decision Models of Terrorist Organizations

Economic analysis provides valuable insight to model and predict terrorist group attacks behaviors and preference. Terrorist organizations use rational decision processes when considering an attack on soft or hard targets. These groups likely determine preference orderings (e.g. attack method, target tick, attack time, and location), input constraints (e.g. availability of operatives, materials needed), and objective functions using economic and decision-making approaches to maximize visibility and impact. Therefore, economic analysis provides valuable insight to model and predict terrorist group attacks, behaviors, and preferences to mitigate threats and decrease vulnerability. DHS seeks innovative economics-based models highlighting relevant aspects of a terrorist group's decision problem including risks of defection and interdiction to craft a strong counter response.

DHS seeks to link this analysis to research focused on deterrence. Deterrence is a major factor in the cost-effectiveness of many security programs. DHS seeks innovative approaches to measure the deterrence effect.

Representative research questions of interest to DHS (not listed in priority order):

- Where do “rational actor” and other economic models break down in evaluating the probabilities of terrorist attacks or understanding terrorist behaviors, and what innovative models can be developed to address those gaps?
- How can knowledge of terrorism objective functions be applied to enhance terrorism risk management?

- What are the likely objectives of terrorist groups that pose a threat to the U.S.?
- What are the business models of terrorist organizations and what are their vulnerabilities?
- How can DHS quantify the relative deterrence effects of alternative technology investments?
- What factors of production of terrorist attacks are most vulnerable to disruption? What elements of an attack have the fewest substitutes?

Theme 4: Homeland Security Risk Sciences

The DHS has multiple priorities from catastrophic natural disasters, terrorist events, customs processing, to immigration services and beyond. To properly manage these priorities (e.g. preparation and response), DHS needs to understand the wide range of risks involved. Risk assessment within the homeland security enterprise is a formidable challenge, given the diverse nature of risk itself. The complexity and heterogeneity of risk in DHS's portfolio – ranging from probabilistic events (i.e. natural disasters) to randomized attacks of terror and violence – complicate the ability to compare risks or develop a single meaningful unit of risk to be measured. DHS seeks projects addressing these limitations with quantitative and qualitative tools to improve DHS management of homeland security risks.

4A. Risk Analysis & Risk Management

Unlike accidents and natural disasters, there is insufficient historical data to estimate the likelihood and types of future terrorist attacks in the U.S. Although a number of classical techniques designed to assess the likelihood of low-frequency, high-consequence events have been applied to terrorism risk management (i.e. probabilistic risk assessment), significant uncertainty in the predictability of terrorist events pose great intelligence and adaptive hazards.

DHS envisions this COE to explore how terrorism risk analysis and management can address the scarcity of historic data, terrorist intelligent, adaptive or secretive behavior, and unknown terrorist utility functions. Addressing these challenges successfully will provide a more efficient and effective terrorism risk management approach.

Representative research questions of interest to DHS (not listed in priority order):

- How can we support potential interactions of existing or proposed terrorism risk management activities between actors within competing interests?
- How do we reconcile dealing with risk events we are not well-equipped to imagine, let alone measure?
- How can DHS determine acceptable levels of risk for individual metrics?

- How can DHS assess immigration fraud risk so as to more effectively target site visits and other verification activities?

4B. Risk Perception and Communication

Effective terrorism risk management requires an understanding of how people perceive and respond to various risks, and how the government may best allocate its limited resources to reduce risk. Clearly, we need effective risk communication approaches. People respond to risks differently, depending upon the types and sources of risk as well as their own situations. For example, more than 40,000 people a year die in automobile accidents in the U.S., yet few people hesitate to travel by car. In contrast, many fear flying in commercial aircraft, which is much safer than driving, when one compares aggregate risks. For many people, terrorism evokes fear and dread disproportionate to probabilities and consequences of terrorist attacks in the U.S.

The federal government cannot protect everyone against all terrorist acts. What terrorism risks the government *should* mitigate, and to what degree, is an unanswered question. Identifying the optimal level of security expenditures is a major challenge, as well as damages caused by various risks and subjective public dread. This COE should conduct research pertaining to risk communication, education, and discussion to allow for more effective risk management, mitigation, and resilience, which might also allow objective and subjective evaluations of risks and their consequences to be more closely aligned.

Representative research questions of interest to DHS (not listed in priority order):

- How can we objectively and accurately measure people's perception of risk using cost-effective and repeatable methodologies?
- What are effective tools, methods, and content for teaching crisis decision analysis and effective protective actions to diverse audiences by age, education, culture, and types of hazards or actions?
- How can the American public's perception and tolerance of terrorism risk compare with its perception and willingness to tolerate risks due to natural disasters or accidents?

4C. Management of Risk from Intelligent, Adaptive Adversaries

Homeland security decision makers are responsible for developing defensible terrorism risk management strategies to guide their resource allocation decisions. While we know that certain terrorist groups have a general desire to harm us, we cannot anticipate all of their specific intentions and capabilities. Known uncertainties must be taken into account when developing a basis for decision-making. DHS seeks projects minimizing uncertainty to manageable levels or projects providing enhanced resource allocation, decision making and communication support.

Representative research questions of interest to DHS (not listed in priority order):

- What other approaches (e.g. game theory, mathematical economics, behavioral economics, psychology, anthropology, organizational theory, decision science) can be used, independently or combined, to enhance terrorism risk analysis?
- How can complex adaptive systems be applied to increase our understanding of terrorism behaviors and enhance terrorism risk management?
- What methods can analysts use to discern what attack scenarios are more or less likely, when there is little or no evidence of the adversaries' planning? How can analysts reduce the uncertainty associated with such assessments and validate their methods over time?

Case Study Example #3: Unaccompanied (Migrant) Children

Background

Unaccompanied (migrant) children (UCs) are defined in statute as “children who lack lawful immigration status in the United States (US), who are under the age of 18, and who either are without a parent or legal guardian in the US or without a parent or legal guardian in the US who is available to provide care and physical custody” (Kandel, 2016, p.2). DHS and the Department of Health and Human Services (HHS) share responsibility for the processing, treatment and placement of UC. DHS Customs and Border Protection (CBP) apprehends and detains UCs arrested at the border, while Immigration and Customs Enforcement (ICE) handles custody transfer and repatriation responsibility (Seghetti et al., 2014, p.2). HHS coordinates and implements the care and placement of UCs in appropriate custody.

In 2008, Congress passed the Trafficking Victims Protection Reauthorization Act (TVPRA). The TVPRA established in statute that CBP turn Unaccompanied (migrant) Children (UCs) over to ICE for transport to HHS within 72 hours of apprehension. In 2014, the number of UCs apprehended at the Southwest border while attempting to enter the United States without authorization surged sharply from previous years, straining the system in place to handle such cases (Kandel, 2016, p.2).

Problem

CBP and ICE are diverting resources from critical core missions to deal with the increased volume of UAC apprehensions.



Applicability of the CHSQA Themes/ Topics (examples)

1. **Data Analytics**- Use statistical and data analytics to address the problem.
 - Data Integration. Determine what information is collected and available to use for analysis, and how to integrate these data.
 - Data Visualization. Display the data to show the magnitude of the problem and analytical results.
 - Predictive Analytics. Using current trends, forecast future situations.
 - Big Data Ethics & Privacy. Use data and conduct research without compromising individual's privacy. Conduct analysis without broadcasting sensitive information related to the operations.
2. **Operations Research/ Systems Analysis**
 - Optimization of Homeland Security Operations. Studies to optimize CBP, ICE, and HHS operations (e.g. find least cost)
 - Creating Innovative Simulations & Modeling. Develop models to reveal the (counterintuitive outcomes) of a policy.
 - Improving Decision Analysis. Provide tools to consistently compare attributes that may seem unrelated.
3. **Homeland Security Risk Sciences**
 - Risk Perception and Communication. Understand the motivations of the UCs.

Case Study #3: Unaccompanied (Migrant) Children (continued)

Research Questions

“How can the processes of CBP, ICE, HHS in the Rio Grande Valley be designed to best employ resources under conditions of increasing volume while still meeting 72 hr. transfer requirements, ensuring humanitarian treatment and care of UCs, and minimizing/ reducing the diversion of resources from other critical missions”

Project Design

(Case Study only includes Methodology component)

- General Transportation Cost Model (using Commercial Air)
 - Provide optimal or near optimal assignment of apprehended subjects to shelters. Minimize transportation costs (Comply with 72 hour rule)
- Transportation Air Charter Model
 - Minimize the total transportation costs subject to capacity constraints in charter and commercial flights, beds available in shelters, escorts available, etc.
- Shelter/ Transition Center Model
 - Use queuing models to find the capacity for a transition center to be able to respond adequately to several scenarios.
- Data Collection and Analysis
 - Approach is to gather data from indicators and find relationships with UC apprehensions using statistical methods (e.g. correlations, regression analysis, time series)
 - Investigate the following indicators (by country of origin): demographic, economic, adult immigration, etc.

Outcomes

Enabling the Decision Maker

Transportation Models were designed to assist field officers/agents in selecting transportation routes and scheduling commercial flights, to provide field offices minimized cost routes, and to help ICE determine least cost between commercial or charter flights. Shelter Models helped HHS to assign UC to shelters, and devise tools to support the cost/benefit analysis of a transition center and evaluate optimal shelter size.

B. Federal Award Information

Award Amounts, Important Dates, and Extensions

Available Funding for the NOFO: Up to \$500,000; total will be distributed over the two year period of performance (Subject to availability of funds)

Projected number of Awards: Up to 3; there may be zero awards

DHS will grant up to three awards for Center Partner. DHS reserves the right to add Partner institutions to the successful Center Lead institution, either from those received for the Center Lead NOFO or from the Partner NOFO, provided the applications successfully pass merit and DHS relevancy reviews. A single institution may receive only one Center Partner award under this NOFO.

Period of Performance: Up to 24 months

DHS anticipates the period of performance of the project to be up to 24 months, encompassing two program years. DHS anticipates each program year will be 12 months. COE annual program years coincide with most academic calendars; i.e., July 1st to June 30th of the following year. The first program year may be more or less than 365 days to allow a new COE's performance periods to be synchronized with this calendar. However, because actual award dates are unknown in advance, applicants should submit proposals for the full year. Each year, annual funding is subject to the availability of appropriated funds, the performance of the Center, and DHS research priorities.

An extension to the period of performance may be permitted. Please refer to Extensions, in Section H, for the steps recipients must follow and what information must be included in the justification for such request to be considered.

Projected Period of Performance Start Date(s): 09/30/2017

Projected Period of Performance End Date(s): 08/31/2019

Funding Instrument

Cooperative Agreement

DHS will exercise substantial programmatic involvement through this cooperative agreement. This includes monitoring project progress; providing technical assistance; disapproving and approving sub-projects, work plans or modifications thereto; holding kickoff meetings; conducting biennial reviews; conducting scientific reviews; and, coordinating research and development activities. See APPENDIX A: Terms and Conditions for additional details of substantial programmatic involvement.

Available Funding

There are two funding opportunities associated with the Center for Homeland Security Quantitative Analysis (CHSQA) award: (1) one for Center Lead (DHS-16-ST-061-CHSQA-Lead) and (2) one for Center Partner (DHS-16-ST-061-CHSQA-Partner). Subject to availability of funds, DHS estimates that a *total* of up to \$4 million per year will be available for funding the Center and all direct and indirect costs for the selected Center lead and Partner applications. DHS does not guarantee any total amount of annual or cumulative funding. DHS may allocate up to \$500,000 of the up to \$4 million Center Lead award to Partner awards.

DHS reserves the right to select research and/or education projects submitted in response to the Center Lead and/or Partner NOFOs and combine them to create the research and education portfolio for the new Center. DHS awards the cooperative agreement to the Center Lead. Partner projects selected by DHS become part of the Center portfolio and are funded through the cooperative agreement with the Center Lead institution. DHS may allocate up to \$250,000 of the \$4 million per year to each selected Partner applicants, subject to availability of funds. The Center Lead is responsible for administering funding to all DHS-selected projects within the Center's portfolio.

Note: The first year of funding may be less due to startup delays; however, applicants should submit proposals for the full amount.

C. Eligibility Information

Eligible Applicants

The Center Partner designation is restricted to an accredited institution of higher education in the United States, in accordance with 6 U.S.C. 188(b)(2)(A) which specifies: "The Secretary, acting through the Under Secretary for Science and Technology, shall designate a university-based center or several university-based centers for homeland security."

Proposals must be submitted by an accredited U.S. institution of higher education that, along with its chosen partners, has the ability and capacity to conduct the required research. The applicant institution must be identified as the official lead for proposal submission and subsequent negotiations.

Applicants must submit only 1 project per proposal. Applicants may submit more than 1 proposal. Principal Investigators that are already Partners under a Center Lead application may not submit the same application under this Partner NOFO.

Center partner applicants are strongly encouraged to partner with other academic institutions, including historically black colleges and universities (HBCUs), Hispanic serving institutions (HSIs), and/or other MSIs; institutions in states that are part of

the Experimental Program to Stimulate Competitive Research (EPSCoR); public or private sector institutions, and non-profit organizations, including any organizations that meet the definition of nonprofit in OMB Circular A-122, relocated to 2 CFR Part 230. However, nonprofit organizations described in Section 501(c)(4) of the Internal Revenue Code that engage in lobbying activities as defined in Section 3 of the Lobbying Disclosure Act of 1995 are not eligible to apply. The Center Lead institution will fund partnering institutions through sub-awards.

Center Partner institution partnerships with foreign institutions are permitted, but may require special justification and approval from DHS. The applicant can include team members who are non-U.S. citizens.

FFRDCs or laboratories funded by federal agencies may not apply. FFRDC employees may cooperate or collaborate with eligible applicants within the limits imposed by applicable legislation, regulations, and DHS policies. FFRDC employees are not eligible to serve in a principal leadership role on a grant or cooperative agreement, and may not receive salaries or in other ways augment their agency's appropriations through awards made by this program. National laboratory employees may participate in planning, conducting, and analyzing the research directed by the COE principal investigator, but may not direct projects on behalf of the applicant organization or principal investigator. The principal investigator's institution, organization, or governance may provide funds through its assistance agreement with DHS to an FFRDC for project-specific, non-federal research personnel, supplies, equipment, facilities, data, and other expenses directly related to the research.

