

**COMBATING TERRORISM TECHNICAL SUPPORT OFFICE/  
Technical Support Working Group  
(CTTSO/TSWG)**

**BROAD AGENCY ANNOUNCEMENT (BAA)  
19S3011**

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**Due Date for Receipt of Phase 1 Quad Charts:**

**No Later Than February 6, 2019  
All submissions are due by 3:00 p.m.  
Eastern Time (ET) on the above date**

- AAC – Advanced Analytic Capabilities**
- CBRNE – Chemical, Biological, Radiological, Nuclear, and Explosives**
- IDD/EC – Improvised Device Defeat/Explosives Countermeasures**
- IFS – Investigative and Forensic Science**
- IW/ET – Irregular Warfare and Evolving Threats**
- PP – Personnel Protection**
- PS – Physical Security**
- TOS – Tactical Operations Support**
- TTD – Training Technology Development**

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**The Broad Agency Announcement Information Delivery System (BIDS) is the system in which all submissions and communications will flow. Communications outside of BIDS may result in expulsion from the competition.**

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## 1. INTRODUCTION.

This is a Combating Terrorism Technical Support Office (CTTSO) Broad Agency Announcement (BAA) issued under the provisions of paragraph 6.102(d)(2)(i) of the Federal Acquisition Regulation (FAR) to provide for the competitive selection of research proposals. Contracts based on responses to this BAA are considered to be the result of full and open competition and in full compliance with the provisions of Public Law (PL) 98-369 Section 2701, “The Competition in Contracting Act.” **Awards for submissions under this BAA are planned for Fiscal Year (FY) 2020. Funds may not be available for all requirements under this BAA. No contract awards will be made until appropriated funds are available from which payment for contract purposes can be made.**

### 1.1. Approach.

A three-phased proposal selection process will be used for this BAA to minimize cost and effort for prospective offerors:

- Phase 1 will consist of the solicitation, receipt, and evaluation of a one-page Quad Chart.
- Phase 2 will consist of the solicitation, receipt, and evaluation of a White Paper and applies to only those submissions that have been accepted in Phase 1.
- Phase 3 will consist of the solicitation, receipt, and evaluation of a Full Proposal and applies to only those submissions that have been accepted in Phase 2. Based on the priority of critical requirements and the availability of funding, Phase 1 submissions can be selected for Phase 3 without a Phase 2 submission.

Clarifications to White Papers and Full Proposals may be requested.

### 1.2. Small Business Set Aside.

The Government encourages nonprofit organizations, educational institutions, small businesses, small disadvantaged business (SDB) concerns, Historically Black Colleges and Universities (HBCU), Minority Institutions (MI), women-owned businesses, and Historically Underutilized Business zone enterprises as well as large businesses and Government laboratories to submit research proposals for consideration and/or to join others in submitting proposals; however, no portion of the BAA will be set aside for these special entities because of the impracticality of reserving discrete or severable areas of research and development (R&D) in any specific requirement area.

### 1.3. Limitation of Funds.

The Government intends to incrementally fund Cost Reimbursable contracts awarded from this BAA as provided by FAR 52.232-22, “Limitation of Funds.” Most contracts awarded are anticipated to be 6 to 24 months in duration. To facilitate incremental funding, submissions shall include the cost and schedule by a task-phased structure with clear exit criteria, and shall be inclusive of all work to complete the effort including any options. It is anticipated that the entire effort will be negotiated with the initial contract award.

[Note: Based upon the availability of funding, the Government may have to partially fund Fixed

Price contracts in accordance with DFAR 252.232-7007, “Limitation of Government’s Obligation.” In such cases, milestone payments will need to be a part of the full proposal. [Applicability of this issue will be stated in the email asking for a Phase III proposal.]

**1.4. Technical Evaluation Support.**

It is the intent of this office to use contractor support personnel in the review, evaluation, and administration of all submissions for this BAA. All contractor support personnel will have access to proprietary data and shall certify that they: (1) will not disclose any information pertaining to this solicitation including any submissions, the identity of any submitters, or any other information relative to this BAA; and (2) have no financial interest in any submissions evaluated, reviewed, and administered. Submissions and information received in response to this BAA constitutes permission to disclose that proposal data to certified evaluators under these conditions.

**1.5. BAA Package Download.**

This BAA Package can be downloaded electronically in its entirety from the BIDS Homepage under BAA Information. Registration is not required to download the BAA package; however, a BIDS registration is required to upload a response to the BAA.

**1.6. BAA Contractual and Technical Questions.**

All contractual and technical questions regarding this BAA, including the published requirements and instructions, must be posted via either the BAA Questions feature, accessible from the BIDS Homepage via Online Help, or emailed to BIDSHelp@cttso.gov. No other office personnel will acknowledge, forward, or respond to any inquiries received in any manner concerning the BAA. Contractual questions and answers will be posted periodically under BAA Questions. All questions must be received no later than 14 days after the release of the BAA.

**1.7. BIDS Website Help Requests.**

For technical help using BIDS, submit questions to the BIDS administrators at BIDSHelp@cttso.gov or by using the Request Help link located on the BIDS Homepage. Include a valid email address, your BIDS username, and a detailed description of the question or concern in the comments block. The BIDS Homepage provides other valuable resources under Useful Links, such as Prerequisites for Working with the Government. Reference documents including the *BIDS Submitter QuickCard* and *Quad Chart Sample* are available for download under Reference Materials. Information regarding compliance requirements for using humans and animals in testing is also available under Reference Materials.

**1.8. BIDS Frequently Asked Questions (FAQs).**

FAQs are a list of questions and associated responses for general and specific topics. Offerors are encouraged to periodically review BAA Questions, accessible from the BIDS Homepage via Online Help.

***NOTE: Persons submitting proposals are advised that only the Contracting Officer can obligate the Government to any agreement involving expenditure of Government funds.***

**2. GENERAL INFORMATION.**

This section includes information applicable to all awards under this BAA.

**2.1. Eligibility.**

To be eligible for contract award, a responsible offeror must meet certain minimum standards pertaining to financial solvency and resources, ability to comply with the performance schedule, prior record of satisfactory performance, integrity, organization, experience, operational controls, technical skills, facilities, and equipment. See FAR 9.104.

- All offerors must be registered in the System for Award Management (SAM) database at <https://www.sam.gov>.

These and other helpful links are provided under Prerequisites for Working with the Government located on the BIDS Homepage under Useful Links.

**2.2. Procurement Integrity, Standards of Conduct, Ethical Considerations.**

Certain post-employment restrictions on former federal officers and employees exist including special Government employees (Section 207 of Title 18, United States Code (U.S.C.)). If a prospective offeror believes that a conflict of interest exists, the offeror should make this known to the Contracting Officer for resolution before time and effort are expended in preparing a proposal.

**2.3. Reserved.**

**2.4. Restrictive Markings on Proposals.**

All proposals should clearly indicate content disclosure limitations. Submissions can be marked as “Proprietary” or words to that effect; however, markings such as “Company Confidential” or other phrases that could be confused with national security classifications shall not be used. All paragraphs that contain proprietary information must be clearly marked. The Contracting Officer may challenge proprietary markings if they are not substantiated.

**2.5. Submission Handling/Rights in Technical Data and Computer Software/Patent Rights.**

**2.5.1. Procurement Integrity.**

The Government shall comply with FAR 3.104 in its treatment of information submitted in response to this BAA solicitation and marked with the individual’s or company’s legend.

**2.5.2. Submission Information and FOIA.**

Records or data bearing a restrictive legend can be included in the proposal. However, the offeror is cautioned that portions of the proposal are subject to release under the terms of the Freedom of Information Act (FOIA), 5 U.S.C. § 552, as amended. In accordance with FOIA regulations, the offeror will be afforded the opportunity to comment on, or object to, the release of proposal information.

**2.5.3. Rights in Technical Data and Computer Software.**

Rights in technical data and computer software and software documentation provided in the proposal are treated in accordance with the Department of Defense Federal Acquisition Regulation Supplement (DFARS) 252.227-7016, “Rights in Bid and Proposal Information.” Rights in technical data, and computer software and computer software documentation in the resultant contract shall be in accordance with DFARS 252.227-7013 (regarding technical data) and DFARS Section 252.227-7014 (regarding computer software and software documentation). Both clauses (DFARS sections 252.227-7013 and 252.227-7014) will be included in any noncommercial contract exceeding the simplified acquisition threshold. Table 1 contains these and related clauses that may be included in the contract.