Federal agencies may not apply. Federal employees are not eligible to serve in a principal leadership role on a grant or cooperative agreement, and may not receive salaries or in other ways augment their agency's appropriations through awards made by this program. Nonetheless, federal employees may interact substantively with awardees in the form of cooperation. Cooperation involves consulting on the planning, management, and coordination of COE activities, sharing or comparing samples, equipment, facilities, data, models, or other support during the conduct of the research in which the interaction is substantial and requires the award of a cooperative agreement, rather than a grant. Substantial involvement occurs when the collaboration or cooperation of a federal employee or facility is necessary to achieving the overall goals of the research supported by a cooperative agreement.

Eligibility Criteria

DHS will not consider applications that do not adhere to one or more of the following requirements:

1. **Deadlines.** DHS will not accept late applications. Without exception, applications must be received by Grants.gov on or before the deadline in this announcement or they will not be considered.
2. **Application relevance.** Applications that do not address the purpose of this announcement will not be considered.
3. **Compliance and completeness.** Applications must substantially comply with the application submission instructions and requirements in this announcement or they will not be considered.
4. **Funding limits.** Applications exceeding the funding limits will not be considered.
5. **Project period.** Applications exceeding the project period term will not be considered.

Cost Share or Match

A cost match or a cost share is voluntary. However, the ability to extend the reach of DHS funds for research and education in support of its mission is an important consideration for DHS. In-kind contributions demonstrate a university's commitment to the COE. Identification of university in-kind contributions will result in a higher rating in DHS's overall proposal review.

D. Application and Submission Information

Submission Date and Other Key Dates and Times

Date Posted to Grants.gov:	08/01/2016
Application Submission Deadline:	11/01/2016 at 11:59:59 PM EDT
Anticipated Funding Selection Date:	06/30/2017
Anticipated Award Date:	09/30/2017

NOTE: The application must be received in Grants.gov by the date and time listed above. If an application is received after the deadline, it will not be considered. Applicants will receive a confirmation from Grants.gov once the application is successfully submitted.

All applications are time stamped by the Grants.gov system when submitted and recipients are notified accordingly. The federal office will download all applications that are received by the deadline date and time as indicated on the NOFO.

Event	Suggested Deadline For Completion
Informational Webinar	08/23/2016 (3:00PM EST) See details below
Obtaining DUNS Number	Four weeks before actual submission deadline 10/04/2016
Obtaining a valid EIN	Four weeks before actual submission deadline 10/04/2016
Updating SAM registration	Four weeks before actual submission deadline 10/04/2016
Starting application in Grants.gov	One week before actual submission deadline 10/25/2016

Address to Request Application Package

Application forms and instructions are available at Grants.gov. To access these materials, go to <http://www.grants.gov>, select “Applicants” then “Apply for Grants,” read the registration requirements and register if necessary (**Allow up to 7-10 business days after you submit before your registration is active in SAM, then an additional 24 hours for Grants.gov to recognize your information**). In order to obtain the application package select “Download a Grant Application Package.” Enter the CFDA and/or the funding opportunity number located on the cover of this NOFO, select “Download Package,” and then follow the prompts to download the application package.

For a hardcopy of the full NOFO, please email request to:

Jacqueline.Greely@HQ.DHS.GOV

Applications will be processed through the Grants.gov portal

Informational Webinar

DHS will conduct an informational webinar for interested applicants on August 23, 2016 at 3:00pm [EST]. During the call, DHS will discuss the NOFO and provide an opportunity for interested applicants to ask questions. The following is the link for the Center for Homeland Security Quantitative Analysis (CHSQA) webinar:

<https://go.foodshield.org/?1sJiq1vb>

Content and Form of Application Submission

A. SF424 Application for Federal Assistance (SF424-V2.0)

Please complete this form in its entirety. If you fill this form out first, other required forms will populate with basic data such as name, address, etc. Signature and date will auto-fill when you submit the application package through Grants.gov.

- a. Block 1, Type of Submission – please check “Application”
- b. Block 8, Type of Application – please check “New”
- c. Block 12, Proposed Project – please provide the start and end dates for your project
- d. Block 15, Total Estimated Project Funding – this amount should correspond to your budget justification and the Budget form’s total for the requested budget period.
- e. Block 16 (E.O. 12372 review question): Please contact your State Single Point of Contact (SPOC) to determine whether you are required to submit this noncompeting continuation application for review, and then check the appropriate box in Block 19. Find your State SPOCs:
http://www.whitehouse.gov/omb/grants_spo
- f. Regarding Block 17: By submitting this application, your organization is providing certifications and assurances regarding:
 1. Drug-Free Workplace Requirements
 2. Debarment, Suspension, and Other Responsibility Matters—Primary Covered Transactions
 3. Information regarding the certifications on drug-free workplace; and debarment, suspension, and other responsibility matters; is attached for your reference as Attachment A
- g. If you are requesting Indirect/Fringe Costs, please attach your indirect cost rate agreement, fringe benefit rate agreement, or a description of how fringe rates are calculated, using the “Add Attachments” button at the end of the 424

B. Budget Information, Non Construction Programs (SF424A-V1.1)

Filling out the Budget Form – please ensure that funds requested on the Budget form correspond to the same items in your budget justification and that the total requested corresponds to Block 15 on the SF 424 form.

C. Certification Regarding Lobbying (GG_Lobbying Form-V1.1)

Submit this form. It will be electronically signed upon submission to Grants.gov as part of your application. If paragraph two of the certification applies, then complete and submit the SF-LLL Disclosure of Lobbying, which is provided as an optional form in the application package.

D. Research & Related: Senior/Key Personnel Profile

Applicants must complete a profile for the principal investigator(s) as well as other Senior Key Personnel identified for the project. Provide biographical a sketch for each senior/key person that include education and research activities

and accomplishments and each individual's role in the proposed project. Each biographical sketch may not exceed two pages.

E. Research and Related: Other Project Information

Tips: Write for a general audience and avoid use of scientific jargon to the extent possible. Please define any technical terminology that is discipline-specific. Be concise and direct in descriptions.

a. Other Project Information (Items 1-6)

Includes information regarding use of human subjects, use of animal subjects, proprietary information, environmental impacts, historic place designation, and international collaborators.

b. Project Summary/Abstract (Item 7)

The summary is limited to one single-spaced page with 12-point Times New Roman font and one-inch margins. Attach the Summary/Abstract to Item 7 on the Research & Related Other Project Information Form.

The Summary/Abstract is for dissemination to the public and must not include any proprietary or confidential information.

Include the title of the Project and provide a summary of (1) the objectives of the project; (2) the approach to be used; and (3) examples of the potential results and how those results may benefit specific homeland security stakeholders. Applicants must select either a research project or a workforce and professional development project for their proposal. Applicants must clearly identify which they have chosen.

c. Project Narrative (Item 8)

The project narrative is limited to 5 single-spaced pages with 12-point font, Times New Roman, and one-inch margins. Applicants must adhere strictly to the page limits. Pages in excess of the page limitations will not be reviewed. Attach the Center Narrative to Item 8 on the Research & Related Other Project Information Form.

Applicants must select either a research project or a workforce development project for their proposal and must clearly identify which they have chosen. Applicants should specifically identify which theme area and topic it has chosen to address.

Applicants must address the requirements as described in Section A. II. Application Project Narrative.

d. Bibliography & References Cited (Item 9)

The bibliography and/or references section is limited to 5 single-spaced pages with 12-point font, Times New Roman, and one-inch margins.

e. Facilities and Equipment (Items 10 and 11)

Each applicant must provide a very specific description of any equipment/hardware that it needs to acquire to perform the work. This description should indicate whether or not each particular piece of equipment/hardware will be included as part of a deliverable item under the resulting award. Also, this description should identify the component, nomenclature, and configuration of the equipment/hardware that it proposes to purchase for this effort. The purchase on a direct reimbursement basis of special test equipment or other equipment will be evaluated for allow ability on a case-by-case basis. Maximum use of Government integration, test, and experiment facilities is encouraged. Government research facilities and operational military units are available and should be considered as potential government furnished equipment/facilities. These facilities and resources are of high value and some are in constant demand by multiple programs.

f. Other Attachments (Item 12)

Use this to attach the documents listed under Other Submission Requirements (i.e. Consolidated List of Partners and Principal Investigator(s)) as well as if you need another place to electronically attach portions of your application

Optional Forms

A. SF-LLL Disclosure of Lobbying Activities

Fill out and submit this form ONLY if Condition 2 in the Lobbying Certification applies.

Other Submission Requirements

A. Consolidated List of Partners and Principal Investigator(s)

Applicants must provide a consolidated list of all Partners and principal investigator(s) to facilitate identification of reviewers that are free of any organizational or personal conflicts of interest.

Unique Entity Identifier and System for Award Management (SAM)

DHS is participating in the Grants.gov initiative that provides the grant community a single site to find and apply for grant funding opportunities; therefore, applicants with electronic access are to submit their applications electronically through <http://www.grants.gov/web/grants/applicants/apply-for-grants.html>. Before you can apply for a DHS grant at grants.gov, you must have a DUNS number, be registered in SAM, and be approved as an Authorized Organizational Representative (AOR).

Applicants are encouraged to register early. The registration process can take four weeks or more to be completed. Therefore, registration should be done in sufficient time to ensure it does not impact your ability to meet required submission deadlines.

DUNS number. Instructions for obtaining a DUNS number can be found at the following website: <http://www.grants.gov/web/grants/applicants/organization-registration/step-1-obtain-duns-number.html>. The DUNS number must be included in the data entry field labeled "Organizational DUNS" on the Standard Forms (SF)-424 forms submitted as part of this application.

System for Award Management. In addition to having a DUNS number, applicants applying electronically through Grants.gov must register with SAM. Step-by-step instructions for registering with SAM can be found here: <http://www.grants.gov/web/grants/applicants/organization-registration/step-2-register-with-sam.html>. Failure to register with SAM will result in your application being rejected by Grants.gov during the submissions process.

Authorized Organizational Representative. The next step in the registration process is creating a username and password with Grants.gov to become an AOR. AORs will need to know the DUNS number of the organization for which they will be submitting applications to complete this process. Applicants must register the individual who is able to make legally binding commitments for the applicant organization as the AOR; this step is often missed and it is crucial for valid submissions. To read more detailed instructions for creating a profile on Grants.gov visit: <http://www.grants.gov/web/grants/applicants/organization-registration/step-3-username-password.html>.

AOR Authorization. After creating a profile on Grants.gov, the E-Biz Point of Contact (POC), who is a representative from your organization listed as the contact for SAM, will receive an email to grant the AOR permission to submit applications on behalf of their organization. The E-Biz POC will then log in to Grants.gov and approve an individual as the AOR, thereby giving him or her permission to submit applications. After you have been approved as an AOR you will be able to submit your application online. To learn more about AOR Authorization, visit: <http://www.grants.gov/web/grants/applicants/organization-registration/step-4-aor-authorization.html>. To track AOR status, visit: <http://www.grants.gov/web/grants/applicants/organization-registration/step-5-track-aor-status.html>.

Electronic Signature. Applications submitted through Grants.gov constitute a submission as electronically signed applications. When you submit the application through Grants.gov, the name of your AOR on file will be inserted into the signature line of the application.

If you experience difficulties accessing information or have any questions please call the grants.gov customer support hotline at (800) 518-4726 or email [grants.gov](mailto:support@grants.gov) at support@grants.gov.

The Federal awarding agency may not make a Federal award to an applicant until the applicant has complied with all applicable DUNS and SAM requirements and, if an applicant has not fully complied with the requirements by the time the Federal awarding agency is ready to make a Federal award, the Federal awarding agency may determine that the applicant is not qualified to receive a Federal award and use that determination as a basis for making a Federal award to another applicant.

Intergovernmental Review

N/A

Funding Restrictions

DHS does not envision any specific funding restrictions at this time. However, DHS substantial programmatic involvement and performance/progress reviews may result in funding restrictions in conjunction with initial and annual continuation awards.

Management and Administration

N/A

Indirect (Facilities & Administrative (F&A)) Costs

Indirect Cost (IDC) is allowable by the recipient and sub-recipients. Provide a copy of the negotiated rate approved by the applicant's cognizant agency at the time of application.

E. Application Review Information

Review and Selection Process

DHS S&T will use a review process with two distinct phases to select the partner institution(s) for a Center of Excellence (COE). The phases are: (1) an external scientific quality review by a panel of peers external to DHS, and (2) an internal relevancy review by a panel of DHS SMEs. Only the highest scoring proposals will be referred from the external to the internal review. Each review phase has separate ratings based on different criteria (e.g., scientific quality, relevance to DHS). A detailed description of the selection process follows.

Proposals will be reviewed and evaluated in accordance with the evaluation criteria identified in the Application Evaluation Criteria section below. Each proposal will be evaluated on its own merit and the relevance of the specific proposal as it relates to the DHS COE Program and the DHS mission. Only applications that achieve a rating of 3.0 or higher will be considered for funding. DHS reserves the right to not fund any partner proposals regardless of its rating.

Note: All proposals will be the intellectual property of the applicants up until a proposal is approved and an award is made. Additionally, the proposal will be incorporated by reference in the award.

I. Scientific Quality Review (External Review)

DHS will conduct a scientific quality review of proposals by an external review panel of SMEs from academia, non-profit research organizations, industry, and/or federal, state, or local agencies. The panelists will have expertise and/or experience in academic disciplines relevant to quantitative analysis, network analysis, and law enforcement. This includes engineering, scientific and mathematics sub-disciplines.

The external review panel will consider only evaluation criteria and weightings identified in this NOFO that focus on the quality and influence of the researchers and proposed research and education programs, qualifications of personnel and suitability of facilities, as well as the appropriateness of research costs.

The OUP Program Manager responsible for the COE serves as chairperson for the external review panel. His/her role is to summarize and convey results (including calculating mean and median ratings) to the Selection Manager (SM) for further consideration, and to answer questions posed by review panelists. The chairperson does not rate the applications. However, the chairperson will serve in an advisory capacity to clarify aspects of the COE program and selection process. In addition, the chairperson maintains order, ensures the absence of conflicts of interest, ensures that all panelists have completed and signed non-disclosure agreements, and ensures proper documentation of the review and rating of the applications. Finally, the chairperson ensures that all documentation is collected from the panel members and all proprietary information is destroyed at the conclusion of the review.