<b>Table 1. Contract Clauses</b>	
<b>DFARS</b>	<b>Title</b>
252.227-7013	Rights in Technical Data – Noncommercial Items
252.227-7014	Rights in Noncommercial Computer Software and Noncommercial Computer Software Documentation
252.227-7016	Rights in Bid and Proposal Information
252.227-7017	Identification and Assertion of Use, Release, or Disclosure Restrictions
252.227-7019	Validation of Asserted Restrictions - Computer Software
252.227-7025	Limitations on the Use or Disclosure of Government-Furnished Information Marked with Restrictive Legends
252.227-7027	Deferred Ordering of Technical Data or Computer Software
252.227-7028	Technical Data or Computer Software Previously Delivered to the Government
252.227-7030	Technical Data - Withholding of Payment
252.227-7037	Validation of Restrictive Markings on Technical Data

**2.5.4. Patents.**

Patents in existence and patent applications pending at the time of the proposal, which relate to the proposed effort, shall be identified in the White Paper and Full Proposal in accordance with the clauses above.

**2.6. Product and Deliverable Requirements.**

All proposal phases shall include the costs for products and data deliverable requirements. Minimum data (report) requirements include Monthly Status Reports (MSRs) and a Final Technical Report even if the research is to be continued under a follow-on contract or contract option. MSRs document program, technical, and financial status. The Final Technical Report summarizes the project and associated tasks at the conclusion of each contract. Include MSRs, the Final Technical Report, and any products and deliverables specific to the performance of the proposed effort (e.g., system specification). The Government will provide the offeror with a full listing of data deliverables (i.e., Contract Data Requirements List) in the request for Phase 3 Full Proposal. Additional products and deliverables could include prototype hardware, software, or systems; test plans; test and technical reports; technical data; specifications; requirements documents; computer programs or software; user manuals; drawings; or other products and data.



The number, types, and preparation instructions for products and deliverables will be specified in the contract.

**2.7. Distribution/Release Limitations.**

The offeror should be aware that all resulting contracts or other awards will contain release limitations for all data resulting from the effort in accordance with DFARS 252.204-7000. This includes products, data, information, and services to be performed. The contractor shall protect all data and information from disclosure, and shall not release any data or information by any method of dissemination without prior Government approval.

**2.8. Subcontracting.**

Pursuant to Section 8(d) of the Small Business Act (15 U.S.C. § 637(d)), it is the policy of the Government to enable small business and small disadvantaged business concerns to be considered fairly as subcontractors to contractors performing work or rendering services as prime contractors or subcontractors under Government contracts, and to assure that prime contractors and subcontractors carry out this policy.

**2.9. Animal or Human Testing Compliance.**

The contractor shall comply with all laws and regulations governing the use of animals or human subjects in research projects.

**2.9.1. Animal Testing.**

Any contract resulting from this BAA that potentially involves the testing of animals shall include the following language:

Any contractor performing research on warm blooded vertebrate animals shall comply with the Laboratory Animal Welfare Act of 1966, as amended, 7 U.S.C. §§ 2131 - 2159, and the regulations promulgated thereunder by the Secretary of Agriculture in 9 C.F.R. Parts 1 through 4, pertaining to the care, handling, and treatment of vertebrate animals held or used for research, teaching, or other activities supported by Federal contract awards. In addition, the contractor shall comply with the provisions of Department of Defense Instruction (DoDI) 3216.01, as implemented by SECNAVINST 3900.38C, and DFARS 252.235-7002, "Animal Welfare," which is incorporated into this contract.

**2.9.2. Human Subjects Testing.**

Any contract resulting from this BAA that potentially involves the use of Human Subjects in the research or study shall include the following language:

The contractor shall comply with all regulations promulgated by the Office of the Secretary of Defense in 32 C.F.R. Part 219, pertaining to the protection of human subjects. In addition, the contractor shall comply with the provisions of DoDI 3216.02. If human subjects are to be used at any time during the project, the contractor shall have a Federal assurance that is acceptable to CTTSO before involving human subjects. Additionally, the protocol shall be approved by a

Federally-assured Institutional Review Board (IRB) office named in the institution's assurance. The contractor shall prepare these documents and shall ensure that they are on file with CTTSO prior to the start of research involving human subjects.