A minimum of three reviewers will review each proposal thoroughly. With the exception of those deemed to have a conflict of interest, all reviewers have access to all proposals, although each reviewer is only assigned a subset of proposals for formal review. Reviewers will rate applications on a set of weighted criteria using numerical ratings of 1 to 5 (poor to excellent). Prior to the in-person review

meeting³, all reviewers will enter their narrative reviews and their preliminary ratings for their assigned proposals into a secure web-based peer review database.

After all of the external reviewers have submitted their preliminary reviews through the secure web-based peer review database, an in-person external review panel meeting will take place in Washington, DC. At the in-person meeting, panelists discuss proposals in a randomly assigned order. Following the introductory description, the rapporteur leads the entire panel in a discussion of the proposal using the evaluation criteria. Primary reviewers and other panelists who have read the entire proposal may provide their final rating for each proposal following these discussions. The rapporteur is responsible for crafting the final summary evaluation of the primary reviewers' comments, as well as other substantive comments from the panel discussion. DHS does not seek reviewer consensus on a summary review, but rather expects a diversity of opinions. Each primary reviewer must sign off on each summary evaluation form to ensure his or her comments adequately reflect their evaluations.

For each proposal, DHS will calculate the mean and median rating for all reviewers. DHS reserves the right to use either the mean or the median rating as the final rating for applications. A minimum threshold level will be established for referral of applications from the external review phase to the internal review phase. DHS will select the minimum threshold based on the ratings of applications for this funding opportunity. For example, if DHS receives six applications, three of which have a rating of 4.0 or higher in the external review phase, while the other three are less than 3.5, 4.0 will be the minimum threshold for passing applications to the internal review phase. If the rating—mean or median—is above the threshold established for the external review phase, the application will be considered to be of high scientific quality and will be forwarded for the internal review phase. Under no circumstances will an application be considered if both the mean and the median overall ratings are below 3.0 (Good).

This summary review is critical as it forms a substantive basis for pre-award negotiations with the selected institution(s). The chairperson is responsible for conveying the summary reviews of successful proposals; i.e., those with ratings above the threshold, to the SM for consideration by the internal review panel. The chairperson is also responsible for conveying the summary reviews of the unsuccessful proposals; i.e., those with ratings under the threshold, to the DHS Grants Officer for processing declination letters.

Additionally, prior to making a Federal award with a total amount of Federal share greater than the simplified acquisition threshold (\$150,000), DHS is required to review and consider any information about the applicant that is in the

³ If a significant number of proposals are received, DHS will conduct the External Review remotely.

designated integrity and performance system accessible through SAM (currently FAPIIS).

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

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

II. DHS Relevancy Review (Internal DHS SMEs)

As soon as feasible after the external review concludes, the SM convenes an internal review panel of DHS SMEs to review proposals transmitted from the external review phase (those proposals having mean or median ratings at or above the quality threshold). The chairperson of the external review panel will also serve as the chairperson of the internal review panel. His/her role is to summarize and convey results (including calculating mean and median ratings) to the SM for further consideration and to answer substantive questions posed by review panelists. The chairperson does not rate the applications. However, the chairperson will serve in an advisory capacity should questions arise during the review that may require clarification of the COE program or selection process. In addition, the chairperson maintains order, ensures the absence of conflicts of interest, and ensures proper documentation of the review and rating of the applications. Finally, the chairperson ensures that all documentation is collected from the panel members and destroyed at the conclusion of the review.

The internal review panel will focus on the mission relevance of the proposed research; the relation of the proposed research to DHS operations and other research and development in this area; and, the potential for the research results to transition to the user community.

The internal review panel will also describe perceived knowledge gaps in the subject area as a further basis for discussions during the site visit phase and for negotiations with the selected institution(s). This panel can also suggest how elements of different proposals referred by the external review panel from either the Center Lead NOFO or the Center Partner NOFO could be combined to better

serve the research needs of DHS S&T and relevant DHS Components. A discussion about DHS's reorganization of research areas or projects will be documented in an Additional Comments section.

With the exception of those deemed to have a conflict of interest, all reviewers have access to all proposals, although they may only be assigned a subset of these proposals for formal review. Reviewers will rate applications on a set of weighted criteria using numerical ratings of 1 to 5 (poor to excellent). Prior to the in-person review meeting, all reviewers will provide their narrative reviews and ratings for their assigned proposals to the chairperson, or if a secure web-based peer review database is used, then they will enter their ratings directly into the on-line database. Narrative comments must support the numerical ratings.

After all internal reviewers have submitted their preliminary reviews to the chairperson, or through the secure web-based peer review database, an in-person internal review panel meeting will take place in Washington, DC. At the in-person meeting, panelists discuss proposals using the selected evaluation criteria described below. Primary reviewers and other panelists who have read the entire proposal may provide ratings for each proposal following these discussions.

For each proposal, DHS will calculate the mean and median rating for all reviewers to determine a final rating. DHS reserves the right to use either the mean or the median rating as the final rating for all applications. A minimum threshold level will be established for referral of applications from the internal review phase to the site visit review phase. DHS will select the minimum threshold based on the ratings of applications for this funding opportunity. For example, if six applications are passed from the external review phase, three of which have a rating of 4.0 or higher in the internal review phase, while the other three are less than 3.5, 4.0 will be the minimum threshold for passing applications to the site visit review phase. If the rating—mean or median—is above the threshold established for the internal review phase, the application demonstrates both scientific quality and relevance. Under no circumstances will an application be considered if both the mean and the median overall ratings are below 3.0.

Application Evaluation Criteria

Prior to making a Federal award, the Federal awarding agency is required by [31 U.S.C. 3321](#) and [41 U.S.C. 2313](#) to review information available through any OMB-designated repositories of government-wide eligibility qualification or financial integrity information. Therefore application evaluation criteria may include the following risk based considerations of the applicant: (1) financial stability, (2) quality of management systems and ability to meet management standards, (3) history of performance in managing federal award, (4) reports and findings from audits, and (5) ability to effectively implement statutory, regulatory, or other requirements.

I. Evaluation Criteria

Each panel or team will be comprised of a set of reviewers and will focus on the evaluation criteria as described in this section. For the external and internal reviews, a minimum of three SMEs will review each proposal and provide comments and ratings based on the relevant criteria. Each phase of the review process is scored separately. The weighting of each criterion is identified under each review phase.

Reviewers will consider the proposals in terms of strengths and weaknesses for each evaluation criterion. DHS will rate each criterion using the following scale: 1=Poor, 2=Fair, 3=Good, 4=Very Good, and 5=Excellent.

- 1 (poor): A proposal where weaknesses far outweigh strengths.
- 2 (fair): A proposal with strengths and weaknesses approximately equal.
- 3 (good): A proposal where there are more strengths than weaknesses.
- 4 (very good): A proposal with many strengths and few weaknesses.
- 5 (excellent): A proposal where strengths far outweigh weaknesses.

Each reviewer's overall rating for a proposal will be calculated by first multiplying the weight for each criterion by its rating, then adding the weighted scores together for an overall proposal rating.

The charts below provide examples of how one reviewer's overall rating for a proposal would be calculated for each review phase.

Research Project Example

Scientific Quality Review (External - Research):

Evaluation Criteria	Reviewer Score	Weight (%)	Weighted Score
Originality and/or Innovativeness	4	45%	1.80
Project Goals, Approaches, and Methodologies	5	30%	1.50
Qualifications of Personnel and Suitability of Facilities	5	15%	0.75
Costs	4	10%	0.40
External Review Rating			4.45

Only those applications meeting the threshold rating for the external review phase will be forwarded to the internal review phase.

DHS Relevancy Review (Internal - Research):

Only those applications meeting the threshold rating for the internal review phase will be forwarded to the site visit review phase.

Evaluation Criteria	Reviewer Score	Weight (%)	Weighted Score
Mission Relevance	5	75%	3.75
Transition Strategy	2	25%	.50
Internal Review Rating			4.25

Workforce Development Project Example

Scientific Quality Review (External – Workforce Development):

Evaluation Criteria	Reviewer Score	Weight (%)	Weighted Score
Project Goals, Approaches, and Methodologies	5	60%	3.00
Integration and Partnerships	3	15%	0.45
Qualifications of Personnel and Suitability of Facilities	5	15%	0.75
Costs	4	10%	0.40
External Review Rating			4.60

Only those applications meeting the threshold rating for the external review phase will be forwarded to the internal review phase.

DHS Relevancy Review (Internal - Workforce Development):

Evaluation Criteria	Reviewer Score	Weight (%)	Weighted Score
Workforce Development	5	100%	5
Internal Review Rating			5

For each proposal, DHS will calculate the mean and median rating for all reviewers to determine a final rating. DHS reserves the right to use either the mean or the median rating as the final rating for all applications.

Research Project Evaluation Criteria:

Scientific Quality Review (External): Reviewers will rate how the proposal addresses the following criteria using numerical ratings of 1 to 5 (poor to excellent) and apply the percentage-weighting factor as indicated for an overall rating.

A. Originality and/or Innovativeness (45%)

- Is it original (i.e., does the proposed effort challenge and seek to shift current research or paradigms by utilizing novel theoretical concepts, approaches or methodologies)?
- Is it innovative (i.e., is the proposal a novel refinement, improvement, or new application of theoretical concepts, approaches, or methodologies proposed)?
- Does this research have the potential to generate influential peer-reviewed publications in the scientific community or lead to new discoveries or areas of investigation?

B. Project Goals, Approaches, and Methodologies (30%)

- Are the research goals clear and based on sound theory?
- Are the proposed goals and methods feasible?
- Are the proposed methods clearly-stated and appropriate for testing the hypotheses?
- Are the data generation or collection approaches appropriate for the research methods?
- Is the proposed timeframe to complete the project(s) appropriate?

C. Qualifications of Personnel and Suitability of Facilities (15%)

- Does the research team have the qualifications – credentials, expertise, and experience – to carry out the proposed research?
- Are the facilities suitable for the proposed research? If so, does the applicant demonstrate a commitment from facility owners to allow researchers to use necessary facilities?

D. Costs (10%): Are the proposed costs appropriate and reasonable?

DHS Relevancy Review (Internal): Reviewers will rate how the proposal addresses the following criteria. Reviewers will rate applications using numerical ratings of 1 to 5 (poor to excellent) and apply the percentage-weighting factor as indicated for an overall rating.

A. Mission Relevance (75% total)

- Do proposed projects address the research themes that DHS has identified in the NOFO?
- Do the goals of the research relate to DHS's mission?
- Does the applicant discuss where, in what circumstances, and by whom research results would be used? Are these applications relevant to DHS's mission?
- Are the potential research outcomes and end users of the research well-described?
- Has the applicant demonstrated an understanding of DHS's existing research and development programs, information systems, and databases in relevant areas?
- Does the proposed program address a knowledge gap not addressed by research and development programs sponsored by DHS or others?

B. Transition Strategy (25%)

- Is there an estimated reasonable timeframe for when COE research results would be available in a usable format?
- Does the transition plan describe transition pathways for technologies, tools, and knowledge products to end users in the HSE?
- Does the application demonstrate a viable plan for developing substantial and continuing linkages with the Homeland Security Enterprise?
- Does the applicant have a university resource (e.g., technology transition office) to provide assistance (e.g., filing invention disclosures, patents, licensing agreements)?

Workforce Development Project Evaluation Criteria:

Scientific Merit Review (External): Reviewers will rate how the proposal addresses the following criteria using numerical ratings of 1 to 5 (poor to excellent) and apply the percentage-weighting factor as indicated for an overall rating.

A. Project Goals, Approaches, and Methodologies (60%):

- Is the approach needs-based or market-driven? Will it establish significant courses or content relevant to role of science and engineering in addressing the complex challenges of the HSE?
- Does the proposed program coursework have the potential to be far-reaching, transferrable, and accessible by a diverse audience?
- Are pedagogical best practices (mentors, internships, technology, etc.) appropriately incorporated?

- Is there a viable plan for a successful transition of students (undergraduates to graduate school or HSE workforce: Graduate students and professionals to the HS workforce)?
- Is the approach for evaluating and reporting on program and student performance and success sound?

B. Integration and Partnerships (15%)

- Does the application incorporate external public and private partners who can provide guidance and or potentially provide employment for supported participants?

C. Qualifications of Personnel and Suitability of Facilities (15%)

- Does the application incorporate qualified personnel – credentials, expertise, and experience – who can enrich and teach the proposed content?
- Are the facilities suitable for the proposed education? If so, does the applicant demonstrate a commitment from facility owners to allow the team to use necessary facilities?

D. Costs (10%): Are the proposed costs appropriate and reasonable?

DHS Relevancy Review (Internal): Reviewers will rate how the proposal addresses the following criteria. Reviewers will rate applications using numerical ratings of 1 to 5 (poor to excellent) and apply the percentage-weighting factor as indicated for an overall rating.

A. Mission Relevance (100%):

- Is the proposed program relevant to the priority areas within DHS?
- Does the proposed program have the potential to enhance or improve the HSE science and engineering workforce over the long term?
- Does it incorporate relevant case studies or content linked to homeland security-related science and technology issues and challenges?

Does the proposed program have education and training programs for current HSE employees?

F. Federal Award Administration Information

Notice of Award

Customarily, applicants are notified about evaluation decisions within six months of the application closing date. A summary statement of the scientific review by the peer panel will be provided to each applicant with an award or declination letter. DHS also requires successful applicants to provide responses to comments or suggestions offered by the peer reviewers and revise and resubmit their proposal accordingly. Successful applicants may also be requested to submit a revised budget. DHS will contact the applicant to obtain these materials. Before or after an award, applicants may be required to provide additional quality assurance documentation. A cooperative agreement award will be executed by a DHS Grants Officer authorized to obligate DHS funding. The successful applicant will receive the award and cover letter by e-mail. The successful applicant will have the option to request an original by mail.