Collaborators with the contractor, to include IRBs, shall also comply with regulations to protect human subjects for both classified and unclassified research. The contractor shall report all changes in the protocol or consent form to the CTTSO Contracting Officer's Representative as they occur. Release of initial and follow-up funding will be contingent upon initial and continuing reviews, and to other IRB and component requirements.

### 3. PROPOSAL PREPARATION.

This section provides information and instructions for the preparation and submission of all phases under this BAA. All submissions must meet these requirements including format, content, and structure, and must include all specified information to avoid disqualification, submission rejection, or delays in evaluation.

#### **3.1. BAA Information Delivery System (BIDS).**

BIDS at <https://bids.cttso.gov/> is used: (1) to provide public access to the BAA package; (2) to collect all unclassified submissions; and (3) to collect placeholder records for all classified submissions. BIDS also provides submission progress tracking, evaluation comment collection, and results notification back to the submitter.

##### **3.1.1. Submitter Registration.**

A BIDS submitter registration is required to respond to this BAA. Existing BIDS accounts are acceptable for a new BAA *if the company contact information is the same or is corrected*. Registrations should reflect the offeror's contracting or business authority. The username, created by the offeror, must be unique and is used for BIDS log in and submission tracking. Registration acceptance for submitters is automatic, but takes several seconds to be recognized by BIDS. A success email will be sent to indicate that the username and account are accepted. BIDS is email dependent and uses the registration email as the single point of contact (POC) for all notifications associated with the BAA. This email address should be monitored frequently during the BAA process for the notices. Submitters should periodically check status in their account, not receiving a notification email does not constitute grounds to appeal an evaluation decision. Spam blockers and other email security software may cause a notification email to be rejected; check your account. Email addresses included in the submissions or any other data field in BIDS will not be used for contact and notification purposes.

##### **3.1.2. User Accounts and Password Resets.**

Registration account information such as the POC, email, and password can be updated after log in. The "Forgot Password?" link on the BIDS Homepage allows registered users with a valid email address to automatically reset a password. The system will verify the account username and email to send a new password to that email.

**3.1.3. Registration and Account Help.**

BIDS Help requests can be emailed to BIDS administrators at [BIDSHelp@cttso.gov](mailto:BIDSHelp@cttso.gov) or submitted via the [Request Help](#) link located on the [BIDS Homepage](#).

**3.1.4. Document Identifier.**

The offeror shall include the document identifier in the header of each submission. Document identifiers must match the BIDS submission record and should be constructed *before* upload to BIDS.

**3.1.4.1. Constructing Document Identifiers.**

Document identifiers, auto-generated in part by BIDS, are based on Subgroup, the requirement number, the username, and a Submitter Internal Tracking (SIT) number. The underlined portion of the sample shown in Table 2 depicts the segment automatically formed by BIDS.

Table 2. Sample Document Identifier and Components Definition

<b>CB-1112-ABCCORP-10703JT-QC</b>	
<b>From Sample</b>	<b>Document Identifier Component</b>
<u>CB</u>	subgroup designation - from BAA
<u>1112</u>	requirement number - from BAA
<u>ABCCORP</u>	username - from BIDS registration
10703JT-QC	SIT number - any alphanumeric combination (with no special characters or spaces) created by the submitter for ( <i>submitter</i> ) tracking purposes along with the <b>document type suffix</b>

**3.1.4.2. Creating Submitter Internal Tracking (SIT) Numbers.**

SIT numbers are unique identifiers created by submitters and entered in the submission record during the upload process. SIT numbers can be any alphanumeric combination (no special characters or spaces) chosen by the submitter plus a suffix indicating the document type. BIDS enforces unique SIT numbers and will not allow the submission record to be saved if the SIT number has already been used. Table 3 provides sample SIT numbering formats for each document type.

Table 3. Sample SIT Numbers for an Accepted Submission

<b>Document Type</b>	<b>Auto-generated by BIDS</b>	<b>SIT#</b>
Quad Charts	CB-1112-ABCORP	10703JT-QC
White Papers	CB-1112-ABCORP	10703JT-WP
Full Proposals	CB-1112-ABCORP	10703JT-FP

Offerors uploading more than one submission to the same requirement shall create unique identifiers by adding a numbered sequence to the document type suffix. Table 4 offers sample SIT number formats for multiple submissions to the same requirement.

Table 4. Sample SIT Numbers for Multiple Submissions to the Same Requirement

Submission #	Auto-generated by BIDS	SIT# Sample 1	SIT# Sample 2*
Submission 1	CB-1112-ABCORP	10703JT-QC1	QC1
Submission 2	CB-1112-ABCORP	10703JT-QC2	QC2
Submission 3	CB-1112-ABCORP	10703JT-QC3	QC3
* NOTE: If the submitter does not require an internal tracking number, use the document type designation.			

### **3.2. BIDS Security and Access Control.**

All data uploaded to BIDS is secure from public view and download. All submissions will be considered proprietary/source selection sensitive and protected accordingly. The documents can only be reviewed by the registrant and authorized Government and contractor representatives with no conflict of interest.

### **3.3. Submission Changes.**

Changes to uploaded submissions are permitted up to the closing date and time. If a modification is required, update the original file in the source application and save. Convert to an acceptable format if applicable. In BIDS, open the submission record, click **Edit Proposal**, and update the record information. Click on the trash can icon to delete the old file. Use **Browse** to select the revised document. Click **Submit Proposal** to save the changes. Documents cannot be edited online through the BIDS web interface. File names must contain no spaces or special characters. Ensure the file size does not exceed the prescribed limits. To completely remove a submission from consideration, select **Delete Proposal**. Changes after the requirement due date and time are not permitted.

### **3.4. Special Handling Procedures for Classified Information.**

If a submission contains classified information, the offeror must first create a placeholder record in BIDS with an unclassified cover page attachment. Identify in the placeholder document that the submission cannot be uploaded due to classification and include the method of delivery (hand-carried, secure fax, secure mail, etc.) as well as the tracking number, if applicable. The BIDS Document Identifier must be clearly identified on the mailed document(s). Classified responses (up to SECRET) must be appropriately and clearly marked (including all paragraphs and pages containing the subject data), packaged, and shipped in accordance with classified material handling procedures and security regulations pertaining to the level of classification for that document.

To obtain mailing instructions for classified submissions, email: [CTTSOsecurity@cttso.gov](mailto:CTTSOsecurity@cttso.gov).

Classified submissions must be received by the applicable due date and time. Classification in no way eliminates the offeror's requirement to comply with all BAA instructions.

### **3.5. Phase 1 Quad Chart Submissions.**

Offerors shall prepare and upload a one-page (8 ½ by 11 inches) Quad Chart in response to Phase 1 of this BAA. Use font sizes of 10 point or greater. If more than one page is submitted,

only the first page will be evaluated. Quad Charts do not require a Cover Page.

### **3.5.1. Phase 1 Due Date and Time.**

All unclassified Quad Charts must be received electronically through BIDS no later than 1500 (3:00 p.m.) Eastern Time (ET) on the date specified on the cover of this document. Likewise, classified submissions must be received by the same due date and time. Offerors must create a placeholder record in BIDS with an unclassified cover page attachment. Refer to the “Special Handling Procedures for Classified Information” in this document for instructions on classified submissions. BIDS does not allow proposals to be uploaded or classified placeholders to be created after the closing date and time. Any proposal, regardless of classification, submitted by any other means, or that is late, will not be considered by the Government. Avoid the last minute rush; submit early.

### **3.5.2. Electronic File Format.**

The Quad Chart shall be submitted in Microsoft Office (Word or PowerPoint), or Adobe Acrobat (PDF – portable document format). ZIP files and other application formats are not acceptable. The document must be print-capable, without password, and no larger than 1024 KB. File names must contain the appropriate file name extension (.doc/.docx, .ppt/.pptx, or .pdf). File names cannot contain spaces or special characters. Apple users must ensure the entire file name and path are free of spaces and special characters. Submissions that cannot be opened, viewed, or printed will not be considered.

### **3.5.3. Quad Chart Content.**

A Quad Chart conveys the essence of the proposed solution for a single requirement. When preparing a submission, the offeror shall ensure that the specific criteria of the requirement are addressed, the solution is clear, and can be accomplished with the proposed technology, cost, and schedule. The Quad Chart includes a document header and four quadrants. The Quad Chart format and sample are provided at the BIDS website under Reference Materials.