I. Work Plan Development Workshop

After award and subject to agreement from the DHS Program Manager, the selected Center Lead and Center Partners will hold a work plan development workshop with homeland security practitioners to develop work plans for each project or theme area selected as part of this funding opportunity. Project proposals will receive an initial year of funding once DHS has approved a project work plan. Additional funding beyond the first year will depend upon performance and availability of funds. DHS expects this workshop to occur within 60 days of the award.

Administrative and National Policy Requirements

All successful applicants for all DHS grant and cooperative agreements are required to comply with DHS Standard Administrative Terms and Conditions, which are available online at:

<http://www.dhs.gov/publication/fy15-dhs-standard-terms-and-conditions>

The applicable DHS Standard Administrative Terms and Conditions will be for the last year specified at that URL, unless the application is to continue an award first awarded in an earlier year. In that event, the terms and conditions that apply will be those in effect for the year in which the award was originally made.

In addition, successful applicants of this NOFO must accept all conditions of the Terms and Conditions that apply specifically to this COE Award as administered by the DHS Grants and Financial Assistance Division (GFAD) (APPENDIX A: Terms and Conditions).

Before accepting the award the authorized official should carefully read the award package for instructions on administering the grant award and the terms and conditions associated with responsibilities under Federal Awards. Recipients must accept all

conditions in this NOFO as well as any Special Terms and Conditions in the Notice of Award to receive an award under this program.

Reporting

See APPENDIX A: Terms and Conditions for the reporting requirements (financial and performance) successful applicants must comply with during the award's period of performance.

Federal Financial Reporting Requirements

See APPENDIX A: Terms and Conditions

The Federal Financial Reporting Form (FFR) is available here:

http://www.whitehouse.gov/sites/default/files/omb/grants/approved_forms/SF-425.pdf, SF-425 OMB #00348-0061

Program Performance Reporting Requirements

See APPENDIX A: Terms and Conditions

Close Out Reporting Requirements

Within 90 days after the end of the period of performance, or after an amendment has been issued to close out a grant, whichever comes first, recipients must submit a final FFR and final progress report detailing all accomplishments and a qualitative summary of the impact of those accomplishments throughout the period of performance.

If applicable, an inventory of all construction projects that used funds from this program has to be reported using the Real Property Status Report (Standard Form SF 429) available at

http://www.whitehouse.gov/sites/default/files/omb/grants/approved_forms/sf-429.pdf.

After these reports have been reviewed and approved by DHS S&T OUP, a close-out notice will be completed to close out the grant. The notice will indicate the period of performance as closed, list any remaining funds that will be de-obligated, and address the requirement of maintaining the grant records for three years from the date of the final FFR.

The recipient is responsible for returning any funds that have been drawn down but remain as unliquidated on recipient financial records.

G. DHS Awarding Agency Contact Information

Contact and Resource Information

A. Grants Officer

The Grants Officer is the DHS official that has the full authority to negotiate, administer and execute all terms and conditions of this Award in concurrence with the Program Officer.

Name: Shareef Prater

Email: shareef.prater@hq.dhs.gov

B. Program Manager

The Program Manager shall be the DHS staff member responsible for monitoring the completion of work and technical performance of the projects or activities described in the Program Narrative statement.

Name: Gia Harrigan

Phone: 202-254-5643

Email: georgia.harrigan@hq.dhs.gov

C. Office of University Programs Mailing Address

S&T Stop 0205

Department of Homeland Security

245 Murray Lane, SW

Washington, DC 20528-0217

H. Additional Information

Extensions

Extensions to this program are allowed. DHS will base extension approvals on the availability of funds, acceptable performance, and the reason(s) for the requested extension. DHS will not provide extensions solely to enable universities to expend unspent funds.

ARTICLE I. ADMINISTRATIVE TERMS AND CONDITIONS

APPENDIX A: Terms and Conditions

In addition to the DHS Standard Administrative Terms and Conditions, which are available online at: <http://www.dhs.gov/publication/fy15-dhs-standard-terms-and-conditions>, the following Terms and Conditions apply specifically to this Center of Excellence (COE) Award as administered by the DHS Grants and Financial Assistance Division (GFAD):

A. RESEARCH PROJECT and MANAGEMENT AWARD SPECIFIC TERMS AND CONDITIONS AND/OR RESTRICTIONS

1. Recipient shall submit all projects and programs funded under this Award to DHS for review and approval.
 2. Recipient shall compete fully and fairly, all projects funded under this Award unless DHS has approved otherwise.
 3. Recipient shall submit annual work plans for the activities for this Award to DHS for review and approval ahead of the next budget period, including individual recipient activities or projects. Modifications to any project or program funded under this award should be submitted to DHS for review and approval before initiating new work.
 - a. Annual work plans must provide information on the overall activities of the Center. The work plan shall include:
 - i. Summary of the Center’s strategic vision and activities;
 - ii. Summary of Center management efforts;
 - iii. Detailed descriptions on each Center project (including sub-recipient projects) to include:
 - o Methodology
 - o Project milestones
 - o Performance metrics used to evaluate progress,
 - o Transition plans
 - o Stakeholder engagement
 - o Potential programmatic risks to completion; and,
 - o Project outcomes and outputs, including information on how project outcomes will advance or impact current policies, procedures, technologies or capabilities.
 - iv. Budget information categorized by both object class and project, including budget justification
4. Recipient shall organize and participate in technical review of the research and education efforts funded under this Award annually, at a minimum, or as determined by the DHS Program Officer.
5. Recipient shall participate in a DHS managed, biennial review of the Center’s progress against milestones, scientific quality, and commitment from the end user for the activities funded under this Award. The DHS Program Officer will select a review panel of subject matter experts representing government, industry and academia, to the extent practicable.
6. Recipient shall participate in at least two DHS Science and Technology (S&T)

outreach events per year for the purposes of sharing information on the research, development, and education efforts funded under this Award.

7. Recipient agrees to work with the technology transfer office of recipient's institution to engage in technology transfer and commercialization activities, as appropriate.
8. DHS has an interest in publications generated from DHS-funded research for program awareness. Recipient shall forward one electronic copy (PDF) of all publications generated under this Award to the Program Officer at the time of publication, and shall send a near-final pre-publication draft to the DHS Program Officer. Please refer to Article II. Section L for information on Enhancing Public Access to Publications.
9. Co-Authoring of Reports and Articles. Papers, presentations, or other documents co-authored by a DHS employee and a COE researcher will be subject to DHS's publications approval process prior to dissemination of the publication by the authors. Recipient shall submit these publications to the DHS author for DHS clearance at least sixty (60) days prior to dissemination of the publication. Recipient agrees to submit all required DHS clearances with the publication materials to the DHS Program Officer of Record.
10. Data Acquisition and Management Plan
 - a. Prior to initiating work on any research project that requires access to third party data, including data provided by DHS Component agencies, the Recipient must provide a plan for acquiring data as described in (b) below. The Recipient shall coordinate review of the plan with the University Privacy Officer prior to submission to DHS. The Recipient shall submit its plan to the DHS Program Officer for review and comment prior to initiating research. DHS will review the plan and notify the Recipient of any concerns that may be identified. The Recipient shall review the Data Acquisition and Management Plans at least annually and identify or update, as necessary, any new areas of research that require access to third party data.
 - b. The plan must include the following information for each project:
 - i. The purpose for collecting the data and characteristics of the data. If the data is deemed privacy sensitive, the Recipient must comply with the applicable federal, state, and local privacy laws, as well as DHS and university/research institute policies regarding the collection and use of personally identifiable information (PII).
 - ii. The uses of the data.
 - iii. A written commitment from the data's owner(s) to provide the Recipient the required data and the conditions under which the data

will be provided.

- iv. A plan for the disposal or retention of the data after the research ends.
- c. Flowdown Requirements: The Recipient shall include the substance of this section in all sub-awards/contracts at any tier where the sub-Recipient may use, generate or have access to government facilities and sensitive or classified information.

11. Information Protection Plan

- a. The Parties agree that all research conducted under this Award is intended to have publicly releasable results. Accordingly, no research under this Award should involve, use, or generate sensitive information, which includes PII, and/or classified information (see Item d of this section for Definitions).

In order to ensure research under this Award does not involve, use, or generate sensitive or classified information, intentionally or accidentally, Recipient shall develop an Information Protection Plan that incorporates policies and procedures that properly define, recognize, and protect such sensitive or classified information. Recipient will submit its plan to the DHS Program Officer for review and comment within 30 days of award. The Recipient will be notified of any concerns that may be identified once the plan is reviewed by DHS. The recipient will review the Information Protection Plan at least annually and update as necessary for new or existing areas of research that may involve sensitive information. Recipient will submit any updates to the Information Protection Plans along with annual reports to the DHS Program Officer for review and comment.

- b. Recipient further understands and agrees that despite the best efforts of the Parties to avoid research under this Award that involves, uses, or generates sensitive or classified information, the possibility exists that such information could nonetheless be involved, used or generated and be subject to protection by law, executive order, regulation or applicable DHS policies. The Recipient is, therefore, responsible for compliance with all applicable laws, regulations and policies. Nothing in this Award shall be construed to permit any public disclosure of sensitive and/or classified information in violation of these restrictions.
- c. The Information Protection Plan will ensure the Recipient identifies, secures, and prohibits public disclosure of “sensitive or classified information.” Recipient maintains responsibility for their due diligence in identifying and properly marking any information governed by U.S. export controls

regulations. For further information on applicable export controls, please see **Article II, Section H** of this award.

d. Required Notifications to DHS:

- i. If Recipient determines that research under this Award involved, used, or generated sensitive or classified information, it agrees to secure the information in accordance with its Information Protection Plan and notify the DHS Program Officer immediately.
- ii. The Recipient shall inform the DHS Program Officer in writing within **24 hours** of the Recipient becoming aware of any potential security lapses involving either: the handling requirements for sensitive or classified information; or material failure of individuals to follow the Information Protection Plan.

e. Flowdown Requirements: The Recipient shall include the substance of this section in all sub-awards/contracts at any tier where the sub-Recipient may use, generate or have access to government facilities and sensitive or classified information.

f. Definitions: For purposes of this section.

- i. Sensitive Information. General Definition. Any information, the loss, misuse, disclosure, or unauthorized access to or modification of which could adversely affect the national or homeland security interest, or the conduct of federal programs, or the privacy to which individuals are entitled under Section 552a of title 5, United States Code (the Privacy Act), but which has not been specifically authorized under criteria established by an Executive Order or an Act of Congress to be kept secret in the interest of national defense, homeland security or foreign policy. This definition includes the following categories of information:

Protected Critical Infrastructure Information (PCII) as set out in the Critical Infrastructure Information Act of 2002 (Title II, Subtitle B, of the Homeland Security Act, Public Law 107-296, 196 Stat. 2135), as amended, the implementing regulations thereto (Title 6, Code of Federal Regulations, Part 29) as amended, and any supplementary guidance officially communicated in writing by an authorized official of the Department of Homeland Security (including the PCII Program Officer or his/her designee);

Information designated as "For Official Use Only," which is unclassified information of a sensitive nature and the unauthorized

disclosure of which could adversely impact a person's privacy or welfare, the conduct of federal programs, or other programs or operations essential to the national or homeland security interest; and

Personally Identifiable Information (PII). Any information that permits the identity of an individual to be directly or indirectly inferred, including any information that is linked or linkable to that individual, regardless of whether the individual is a U.S. citizen, legal permanent resident, visitor to the U.S., or employee or contractor to the Department.

Sensitive PII is PII which if lost, compromised, or disclosed without authorization, could result in substantial harm, embarrassment, inconvenience, or unfairness to an individual.

- ii. Classified Information. Defined as information designated in accordance with Executive Order 12958.

12. Intellectual Property Management

- a. It is vitally important that both Parties understand their respective intellectual property rights and applicable obligations under this Award.
- b. Recipients should refer to both 2 C.F.R. § 215 "Uniform Administrative Requirement for Grants and Agreements with Institutions for Higher Education, Hospitals" and 37 C.F.R. § 401 "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements" for a complete summary of their rights and responsibilities.
- c. Flowdown Requirements: The Recipient shall include the substance of this section in all sub-awards/contracts at any tier where the sub-Recipient may use, generate or have access to government facilities and sensitive or classified information.
- d. Definitions: Please refer to Article II. Section J.

13. Research Safety Plan

- a. DHS COE research addresses issues of importance to intelligence and counter-terrorism agencies, law enforcement, or emergency responders, all of which involve inherent risks. To ensure that researchers and research

facilities funded through this Award meet the highest safety standards possible, DHS requires every Recipient of a COE award to develop a Research Safety Plan. The Recipient shall review the Research Safety Plan at least annually and identify or update, as necessary, any new areas of research or sub-recipients conducting research activities under this plan. This review will also ensure that all sub-recipients conducting research covered by this plan have developed and implemented appropriate safety plans and periodic safety training in accordance with their institutional policies and procedures. Recipient will submit any updates to the Research Safety Plan to the DHS Program Officer for review and comment.

- b. The Research Safety Plan must include, at a minimum, the following:
 - i. Identification of possible research hazards associated with the types of research to be conducted under this Award;
 - ii. Research protocols or practices that conform to generally accepted safety principles applicable to the nature of the research;
 - iii. The Recipient's processes and procedures to ensure compliance with the applicable protocols and standards;
 - iv. The Recipient's processes and procedures to ensure the prevention of unauthorized activities conducted in association with this Award;
 - v. Faculty oversight of student researchers;
 - vi. Research safety education and training to develop a culture of safety;
 - vii. Access control, where applicable;
 - viii. Independent review by subject matter experts of the safety protocols and practices; and
 - ix. Demonstrated adherence to all safety-related terms and conditions contained elsewhere in this Award.
- c. Flowdown Requirements: The Recipient shall include the substance of this section in all sub-awards/contracts at any tier where the sub-Recipient may conduct research where safety protocols are necessary to conduct safe research.

- 14. Public Communication: The Recipient shall input and update all required project information into relevant webpage(s) hosted on the www.hsuniversityprograms.org. Posting and updating Center and project level information is a condition for receiving further annual funding increments. This website is one of the primary mechanisms used to communicate COE information to the public. Project updates follow pre-determined categories of information that must be populated at least annually. The DHS Office of University Programs maintains the right to edit and post submissions to

www.hsuniversityprograms.org, as needed.