#### **3.5.3.1. Header Information.**

Header information shall include the BAA Announcement number, the Document Identifier, and the Proposal Title. The date and company name should be included along with the appropriate document markings.

#### **3.5.3.2. Top Left Quadrant, Graphical Depiction.**

The top left quadrant is a graphical depiction, photograph, or artist’s concept of the proposed solution or prototype. Include labels or brief descriptive text as needed for clarification. Ideally, this will convey the prototype concept, use, capability, and any relevant size or weight relationships based on the published requirement.

#### **3.5.3.3. Top Right Quadrant, Operational and Performance Capabilities.**

The top right quadrant contains the operational and performance capabilities summary. Describe any basic, new, or enhanced capabilities the system will provide to meet the published requirement. In bullet form, list key aspects of performance, capability, operational use, relevant software or hardware specifications, and planned

interface and/or compatibility. The offeror is only required to submit past performance information in response to a request for Full Proposal.

#### **3.5.3.4. Bottom Left Quadrant, Technical Approach.**

The bottom left quadrant contains the proposed technical approach. Specifically, describe the technology involved, how it will be used to solve the problem, actions done to date, and any related ongoing efforts. Briefly describe the tasks to be performed for each phase. A bullet list is acceptable.

#### **3.5.3.5. Bottom Right Quadrant, Cost and Schedule.**

The bottom right quadrant contains the Rough Order of Magnitude (ROM) and Schedule, Products and Deliverables, and Corporate Contact Information. ROM and Schedule shall be proposed by phase and include the cost, period of performance (POP), and exit criteria for each phase. A total cost and POP that combines all phases shall also be included. Products and Deliverables shall include, by phase, a list of all prototype hardware and software along with the required data as described in “Product and Deliverable Requirements” in section 2 of this document. Corporate Contact Information shall include the submitter’s company name, POC, phone number, and email address. Include any significant teaming partner (contact information) relevant to the evaluation. (Note that the contact information in the BIDS registration is used for all notices and contact purposes.)

#### **3.5.4. Phase 1 Notification to Offeror.**

The Government will notify the offeror when a submission has been accepted or rejected. Notification of acceptance with a request to submit the next phase document will be emailed to the offeror’s contracting authority as entered in the BIDS registration and will indicate the next submission type, clarification requests, and due date and time. Likewise, rejection notifications will be emailed to the address provided in the BIDS registration.

**Debriefings for Quad Charts will not be conducted due to the nature of BAAs.** In general, submissions are not considered for further review when they do not meet the basic requirement, are too costly, or do not fit the mission. All Quad Charts are evaluated in accordance with Section 4, Proposal Evaluation, of this BAA. Unspecified requirements (R000s) are for proposing unique innovations that have not yet been identified by CTTSO. Submissions against an unspecified requirement should be responsive to the topics noted in the requirement. Proposed technologies from the unspecified requirements will be competing against proposed technologies for identified and prioritized interagency requirements. Because CTTSO does not budget for unspecified requirements, awards may not be made against the unspecified requirements. Note: Quad charts submitted in response to a Subgroup’s R000 may be shared with other CTTSO Subgroups if the submission demonstrates relevance to more than one focus area.

#### **3.5.5. Phase 1 Status and Inquiries.**

Phase 1 is complete when all submissions have been accepted or rejected in accordance with this BAA. Inquiries by phone concerning the status of Quad Charts will not be accepted. After log in to the BIDS website, submitters are able to check the status of their submission(s) under **Check My Current Proposals**.

**3.6. Phase 2 White Paper Submissions.**

Offerors shall prepare and upload a White Paper with no more than twelve (12) pages plus a cover page in response to Phase 2 of this BAA. All submission pages shall be 8 ½ by 11 inches, double-spaced with fonts no smaller than 10 point; all margins shall be one inch. Each page of the submission shall contain the document identifier in the document header. If the White Paper contains more than 12 pages including tables, charts, and figures, only the first 12 pages will be evaluated. All White Paper submissions must include a cover page. The cover page template is provided at the BIDS website under Reference Materials. The cover page is excluded from the White Paper page count.