15. COE Science and Engineering Workforce Development:

Should the COE work with DHS through this initiative, the recipient shall follow the below terms and conditions:

- a. DHS must ensure that U.S. citizens are trained in homeland security-related science and engineering disciplines in order to maintain U.S. leadership in science and technology, as required by the Homeland Security Act of 2002. Only U.S. citizens can work with federal, state and local agencies in the agencies' secure offices and operating environments, and can obtain security clearances and access to sensitive information needed to conduct research into homeland security issues.
- b. Under this initiative, each COE may use COE Science and Engineering Workforce Development tuition assistance and stipends to support U.S. students studying the topics of, and working on homeland security research projects of their COEs.
 - i. Ninety-two percent (92%) of funds must go directly to support undergraduates, graduates, or a combination of undergraduate and graduate, students who are U.S. citizens working in the recipient COE's research area.
- c. All students supported by COE Workforce Development funds shall report directly to COE faculty or staff, and shall work primarily on COE projects. Student participation in COE activities must take precedence to other research or employment for students to be eligible for COE support. COE activities include but are not limited to the following: supporting COE management activities, working on COE research projects, teaching, and experiential learning related to COE research topics.
- d. Grants may be used to complement existing funding sources for students that are selected as participants, but may not supplant or be used in lieu of other COE funds. ***DHS expects a net increase in the number of students supported in COE programs funded through this section. These funds must be awarded only to newly supported students.***
- e. All COEs working with DHS on this initiative must develop and submit a Workforce Development work plan to DHS Program Manager for review and approval ahead of the next budget period, including individual recipient activities or projects. Modifications to any project or program funded under this award should be submitted to DHS for review and approval before initiating new work.

The work plan shall include:

 - i. A description of the COE's established or proposed science and engineering research and coursework including how research experiences will be incorporated in to the program.

- ii. Details of an application and award process for selecting recipients. This process must include input from external subject matter experts (SMEs). Qualified students must meet the following minimum standards:
1. Must be U.S. citizens.
 2. Must achieve and maintain a cumulative GPA of 3.30 or higher on a 4.00 scale, averaged over all academic terms.
 3. Must major in priority science and engineering-related discipline associated with the COE research areas. ***These funds may not be used to support the completion of professional degrees (law school, medical school, etc.)***
 4. NOTE: Many positions in the homeland security field require a background check. Therefore, the student selection process and program experiences should include plans to address these requirements.
 5. A commitment to facilitate student attendance at a professional conference within a science and engineering-related field of study.
 6. A description of how the COE will assign qualified academic mentors for each recipient from the student's field of study.
 7. A plan to make awards within one year of receipt of funds. Recipient institutions must award tuition assistance and stipends to students attending COE-affiliated institutions and working on COE research, development or technology transition projects. The students must be supported for up to 2 years for undergraduates and 3 years for graduate students or for the duration of their studies whichever is less. COEs may adjust this amount to account for other monetary awards to individual students.
 8. For undergraduates, awards shall cover up to 100% but not less than 50% of tuition and mandatory fees (or equivalent), plus a stipend of no more than \$1,200 per month for twelve months. Stipends can be less than \$1,200 per month if appropriate for the geographic region or if paid summer internships can be secured.
 9. For graduate students, awards shall cover up to 100% but not less than 50% of tuition and mandatory fees (or equivalent), plus a stipend of no more than \$2,700 per month for twelve months. Stipends can be less than \$2,700 per month if appropriate for the geographic region or if paid internships can be secured.
- iii. A plan for identifying and placing students in the two required ten week internships that complement DHS COE approved research or are

operational venues that work in the COE field of study. Internships should take place away from the student's home institution. Students must receive a stipend and travel/lodging support to an internship location during summer months for 2 summers if paid internships cannot be secured. Funds budgeted for stipends during summer months may be re-budgeted if paid internships are secured.

- iv. Details of a strategy to ensure supported students proactively seek and obtain paid employment within the Homeland Security Enterprise (DHS, federal/state/local government, etc.) for at least one year after graduation.
 - 1. Employment requirement will be waived for those entering the military /military school, or with a commitment to teach Science and Engineering at the elementary or secondary level.
 - 2. Undergraduate students will be allowed a deferment of the one year service requirement if they have been accepted into a Science and Engineering related graduate program. Include a plan for managing and tracking this type of deferment.
- v. An approach to evaluating student success
- vi. A plan to monitor the activity of individual students to assure compliance with program requirements; develop a mitigation strategy; and establish procedures to ensure funds are used appropriately.
- vii. A plan to monitor student's homeland security employment placement for up to six years after graduation from the program.

B. DHS PROGRAMMATIC INVOLVEMENT

In addition to the usual monitoring and technical assistance, the following identifies DHS responsibilities under this Award:

- 1. DHS shall determine if a kickoff meeting is required for proposed projects or proposed continuations of existing projects. DHS shall coordinate with appropriate DHS staff, Center staff and Center researchers prior to project initiation.
- 2. DHS shall approve or disapprove annual work plans and any modifications to the work plans for this Award (See Article 1. A.).
- 3. DHS shall conduct ongoing monitoring of the activities of Recipient's work plan and activities funded through this Award through face-to-face and/or telephone meetings and review of progress reports.
- 4. DHS shall coordinate biennial reviews in cooperation with the Recipient during the Project Period to provide guidance on how the research and education programs need to evolve to align with the needs of the Homeland Security

Enterprise consistent with the COE mission. The biennial review evaluates the Center's long-term strategy, relevance of the research and education to DHS mission needs and technology gaps, stakeholder engagement, research quality, outreach efforts and management of the activities funded under this Award. The DHS Program Officer will select a review panel of subject matter experts representing government, industry and academia for the biennial review.

5. DHS coordination with the Recipient will include, but is not limited to:
 - a. Providing strategic input as necessary on an ongoing basis;
 - b. Coordinating research and development activities that support the national research agenda; and
 - c. Creating awareness and visibility for this program.
6. DHS may modify this Award to support additional research projects funded by DHS or other sources provided that these projects meet three conditions:
 - a. Are research for a public purpose that addresses homeland security research priorities;
 - b. Fall within scope of the grant or cooperative agreement; and
 - c. Conform to federal assistance agreements (grant and cooperative agreement) guidelines.
7. DHS employees may co-author publications with COE researchers. Any publication co-authored by DHS staff will be subject to DHS's publications approval process prior to dissemination of the publication as required under Item 9, in Section A.
8. DHS shall review and provide comments on the Recipient's Information Protection Plan as required under Item 11 in Section A.
9. DHS shall review and provide comments on the Recipient's Research Safety Plan as required under Item 13, in Section A.
10. DHS may create a Federal Coordinating Committee that provides guidance and direction to the DHS Program Officer regarding the Recipient's research plan.
11. DHS may invite subject matter experts, end users, or stakeholders to assist in evaluating the Center's annual work plan, annual meetings, or other events for the purpose of reviewing project quality and/or providing relevant operational perspectives.
12. DHS shall facilitate initial engagement with Homeland Security Enterprise stakeholders, but recipient is expected to maintain ongoing engagement for research areas of interest to the stakeholders.

C. AMENDMENTS AND REVISIONS

1. Budget Revisions.

- a. Transfers of funds between direct cost categories in the approved budget when such cumulative transfers among those direct cost categories exceed ten percent of the total budget approved in this Award require prior written approval by the DHS Grants Officer.
- b. The Recipient shall obtain prior written approval from the DHS Grants Officer for any budget revision that would result in the need for additional resources/funds.
- c. The Recipient is not authorized at any time to transfer amounts budgeted for direct costs to the indirect costs line item or vice versa, without prior written approval of the DHS Grants Officer.

2. Extension Request.

- a. Extensions to the Period of Performance can only be authorized in writing by the DHS Grants Officer.
- b. The extension request shall be submitted to the DHS Grants Officer sixty (60) days prior to the expiration date of the performance period.
- c. Requests for time extensions to the Period of Performance will be considered, but will not be granted automatically, and must be supported by adequate justification to be processed. The justification is a written explanation of the reason or reasons for the delay; an outline of remaining resources/funds available to support the extended Period of Performance; and a description of performance measures necessary to complete the project. Without performance and financial status reports current and justification submitted, extension requests shall not be processed.
- d. DHS has no obligation to provide additional resources/funding as a result of an extension.

D. EQUIPMENT

1. Title to equipment acquired by the Recipient with federal funds provided under this Award shall vest in the Recipient, subject to the conditions pertaining to equipment in the 2 C.F.R. Part 200.
2. Prior to the purchase of Equipment in the amount of \$5,000 or more per unit cost, the recipient must obtain the written approval from DHS.
3. For equipment purchased with Award funds having a \$5,000 or more per unit cost, the Recipient shall submit an inventory that will include a description of the

property; manufacturer model number, serial number or other identification number; the source of property; name on title; acquisition date; and cost of the unit; the address of use; operational condition of the property; and, disposition data, if applicable. This report will be due with the Final Progress Report 90 days after the expiration of the project period, and emailed to DHS-GrantReports@hq.dhs.gov.

E. FINANCIAL REPORTS

1. (Annual) Federal Financial Reports. The Recipient shall submit a Federal Financial Report (SF425) to the DHS Grants Officer no later than ninety (90) days after the end of the budget period end date. The report shall be emailed to DHS-GrantReports@hq.dhs.gov and include the grant program name and number in the subject line.
2. Final Federal Financial Report. The Recipient shall submit the final Federal Financial Report (SF425) to the DHS Grants Officer no later than ninety (90) days after the end of the Project Period end date. The report shall be emailed to DHS-GrantReports@hq.dhs.gov and include the grant program name and number in the subject line.
3. Quarterly Federal Financial Reports (Cash Transaction). The Recipient shall submit the Federal Financial Report (SF425) Cash Transaction Report to the Department of Health and Human Services, Payment Management System. Quarterly Cash Transaction reports shall be submitted no later than 1/30, 4/30, 7/30, and 10/30.

F. PAYMENT

The Recipient shall be paid in advance using the U.S. Department of Health and Human Services/Payment Management System, provided it maintains or demonstrates the willingness and ability to maintain procedures to minimize the time elapsing between the transfer of the funds from the DHS and expenditure disbursement by the Recipient. When these requirements are not met, the Recipient will be required to be on a reimbursement for costs incurred method.

Any overpayment of funds must be coordinated with the U.S. Department of Health and Human Services/Payment Management System.

G. PERFORMANCE REPORTS

1. Annual Performance Reports. The Recipient shall submit annual performance reports to the DHS Grants Officer for review and acceptance by DHS as a condition for receiving further annual funding increments. Annual performance reports are due no later than sixty (60) days after the end of the Center's budget period of each year. Annual reports must provide a summary of the activities conducted during the prior budget year. The report shall be emailed to DHS-GrantReports@hq.dhs.gov and include the grant program name and number in the subject line.
 - a. Performance reports must provide information on the overall progress of the Center. These reports shall include:
 - i. Summary reports on the Center's strategic vision and activities;
 - ii. Summary of Center management efforts;
 - iii. Performance reports on each Center Project to include:
 - o Explanation of any changes from the initially approved work plan
 - o Progress against each milestone and explanation of why milestones were not reached
 - o Unanticipated problems and plans for addressing them; and
 - o Information on how project outcomes will advance or impact current technologies or capabilities.
 - iv. Budget information categorized by both object class and project
 - v. If applicable, include a certification that no patentable inventions were created during the budget period.
 - vi. Updates to the Center's Information Protection Plan and Researcher Safety Plan as needed.
 - b. If the performance report contains any information that is deemed proprietary, the Recipient will denote the beginning and ending of such information with the following heading: *****PROPRIETARY INFORMATION*****
2. Annual COE Science and Engineering Workforce Development Report. COEs working with DHS through the COE science and engineering workforce development initiative will submit a separate Science and Engineering Workforce Development Annual Performance Report to the DHS Grants Officer.
 - a. The report shall compare actual accomplishments to the approved project objectives and shall include:
 - i. A program overview section on the goals, objectives and accomplishments to date; total number of students supported; total number of students graduated; total number of students still enrolled; number of graduate students supported; number of undergraduate students supported; total number of students currently employed full time in a Homeland Security related position

- ii. A student report for each supported student including: student name; current status of student (graduated/enrolled); degree (masters, bachelors, PhD); major; dates of funding; total funding amount; description of complete internship/research experiences; workshops/conference attended; publications, presentations, poster sessions; other relevant accomplishments/success stories; copy of student resume
- 3. Final Performance Report. The Recipient shall submit the Final COE Performance Report to the DHS Grants Officer and DHS Program Officer no later than ninety (90) days after the expiration of the Project Period (See Section H). The report shall be emailed to DHS-GrantReports@hq.dhs.gov and include the grant program name and number in the subject line.
 - a. The Final COE Performance Report shall include:
 - i. An executive summary and final summary abstracts for each sub-project across all years of the period of performance
 - ii. Address the areas identified above in the annual report section
- 4. The Final COE Science and Engineering Workforce Development Performance Report. COEs working with DHS through the COE science and engineering workforce development initiative will submit final reports within ninety (90) days after the expiration date of the performance period of this initiative to the DHS Grants Officer.
 - a. The Final COE Science and Engineering Workforce Development Performance Report shall include:
 - i. Post completion employment plans for each student scholar/fellow or an explanation for student leaving the program.
 - ii. Summary of research accomplishments and contributions, post-award activity and post-graduation placement, new skills or knowledge acquired

H. PERIOD OF PERFORMANCE

The Period of Performance is the Project Period approved for the supported activity and is comprised of one or more Budget Periods as reflected on the Notice of Award cover page.

1. Project Period. The Project Period shall be for approximately 5 years, unless extensions are approved. All COEs' annual performance periods shall run from July 1 to July 30 of the following year. An exception is made for the first performance period, which will run from the date of award to June 30 of the following year. Subsequent years' funding is contingent on acceptable performance, as determined by the Department of Homeland Security's (DHS's), acceptance and

approval of each non-competing continuation application, and the availability of the next year's annual DHS appropriations. The Recipient shall only incur costs or obligate funds within the Project Period for approved activities.

2. Budget Period. The Budget Period shall be for a period of 12 months, from July 1, 2015 through June 30, 2016.

a. Additional funding will be provided for subsequent Budget Periods of the project, contingent on all of the following:

- i. Acceptable performance of the project as determined by the DHS under this Award;
- ii. Acceptance and approval by the DHS of each noncompeting continuation application;
- iii. Acceptance and approval by the DHS of each previous Annual Performance Report and
- iv. Subject to the availability of appropriated funds.

3. Non-Competing Continuation Requirements.

a. Ninety (90) days prior to the expiration date of each budget period, the Grants Officer will request submission of the annual incremental funding request details via Grants.gov website. The Recipient shall submit a non-competing continuation application to request the next Budget Period's incremental funding and a separate request for any possible carryover of prior year funds.

The non-competing continuation application shall include:

- i. An annual project work plan as described in Article A, Item 3
- ii. Carryover of Funds. Recipients are required to submit a separate Carryover Application for the unobligated balances remaining from funds awarded in one budget period to be carried over to the next succeeding budget period. This submission is due to the DHS Grants Officer and DHS Program Manager 90 days prior to budget period expiration (e.g., March 31) and is a best estimate at the budget period expiration from the recipient (lead university and all sub-recipients). The Program Officer will review the Carryover justification, in consultation with the DHS Grants Officer, and provide input to the Grants Officer that the justification is reasonable and the carryover funds should be used to complete any objectives which remain unmet from the prior budget period. Requests for carryover of funds from one Budget Period to the next Budget Period shall be submitted separately via email to the DHS Grants Officer with an SF 424 (R&R) face page and shall include:

1. A brief description of the projects or activities and milestones to be carried forward,

2. The amount of funds to be carried over,
 3. The reason the projects or activities were not completed in accordance with the project time line, and
 4. The impact on any future funding for the projects or activities.
- iii. The DHS Program Officer will review the continuation application submission and provide input to the Grants Officer as to whether the Continuation Application is consistent with the approved work plan
 - iv. COE Science and Engineering Workforce Development annual work plan and budget justification: COEs retain the ability to balance financial support as appropriate if students have or will receive other sources of funding. Should the COE work with DHS through this initiative, the recipient will submit an annual work plan described in Article A, Item 15.

I. PRIOR APPROVAL REQUIRED

The Recipient shall not, without the prior written approval of the DHS, request reimbursement, incur costs or obligate funds for any purpose pertaining to the operation of the project, program, or activities prior to the approved Budget Period.

ARTICLE II. GENERAL TERMS AND CONDITIONS

A. ACCESS TO RECORDS.

The Recipient shall retain financial records, supporting documents, statistical records, and all other records pertinent to this Award for a period of 3 years from the date of submission of the final expenditure report. The only exceptions to the aforementioned record retention requirements are the following:

1. If any litigation, dispute, or audit is started before the expiration of the 3-year period, the records shall be retained until all litigation, dispute or audit findings involving the records have been resolved and final action taken.
2. Records for real property and equipment acquired with federal funds shall be retained for 3 years after final disposition.
3. The DHS Grants Officer may direct the Recipient to transfer certain records to DHS custody when he or she determines that the records possess long term retention value. However, in order to avoid duplicate recordkeeping, the DHS Grants Officer may make arrangements for the Recipient to retain any records that are continuously needed for joint use.

DHS, the Inspector General, Comptroller General of the United States, or any of their duly authorized representatives, have the right of timely and unrestricted access to any books, documents, papers, or other records of the Recipient that are pertinent to this Award, in order to make audits, examinations, excerpts, transcripts and copies of such documents. This right also includes timely and reasonable access to Recipient's personnel for the purpose of interview and discussion related to such documents. The rights of access in this award term are not limited to the required retention period, but shall last as long as records are retained.

With respect to sub-recipients, DHS shall retain the right to conduct a financial review, require an audit, or otherwise ensure adequate accountability of organizations expending DHS funds. Recipient agrees to include in any sub-award made under this Agreement the requirements of this award term (Access to Records).

B. COMPLIANCE ASSURANCE PROGRAM OFFICE AND EXPORT CONTROLS GROUP TERMS AND CONDITIONS

1. The Compliance Assurance Program Office (CAPO) comprises the DHS Treaty Compliance Group and the DHS Regulatory Compliance Group. The Compliance Assurance Program Manager (CAPM) is the DHS official responsible for overseeing CAPO and implementing procedures to ensure that the Recipient and any Recipient institutions/collaborators under this Award comply with applicable international treaties; federal regulations and guidance documents; and DHS policies for Arms Control Agreements, Biosafety, Select Agent and Toxin Security, Animal Care and Use, the Protection of Human Subjects, and Life Sciences Dual Use Research of Concern.

Additional guidance regarding the review process is provided in the following sections, along with contact information for CAPO. This guidance applies to the Recipient and any/all Recipient institutions involved in the performance of work under this Award. The Recipient is responsible for ensuring that any/all Recipient institutions and collaborators comply with all requirements and submit relevant documentation, as outlined in sections C – G below, for work being performed under this Award.

2. The Export Controls Group Program Manager (ECGPM) is the DHS official responsible for overseeing the ECG and implementing procedures to provide assistance to DHS programs, Components, and sub agencies regarding compliance with export control regulations in accordance with the Export Administration Regulations (EAR) (15 CFR Parts 730-774) and the International Traffic in Arms Regulations (ITAR) (22 CFR Parts 120-130).

For further information concerning Recipient's export controls obligations, please see Article II, Section H of this Award.

C. TREATY COMPLIANCE FOR BIOLOGICAL AND CHEMICAL DEFENSE EFFORTS

The Recipient and any Recipient institution shall conduct all biological and chemical defense research, development, testing, evaluation, and acquisition projects in compliance with all arms control agreements of the U.S., including the Chemical Weapons Convention (CWC) and the Biological Weapons Convention (BWC). DHS Directive 041-01, *Compliance With, and Implementation of, Arms Control Agreements*, requires review of all such projects, including classified projects; projects involving biological and/or chemical agents, surrogates, or simulants; and non-laboratory activities related to biological and/or chemical agents (e.g., literature reviews, simulations, and/or modeling activities) **to be systematically evaluated for compliance at inception, prior to funding approval, whenever there are any project changes, and whenever in the course of project execution an issue potentially raises a compliance concern.**

1. Requirements for Initial Treaty Compliance Review. To ensure compliance with DHS Directive 041-01, for each biological and/or chemical defense-related effort (including non-laboratory activities related to biological and/or chemical agents) to be conducted under this Award, the Recipient must submit the following documentation for compliance review and certification **prior to funding approval**: a completed Treaty Compliance Form (TCF) and a Statement of Work.
2. Requirements for Ongoing Treaty Compliance Review. To ensure ongoing treaty compliance for approved biological and/or chemical defense-related efforts funded through this Award, the Recipient must submit the following documentation for review and approval prior to any project modification and/or whenever in the course of project execution an issue potentially raises a compliance concern: an updated Treaty Compliance Form and an updated Statement of Work detailing the proposed modification. The proposed project modification must receive written approval from CAPO prior to initiation. Examples of project modifications include – but are not limited to—the addition of agents, a change in performer, modifications to the scope of work, and changes to the technical approach.

The Recipient should contact CAPO regarding treaty compliance issues at treatycompliance@hq.dhs.gov to: obtain the TCF, submit the completed Form, and/or request additional guidance regarding treaty compliance documentation and review requirements, as applicable to (1) new biological and/or chemical defense-related efforts, or (2) modifications to previously approved efforts. CAPO will review all submitted materials and provide written confirmation of approval to initiate work to the Recipient once the treaty compliance certification process is complete. **The Recipient and any Recipient institution**

shall not initiate any new activities, or execute modifications to approved activities, prior to receipt of this written confirmation.

D. REGULATORY COMPLIANCE FOR BIOLOGICAL LABORATORY WORK

The Recipient and any Recipient institution shall conduct all biological laboratory work in compliance with applicable federal regulations; the latest edition of the CDC/NIH *Biosafety in Microbiological and Biomedical Laboratories* (BMBL); the *NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules* (NIH Guidelines); DHS Directives; and any local institutional policies that may apply for Recipient institution facilities performing work under this Award. CAPO will review the submitted Treaty Compliance Form (TCF) for planned work under this Award to determine the applicability of the requirements outlined in this section. The Recipient must contact CAPO regarding regulatory compliance issues at STregulatorycompliance@hq.dhs.gov for guidance on the requirements, and then **submit all required documentation based on CAPO guidance, prior to the initiation of any biological laboratory work under this Award.**

1. Requirements for All Biological Laboratory Work. Biological laboratory work includes laboratory activities involving: (1) synthetic or recombinant nucleic acid molecules, or 'rDNA'; (2) Biological Select Agents and Toxins, or 'BSAT'; or (3) biological agents, toxins, or other biological materials that are non-rDNA and non-BSAT. Each Recipient and any Recipient institution conducting biological laboratory work under this Award **must submit copies of the following documentation, as required by CAPO, for review prior to the initiation of such work:**
 - a. Research protocol(s), research or project plan(s), or other detailed description of the biological laboratory work to be conducted;
 - b. Documentation of project-specific biosafety review for biological laboratory work subject to such review in accordance with institutional policy;
 - c. Institutional or laboratory biosafety manual (may be a related plan or program manual) for each facility/laboratory to be involved in the biological laboratory work;
 - d. Biosafety training program description (should be provided as available in existing policies, plans, and/or manuals) for all relevant facilities/laboratories where work is conducted;
 - e. Documentation of the most recent safety/biosafety inspection(s) for each facility/laboratory where the biological laboratory work will be conducted;
 - f. Exposure Control Plan, as applicable;
 - g. Documentation from the most recent Occupational Safety and Health Administration (OSHA) or State Occupational Safety and Health Agency inspection report; a copy of the OSHA Form 300 *Summary of Work Related Injuries and Illnesses* or equivalent, for the most recent calendar year; and documentation of any OSHA citations or notices of violation received in the

past 5 years; and

- h. Documentation from the most recent U.S. Department of Transportation (DOT) inspection report; and documentation of any DOT citations or notices of violation received in the past 5 years.
2. Requirements for Research Involving Synthetic or Recombinant Nucleic Acid Molecules. Laboratory activities involving synthetic or recombinant nucleic acid molecules are defined by the NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules, “NIH Guidelines”. Each Recipient and any Recipient institution shall conduct all such activities in compliance with the NIH Guidelines. In addition to the documentation referenced in Section B.1 above, each facility conducting research activities under this award involving synthetic or recombinant nucleic acid molecules **must submit copies of the following documentation to CAPO for review prior to the initiation of such activities:**
- a. Institutional Biosafety Committee (IBC) Charter, and/or other available documentation of IBC policies and procedures;
 - b. Most recent Office of Biotechnology Activities (OBA) acknowledgement letter of the annual IBC Report;
 - c. IBC-approved rDNA research protocol(s); and
 - d. Documentation of final IBC approval for each rDNA research protocol and all subsequent renewals and amendments as they occur.
3. Requirements for Activities Involving Biological Select Agents and Toxins (BSAT). Planned activities involving the possession, transfer, and/or use of BSAT must be reviewed by CAPO prior to initiation. This requirement also applies to activities involving select toxins that fall below the Permissible Toxin Limits, both at facilities registered with the National Select Agent Program and at unregistered facilities. Each Recipient and any Recipient institution shall conduct all BSAT work in compliance with all applicable regulations, including 42 C.F.R. § 73, 7 C.F.R. § 331, and 9 C.F.R. § 121, related entity- and laboratory-specific policies and procedures, and DHS Directive 026-03, Select Agent and Toxin Security. In addition to the documentation referenced in Section B.1 above, each facility conducting activities involving BSAT under this Award **must submit copies of the following documentation to CAPO for review prior to the initiation of such activities:**
- a. Current APHIS/CDC Select Agent Certificate of Registration;
 - b. Current versions of the Biosafety, Security, and Incident Response Plans required and reviewed under the Select Agent Regulations; and

The Recipient should contact CAPO at STregulatorycompliance@hq.dhs.gov to submit documentation or request more information regarding the DHS regulatory documentation and compliance review requirements. CAPO will provide written confirmation of receipt of all

required documentation to the designated Point(s) of Contact. CAPO will evaluate the submitted materials, along with available documentation from any previous reviews for related work at the Recipient and Recipient institution. Additional documentation may be required in some cases and must be submitted upon request. **CAPO will review all submitted materials and provide written confirmation of approval to initiate work to the Recipient once all requirements have been met.**

CAPO review of submitted materials may identify the need for further compliance review requirements, which may include documentation-based and on-site components. The Recipient, and any Recipient institutions conducting biological laboratory work under this Award, must also comply with ongoing CAPO compliance assurance and review requirements, which may include but are not limited to: initial and periodic documentation requests, program reviews, site visits, and facility inspections.

The Recipient must promptly report the following to CAPO, along with any corrective actions taken: (1) any instance of biosafety or BSAT program issues as identified by the APHIS/CDC National Select Agent Program, other compliance oversight authorities, or institutional-level reviews (*e.g.*, IBC or equivalent, laboratory safety/biosafety inspections); (2) any suspension or revocation of the APHIS/CDC Certificate of Registration; and (3) any for-cause suspension or termination of biological, rDNA, or BSAT activities at the laboratories/facilities where DHS-sponsored work is conducted.

Foreign Contractors/Collaborators and U.S. Institutions with Foreign Subcomponents. All entities involved in activities under this Award must comply with applicable national and regional/local regulations, and standards and guidelines. The Recipient must provide CAPO documentation sufficient to illustrate this compliance. CAPO will evaluate compliance measures for these institutions on a case-by-case basis. **The Recipient must not initiate work for the conduct of biological laboratory work under this Award without CAPO’s formal written approval.**

E. RESEARCH INVOLVING ANIMALS

The Recipient and any Recipient institution shall conduct all research involving animals under this Award in compliance with the requirements set forth in the Animal Welfare Act of 1966 (P.L. 89-544), as amended, and the associated Animal Welfare Regulations in 9 C.F.R., Chapter 1, Subchapter A; the Public Health Service (PHS) Policy on Humane Care and Use of Laboratory Animals (which adopts the “U.S. Government Principles for the Utilization and Care of Vertebrate Animals used in Testing, Research, and Training”, 50 FR 20864, May 20, 1985); the National Research Council (NRC) Guide for the Care and Use of Laboratory Animals; the Federation of Animal Science Societies (FASS) Guide for the Care and Use of Agricultural Animals in Research and Teaching; and any additional requirements set forth in DHS Directive 026-01, *Care and Use of Animals in Research*. Each Recipient and any Recipient institution planning to perform research involving animals under this Award must comply

with the requirements and submit the documentation outlined in this section.

1. Requirements for Initial Review of Research Involving Animals. Research Involving Animals includes any research, experimentation, biological testing, and other related activities involving live, vertebrate animals, including any training for such activities. Each facility conducting research involving animals under this Award **must submit copies of the following documentation to CAPO for review prior to the initiation of such research:**
 - a. Institutional Animal Care and Use Committee (IACUC)-approved animal research protocol(s), including documentation of IACUC approval, any protocol amendments, and related approval notifications;
 - b. Public Health Service (PHS) Animal Welfare Assurance, including any programmatic amendments, and the most recent NIH Office of Laboratory Animal Welfare (OLAW) approval letter for each Recipient and Recipient institution; OR DHS Animal Welfare Assurance, if the Recipient is not funded by the PHS and does not have a PHS Assurance on file with OLAW. Any affiliated IACUCs must be established under the same requirements as set forth in the PHS Policy;
 - c. Most recent IACUC semiannual program review and facility inspection reports covering all relevant facilities/laboratories involved in DHS-funded work; and
 - d. Most recent Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC) inspection report(s) for AAALAC-accredited institution(s) housing and/or performing work involving animals under this Award.

All documentation, as well as any questions or concerns regarding the requirements referenced above, should be submitted to CAPO at STregulatorycompliance@hq.dhs.gov. Additional documentation may be required in some cases and must be submitted upon request. CAPO will review all submitted materials and provide written confirmation to the Recipient once all documentation requirements have been met. Upon receipt of this written confirmation, the Recipient may initiate approved animal research projects under this Award, but must address any potential compliance issues or concerns identified by CAPO. **Research involving the use of nonhuman primates or international collaborations involving animal research will require more extensive review prior to approval, and must not begin under this Award without first obtaining a formal certification letter from CAPO.**

The Recipient, as well as any Recipient institution and partner institutions conducting animal research under this Award, shall also comply with ongoing CAPO compliance assurance functions, which may include but are not limited to: periodic site visits, program reviews, and facility inspections.

1. Requirements for Ongoing Review of Research Involving Animals. For ongoing

animal research activities, each Recipient and any Recipient institutions must submit updates to CAPO regarding any amendments or changes to (including expiration, renewal, or completion of) ongoing animal protocols as they occur, and may be required to submit annual updates regarding the ACU program at Recipient and Recipient institutions. Annual updates may include, but are not limited to, the IACUC semiannual (program review and facility inspection) reports, the USDA inspection report, and the most recent AAALAC inspection report, as applicable.

The Recipient must promptly report the following to CAPO, along with any corrective actions taken: (1) any unanticipated problems or noncompliance with animal care and use regulations and policies adopted by DHS (as referenced above); (2) any change in AAALAC accreditation status; (3) any USDA Notice of Violation; and (4) IACUC suspension of any animal research activity conducted under this Award.

Foreign Contractors/Collaborators and U.S. Institutions with Foreign Subcomponents.

Foreign organizations (including direct Contractors, Subcontractors, Grant Recipients, Sub-recipients, and subcomponents or collaborating partners to U.S. Recipients) are subject to all DHS requirements for work involving animals. The Recipient must provide CAPO documentation sufficient to illustrate this compliance. CAPO will evaluate compliance measures for these institutions on a case-by-case basis to determine their sufficiency. **The Recipient must not initiate work involving animals at foreign institutions under this Award without formal written approval from CAPO.**

F. LIFE SCIENCES DUAL USE RESEARCH OF CONCERN (DURC)

The Recipient and any Recipient institutions shall conduct all research involving agents and toxins identified in sections III.1 and 6.2.1 of the *USG Policy for Oversight of Dual Use Research of Concern* and *USG Policy for the Institutional Oversight of Dual Use Research of Concern*, respectively, in accordance with both policies referenced above and in accordance with any additional requirements set forth in related DHS policies and instructions. Each Recipient and any Recipient institutions planning to perform research involving agents and toxins identified in sections III.1 and 6.2.1 of the USG DURC policies under this award must submit the following documentation outlined in this section for CAPO review. Institutions were required to implement the policy on or by September 24, 2015.

1. Requirements for Research Using DURC Agents and Toxins. To ensure compliance with the USG DURC Policies, each facility conducting research involving the agents and toxins identified in sections III.1 and 6.2.1 of the USG DURC Policies under this Award must submit the following documentation for compliance review by CAPO

prior to the initiation of such activities.

- a. Institutional Review Entity (IRE) charter, and/or other available documentation of IRE policies and procedures, to include the contact information for the Institutional Contact for DURC (ICDUR);
- b. Institution's project-specific risk mitigation plan, as applicable;
- c. DURC training or education program description;
- d. Formal annual assurance of compliance with the USG Policy for Institutional Oversight of Life Sciences Dual Use Research of Concern;
- e. A completed iDURC form and a Statement of Work.

2. Required Notifications to DHS:

- a. Within 30 calendar days of initial and periodic reviews of institutional review of research with DURC potential, notify CAPO of the results, including whether the research does or does not meet the DURC definition.
- b. Report, in writing, any instances of noncompliance and mitigation measures to correct and prevent future instances of noncompliance within 30 calendar days to CAPO.

3. Flowdown Requirements: The Recipient shall include the substance of this section in all sub-awards/contracts at any tier where the sub-Recipient is performing work with agents or toxins identified in sections III.1 of the *USG Policy for Oversight of Dual Use Research of Concern* and 6.2.1 of the *USG Policy for the Institutional Oversight of Dual Use Research of Concern*.

The Recipient should contact CAPO at STregulatorycompliance@hq.dhs.gov to submit documentation or to request more information regarding the DHS regulatory documentation and compliance review requirements. CAPO will provide written confirmation of receipt of all required documentation to the designated Points of Contact. CAPO will evaluate the submitted materials. Additional documentation may be required in some cases and must be submitted upon request. CAPO will review all submitted materials and provide written confirmation to the Recipient once all requirements have been met. Upon receipt of this written confirmation, the Recipient may initiate approved projects under this award.

In order to meet the reporting requirements set forth in section IV.2 of the 2012 *USG Policy for Oversight of Life Sciences Dual Use Research of Concern* (the biannual DURC Data Call), the Recipient and any Recipient institution shall submit documentation regarding all active, planned or recently completed (within twelve months of the submission) unclassified intramural or extramural activities on Federally-funded or conducted life science research projects biannually on the first Monday in May and November. The Recipient should contact CAPO at STregulatorycompliance@hq.dhs.gov to submit documentation. Documentation should include an update on all listed activities, including status, all agents or toxins

incorporated by strain or surrogate name, performers, contract information, and sites of activities. Documentation should also include any changes to existing or completed projects since the most recent submission, including—but not limited to—the addition of agents, a change in performer, modifications to the scope of work, and/or changes to the technical approach. A supplemental report detailing all work involving low pathogenic avian influenza virus H7N9 (LPAI H7N9) and Middle East Respiratory Syndrome Coronavirus (MERS-CoV).

Foreign Contractors/Collaborators and U.S. Institutions with Foreign Subcomponents.

Foreign organizations (including direct Contractors, Subcontractors, Grant Recipients, Sub-recipients, and subcomponents or collaborating partners to U.S. Recipients) are subject to the iDURC policy. The Recipient must provide CAPO documentation sufficient to illustrate this compliance. CAPO will evaluate compliance measures for these institutions on a case-by-case basis. The Recipient must not initiate work nor provide funds for the conduct of biological laboratory work under this Award without CAPO's formal written approval.

G. RESEARCH INVOLVING HUMAN SUBJECTS

The Recipient and any Recipient institutions shall conduct all Research Involving Human Subjects in compliance with the requirements set forth in 45 C.F.R. § 46, Subparts A-D, DHS Directive 026-04, *Protection of Human Subjects*, and any related DHS policies and instructions prior to initiating any work with human subjects under this Award. Each Recipient and any Recipient institutions planning to perform research involving human subjects under this Award must submit the documentation outlined in this section for CAPO review.

1. Requirements for Research Involving Human Subjects. Each facility conducting work involving human subjects under this Award is required to have a project-specific Certification of Compliance letter issued by the CAPO. Each Recipient must submit the following documentation to the CAPO for compliance review and certification prior to initiating research involving human subjects under this Award:
 - a. Research protocol, as approved by an Institutional Review Board (IRB), for any human subjects research work to be conducted under this Award;
 - b. IRB approval letter or notification of exemption (see additional information below on exemption determinations), for any human subjects research work to be conducted under this Award;
 - c. IRB-approved informed consent document(s) (templates) or IRB waiver of informed consent for projects involving human subjects research under this Award; and
 - d. Federal-wide Assurance (FWA) number from the HHS Office for Human Research Protections (OHRP), or documentation of other relevant assurance, for all Recipient institutions (including Sub-recipients) involved in human subjects research under this

Award.

2. Exemptions for Research Involving Human Subjects. Exemption determinations for human subject research to be conducted under this Award should only be made by authorized representatives of (1) an OHRP-registered IRB, or equivalent, or (2) the CAPO. Exemption determinations made by an OHRP-registered IRB, or equivalent, should be submitted to the CAPO for review and record-keeping. Program Officers, principal investigators, research staff, and other DHS or institutional personnel should not independently make exemption determinations in the absence of an IRB or CAPO review. DHS Program Officers (or institutions conducting human subjects' research under this Award) seeking an exemption determination from the CAPO should submit a request to STregulatorycompliance@hq.dhs.gov that includes the following:
 - a. Research protocol or detailed description of planned activities to be conducted under this Award.
 - b. Identification of the exemption category that applies to the project(s) to be conducted under this Award and explanation of why the proposed research meets the requirements for that category of exemption.

All documentation, as well as any questions or concerns regarding the requirements referenced above, should be submitted to the CAPO at STregulatorycompliance@hq.dhs.gov. The submitted documentation will be retained by the CAPO and used to conduct a regulatory compliance assessment. Additional documentation may be required in some cases to complete this assessment. The Recipient must provide this documentation upon request, and address in writing any compliance issues or concerns raised by the CAPO before a certification letter is issued and participant enrollment can begin under this Award. The CAPO will review all submitted materials and provide written confirmation to the Recipient once all documentation requirements have been met.

The Recipient and any Recipient institution shall submit updated documentation regarding ongoing research involving human subjects, as available and prior to the expiration of previous approvals. Such documentation includes protocol modifications, IRB renewals for ongoing research protocols ("Continuing Reviews"), and notifications of study completion.

The Recipient must promptly report the following to CAPO, along with any corrective actions taken: (1) any instance of noncompliance with human subjects research regulations and policies adopted by DHS (as referenced above); and (2) suspension, termination, or revocation of IRB approval of any human subjects research activities conducted under this Award.

Foreign Contractors/Collaborators and U.S. Institutions with Foreign Subcomponents. Foreign organizations (including direct Contractors, Subcontractors, Grant Recipients, Sub-recipients, and subcomponents or collaborating partners to U.S. Recipients) are subject to all DHS and

CAPO requirements for research involving human subjects. All entities involved in activities under this Award must comply with applicable national and regional/local regulations, and standards and guidelines equivalent to those described for U.S. institutions (e.g., 45 C.F.R. § 46, including all Subparts, as relevant). The CAPO will evaluate compliance measures for these institutions on a case-by-case basis to determine their sufficiency. The Recipient must not initiate nor provide funds for the conduct of work involving human subjects at foreign institutions under this Contract without formal written approval from the CAPO.

H. COMPLIANCE WITH U.S. EXPORT CONTROLS

1. *Definitions.* “Export-controlled items,” as used in this clause, means items subject to the Export Administration Regulations (EAR) (15 CFR Parts 730-774) or the International Traffic in Arms Regulations (ITAR) (22 CFR Parts 120-130). The term includes:
 - a. “Defense items,” defined in the Arms Export Control Act, 22 U.S.C. 2778(j) (4) (A), as defense articles, defense services, and related technical data, and further refined in the ITAR, 22 CFR Part 120.
 - b. “Items,” defined in the EAR as “commodities,” “software,” and “technology,” that are also defined in the EAR, 15 CFR Part 772.1.
2. Activities performed by the Recipient and any Recipient institution under this Award may be subject to U.S. export control regulations. Nothing in this Agreement shall be construed as an approval of, certification of, or waiver for an export’s compliance with applicable laws and regulations regarding export-controlled items, including, but not limited to, the requirement for contractors to register with the Department of State in accordance with the ITAR, 22 CFR Parts 121.1-121.45 and 129.3. The Recipient and any Recipient institution shall conduct all such activities, to include any and all DHS-funded research and development, acquisitions, and collaborations in full compliance with U.S. export control regulations. The Recipient and any Recipient institution maintains responsibility for conducting its due diligence regarding its compliance with export control regulations and that all legal requirements for compliance with such controls are met prior to transferring commodities, technologies, technical data, or other controlled information to a non-U.S. person or entity. The Recipient shall contact The Department of State regarding any questions relating to compliance with the ITAR and shall consult directly with the Department of Commerce regarding any questions relating to compliance with the EAR. Upon DHS request, the Recipient and any Recipient institution must provide to the ECG documentation and any other information necessary to determine satisfaction of this requirement.

I. CONTROLLED UNCLASSIFIED INFORMATION

The parties understand that information and materials provided pursuant to or resulting from this Award may be export controlled, sensitive, for official use only, or otherwise protected by law, executive order or regulation. The Recipient is responsible for compliance with all applicable laws and regulations. Nothing in this Award shall be construed to permit any disclosure in violation of those restrictions.

J. INTELLECTUAL PROPERTY RIGHTS

Patent rights.

The Recipient is subject to applicable regulations governing patents and inventions, including government-wide regulations issued by the Department of Commerce at 37 CFR Part 401, "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements." The clause at 37 CFR 401.14 is incorporated by reference herein. All reports of subject inventions made under this Award should be submitted to DHS using the Interagency Edison system website at <http://www.edison.gov>.

Data rights.

1. **General Requirements.** The Recipient grants the Government a royalty free, nonexclusive and irrevocable license to reproduce, display, distribute copies, perform, disseminate, or prepare derivative works, and to authorize others to do so, for Government purposes in:
 - a. Any data that is first produced under this Award and provided to the Government;
 - b. Any data owned by third parties that is incorporated in data provided to the Government under this Award; or
 - c. Any data requested in paragraph 2 below, if incorporated in the Award."Data" means recorded information, regardless of form or the media on which it may be recorded.

2. **Additional requirement for this Award.**
 - a. **Requirement:** If the Government believes that it needs additional research data that was produced under this Award, the Government may request the research data and the Recipient agrees to provide the research data within a reasonable time.
 - b. **Applicability:** The requirement in paragraph 2.a of this section applies to any research data that are:
 - i. Produced under this Award, either as a Recipient or sub-recipient;
 - ii. Used by the Government in developing an agency action that has the

force and effect of law; and

iii. Published, which occurs either when:

- 1) The research data is published in a peer-reviewed scientific or technical journal; or
- 2) DHS publicly and officially cites the research data in support of an agency action that has the force and effect of law

c. Definition of “research data:” For the purposes of this section, “research data:”

iv. Means the recorded factual material (excluding physical objects, such as laboratory samples) commonly accepted in the scientific community as necessary to validate research findings.

v. Excludes:

- 1) Preliminary analyses;
- 2) Drafts of scientific papers;
- 3) Plans for future research;
- 4) Peer reviews;
- 5) Communications with colleagues;
- 6) Trade secrets;
- 7) Commercial information;
- 8) Materials necessary that a researcher must hold confidential until they are published, or similar information which is protected under law; and
- 9) Personnel and medical information and similar information the disclosure of which would constitute a clearly unwarranted invasion of personal privacy, such as information that could be used to identify a particular person in a research study.

d. Requirements for sub-awards: The Recipient agrees to include in any sub-award made under this Agreement the requirements of this award term (Patent Rights and Data Rights) and **DHS Standard Terms and Conditions award term (Copyright).**

K. PROGRAM INCOME.

Post-award program income:

In the event program income becomes available to the recipient post-award, it is the recipient’s responsibility to notify the DHS Grants Officer to explain how that development occurred, as part of their request for guidance and/or approval. The Grants Officer will review approval requests for program income on a case-by-case basis; approval is not automatic. Consistent with the policy and processes outlined in 2 C.F.R. Part 200, pertinent guidance and options, as determined by the type of recipient and circumstances involved, may be approved by the Grant Officer.

If approval is granted, an award modification will be issued with an explanatory note in the remarks section of the face page, concerning guidance and/or options pertaining to the recipient's approved request. All instances of program income shall be listed in the progress and financial reports.

L. PUBLICATIONS.

1. Publications. All publications produced as a result of this funding which are submitted for publication in any magazine, journal, or trade paper shall carry the following:
 - a. Acknowledgement. "This material is based upon work supported by the U.S. Department of Homeland Security under Grant Award Number {insert Award Number as outlined in Item #5 on Notice of Award cover page}"
 - b. Disclaimer. "The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Department of Homeland Security."

Recipient agrees to include in any sub-award made under this Agreement the requirements of this award term (Publications).

2. Use of DHS Seal and DHS S&T Logo. Recipient shall not use the DHS seal. Recipient shall acquire DHS's approval prior to using the DHS S&T logo.
3. Enhancing Public Access to Publications. Per Article I. Section A. DHS requires that the Recipient shall forward one electronic (PDF) copy of all publications generated under this award to the Program Officer at the time of publication. The Program Officer will make all publications publically available by posting on www.hsuniversityprograms.org in a manner consistent with copyright law no later than 12 months after the official date of publication. DHS Policy explicitly recognizes and upholds the principles of copyright. Authors and journals can continue to assert copyright in publications that include research findings from DHS-funded activities, in accordance with current practice. While individual copyright arrangements can take many forms, DHS encourages investigators to sign agreements that specifically allow the manuscript or software to be deposited with DHS for U.S. Government use after journal publication. Institutions and investigators may wish to develop particular contract terms in consultation with their own legal counsel, as appropriate. But, as an example, the kind of language that an author or institution might add to a copyright agreement includes the following: "Journal (or Software recipient) acknowledges

that the Author retains the right to provide a final copy of the final manuscript or software application to DHS upon acceptance for Journal publication or thereafter, for public access purposes through DHS’s websites or for public archiving purposes.”

M. SITE VISITS

The DHS, through authorized representatives, has the right, at all reasonable times, to make site visits to review project accomplishments and management control systems and to provide such technical assistance as may be required. If any site visit is made by the DHS on the premises of the Recipient, or a contractor under this Award, the Recipient shall provide and shall require its contractors to provide all reasonable facilities and assistance for the safety and convenience of the Government representatives in the performance of their duties. All site visits and evaluations shall be performed in such a manner that will not unduly delay the work.

N. TERMINATION

Either the Recipient or the DHS may terminate this Award by giving written notice to the other party at least thirty (30) calendar days prior to the effective date of the termination. Failure to adhere to the terms and conditions may result in award termination. All notices are to be transmitted to the DHS Grants Officer via registered or certified mail, return receipt requested. The Recipient’s authority to incur new costs will be terminated upon arrival of the date of receipt of the letter or the date set forth in the notice. Any costs incurred up to the earlier of the date of the receipt of the notice or the date of termination set forth in the notice will be negotiated for final payment. Closeout of this Award will be commenced and processed pursuant to 2 C.F.R. Part 200.

O. TRAVEL

Travel required in the performance of the duties approved in this Award must comply with 2 C.F.R. Part 200.

Foreign travel must be approved by DHS in advance and in writing. Requests for foreign travel identifying the traveler, the purpose, the destination, and the estimated travel costs must be submitted to the DHS Grants Officer 60 days prior to the commencement of travel.

P. GOVERNING PROVISIONS

The following are incorporated into this Award by this reference:

31 CFR 205
2 C.F.R. Part 200

Application

Rules and Procedures for Funds Transfers
Uniform Administrative Requirements, Cost Principles, and
Audit Requirements for Federal Awards
Grant Application and Assurances dated
May, 2015

Q. ORDER OF PRECEDENCE

1. 2 C.F.R. Part 200, "Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards."
2. The terms and conditions of this Award.
3. Application and Assurances dated May, 2015

APPENDIX B: Acronyms

List of commonly used acronyms in this NOFO:

CBP:	Customs and Border Protection
CHSQA:	Center for Homeland Security Quantitative Analysis
COE:	Center of Excellence
CDS:	S&T's Capability Development Support
CRCL:	Civil Rights & Civil Liberties
DHS:	U.S. Department of Homeland Security
DNDO:	Domestic Nuclear Detection Office
E2E:	End-to-End
FEMA:	Federal Emergency Management Agency
FLETC:	Federal Law Enforcement Training Center
FFRDC:	Federally Funded Research and Development Center
FPS:	Federal Protective Service
FRG	S&T's First Responders Group
HSARPA:	S&T's Homeland Security Advanced Research Projects Agency
HSE:	Homeland Security Enterprise
I&A:	Office of Intelligence and Analysis
ICE:	Immigration and Customs Enforcement
MSI:	Minority Serving Institution
NOFO:	Notice of Funding Opportunity
NPPD:	National Protection and Programs Directorate
OUP:	S&T's Office of University Programs
PPD:	Presidential Policy Directive
PRIV:	Privacy Office
QHSR:	Quadrennial Homeland Security Review
RDP	S&T's Research and Development Partnerships Group
S&T:	Science and Technology Directorate
SME:	Subject Matter Expert
SPAR:	Office of Strategy, Planning, Analysis and Risk
STEM:	Science, Technology, Engineering and Mathematics
TSA:	Transportation Security Administration
USCG:	U.S. Coast Guard
USCIS:	U.S. Citizenship and Immigration Services
USSS:	U.S. Secret Service

APPENDIX C: References for Themes, Topics and Questions

The following list of publications is provided as a resource for applicants. While this list is not exhaustive, it does represent key policy documents and reports used in the development of this NOFO. Applicants are expected to be aware of the diversity of available studies, policy documents, and findings relevant to this NOFO.

National Strategic Documents

- 2012 National Strategy for Information Sharing and Safeguarding:
https://www.whitehouse.gov/sites/default/files/docs/2012sharingstrategy_1.pdf
- 2016 Federal Cybersecurity Research and Development Strategic Plan:
https://www.whitehouse.gov/sites/whitehouse.gov/files/documents/2016_Federal_Cybersecurity_Research_and_Development_Strategic_Plan.pdf
- Quadrennial Homeland Security Review (QHSR): <http://www.dhs.gov/quadrennial-homeland-security-review>
- DHS Strategic Plan FY2014 – 2018:
<http://www.dhs.gov/sites/default/files/publications/FY14-18%20Strategic%20Plan.PDF>

References

Abadie, A. and J. Gardeazabal (2008). “Terrorism and the world economy,” *European Economic Review*, 52:1, pp. 1-27.

Berman, E. (2012). “Economic and Decision Models of Terrorist Enterprises,” Research Project Summaries, *CREATE Homeland Security Center*. Paper 107.
http://research.create.usc.edu/project_summaries/107

(2014). “Big Data: Seizing Opportunities, Preserving Values,” *Executive Office of the President*, pp. 1-85. Accessed 29 March 2016 at
https://www.whitehouse.gov/sites/default/files/docs/big_data_privacy_report_may_1_2014.pdf

(n.d.). “Cyber Security Resource Center: Cybersecurity Incidents,” *Office of Personnel Management*. Accessed April 3 2016 at
<https://www.opm.gov/cybersecurity/cybersecurity-incidents/>

(n.d.). “Data Visualization: Making Big Data Approachable and Valuable,” *SAS (White Paper)*, pp. 1-4. Accessed March 31 2016 at
http://www.sas.com/content/dam/SAS/en_us/doc/whitepaper2/sas-data-visualization-marketpulse-106176.pdf

- (2010). "DHS Risk Lexicon: 2010 Edition," *Department of Homeland Security*, pp.1-72. Accessed March 29 2016 at <https://www.dhs.gov/xlibrary/assets/dhs-risk-lexicon-2010.pdf>
- Enders, W. and E. Olson (2011). "Measuring the Economic Costs of Terrorism." Department of Economics Finance and Legal Studies, *University of Alabama*.
- (2015). Fiscal Years 2014-2018 Strategic Plan. *Department of Homeland Security*.
- Gandomi, A. and M. Haider (2015). "Beyond the hype: Big data concepts, methods, and analytics," *International Journal of Information Management*, 35:2, pp 137-144.
- Gartner IT Glossary. Accessed 31 March 2016 at <http://www.gartner.com/it-glossary/>
- Hermann, J.W. (ed.) (2013). *Handbook of Operations Research for Homeland Security*. International Series in Operations Research & Management Science. Springer: New York.
- Hordijk, L. (2007). "What is systems analysis?" *International Institute for Applied Systems Analysis*. Options Magazine (Winter 2007).
- Kandel, W.A. (2016). "Unaccompanied Alien Children: An Overview," *Congressional Research Service*, 7-5700, pp. 1-19.
- Kousky, C. (2014). "Informing climate adaptation: A review of the economic costs of natural disasters," *Energy Economics*, 46, pp. 576-592.
- Lagoze, C. (2014). "Big Data, data integrity, and the fracturing of the control zone," *Big Data & Society*, pp. 1-11.
- Lundberg, R. and H. Willis (2015). "Assessing Homeland Security Risks: A Comparative Risk Assessment of 10 Hazards," *Homeland Security Affairs*, 11:10.
- Patil, S., B. Patruni, H. Lu, F. Dunkerley, J. Fox, D. Potoglou, and N. Robinson (2015). "Public Perception of Security and Privacy: Results of the comprehensive analytics of PACT's pan-European Survey," *RAND Corporation*, pp. 1-119.
- Rabbani, M., H.R. Soufi, and S.A. Tourabi (2016). "Developing a two-step fuzzy cost-benefit analysis for strategies to continuity management and disaster recovery," *Safety Science*, 85, pp. 9-22.
- (2014). "Report to the President: Big Data and Privacy: A Technological Perspective," *Executive Office of the President*, President's Council of Advisors on Science and Technology, pp. 1-76. Accessed 25 March 2016 at

https://www.whitehouse.gov/sites/default/files/microsites/ostp/PCAST/pcast_big_data_and_privacy_-_may_2014.pdf

- Ressler, S. (2006). "Social Network Analysis as an Approach to Combat Terrorism: Past, Present, and Future Research," *Homeland Security Affairs*, 2:2. <http://www.hsaj.org>
- Ruiz Estrada, M.A., D. Park, J.S. Kim, and A. Khan (2015). "The economic impact of terrorism: A new model and its application to Pakistan," *Journal of Policy Modeling*, 37:6, pp. 1065-1080.
- Ruiz Estrada, M.A. and E. Koutronas (2016). "Terrorist Attack Assessment: Paris November 2015 and Brussels March 2016," *Journal of Policy Modeling*.
- Seghetti, L., A. Siskin, and R.E. Wasem (2014). "Unaccompanied Alien Children: An Overview," *Congressional Research Service*, pp. 1-14.
- Stanovich, M. (nd.). "'Network-Centric' Emergency Response: The Challenges of Training for a New Command and Control Paradigm," *Institute for Security Technology Studies*, Dartmouth College. <http://www.ists.dartmouth.edu/library/191.pdf>
- Stewart, M.G. and J. Mueller (2014). "Cost-benefit analysis of airport security: Are airports too safe?" *Journal of Air Transport Management*, 35, pp. 19-28.
- (2016). "What is Operations Research?" *INFORMS*. Accessed 24 April 2016 at <https://www.informs.org/About-INFORMS/What-is-Operations-Research>
- (n.d.). Plastic Composite Based Scintillators for Multi-Signature Radiation Detectors. HSHQDC-16-R-00012. *Small Business Innovation Research (SBIR) Program*. U.S. Department of Homeland Security. Accessed 03 May 2015 at <https://www.sbir.gov/node/867801>