**3.6.1. Phase 2 Due Date and Time.**

All unclassified White Papers must be received electronically through BIDS no later than the due date and time specified in the Phase I Quad Chart acceptance email. Likewise, classified submissions must be received by the same due date and time. Offerors must create a placeholder record in BIDS with an unclassified cover page attachment. Refer to the “Special Handling Procedures for Classified Information” in this document for instructions on classified submissions. BIDS does not allow proposals to be uploaded or classified placeholders to be created after the due date and time. Any proposal, regardless of classification, submitted by any other means, or that is late, will not be considered by the Government.

**3.6.2. Electronic File Format.**

The White Paper shall be submitted in Microsoft Office (Word), or Adobe Acrobat (PDF– portable document format) format. ZIP files and other application formats are not acceptable. The document must be print-capable, without password, and no larger than 2048 KB. File names must contain the appropriate file name extension (.doc/.docx or .pdf). File names cannot contain spaces or special characters. Apple users must ensure the entire file name and path are free of spaces and special characters. Submissions that cannot be opened, viewed, or printed will not be considered.

**3.6.3. Phase 2 Document Upload.**

To upload a next phase document use the link back to BIDS provided in the acceptance email, or log in to BIDS under **Proposals Due** to open the accepted record. Select **Create Next Proposal** and follow the instructions.

**3.6.4. White Paper Content.**

White Papers shall provide a description of the technical approach, the specific tasks and deliverables by phase, schedule and cost estimate by phase, intellectual property and government rights, transition planning for production, and a capability statement. The offeror shall incorporate all clarification data requests from the acceptance email into the submission. Indicate clarification entries by footnote and reference the requested item(s) in the footer area. The following White Paper sections and details are required.

**3.6.4.1. Cover Page.**

A cover page template is provided on the BIDS website under Reference Materials.

The cover page includes necessary contractual information including the offeror's contracting POC (name, telephone number, email address, facsimile number, mailing address) and business information (Data Universal Numbering System (DUNS) number, Commercial and Government Entity (CAGE) code, business type. Include the proposed contract type, total cost, and the duration of all phases/tasks. The cover page is excluded from the page count.

**3.6.4.2. Technical Approach.**

Describe the proposed solution relative to the requirement. Focus content on operational capabilities required to address the problem, the underlying theory that supports the operational capability, and suggested concept of operations. Identify end users that could be interested in the proposed solution and describe how the solution will be a benefit. Include drawings, diagrams, charts, and tables needed to explain the effort. Describe if, and where, the proposed technology/solution has been, or is being used. Identify sponsoring agency and funding resources; or if none, so state.

**3.6.4.3. Tasks and Deliverables.**

Identify the proposed tasks by phase in the order of occurrence. A phase must have clear exit criteria to serve as a "go" or "no-go" decision point to proceed to the next phase. Identify work that will be performed by other organizations or agencies. Identify anticipated technical risks along with planned mitigation efforts. Indicate any Government furnished material (GFM), equipment (GFE), or information (GFI) that will be required with the task and need date; or if none, so state. For each phase include the exit criteria and all products and deliverables as defined in "Product and Deliverable Requirements" in section 2 of this document. If a phase is proposed as an option, so state.

**3.6.4.4. Schedule.**

Develop a master project schedule preferably in Gantt chart format. The schedule shall indicate the planned start and stop point for each phase with top level subordinate tasks, estimated delivery dates, and completion dates. Indicate the total project POP in months using January 2<sup>nd</sup> as a notional start date through the completion date.

**3.6.4.5. Cost.**

Provide the proposed, task-phased budgetary estimate inclusive of any proposed options. At a minimum, this estimate shall detail estimated labor hours and costs, anticipated material costs, product and deliverable costs (see section 2 General Information, "Product and Deliverable Requirements" in this document) and other costs (e.g., subcontracts, indirect rates, profit or fee rate) for each phase/task. Costs allocated to other organizations (e.g., Government testing) shall be clearly shown; or if none, so state. Changes in cost greater than 10 percent from those proposed in the prior submission shall be explained.

**3.6.4.6. Intellectual Property, Technical Data, and Software.**

Disclose/discuss all intellectual property, technical data, and/or software rights that



are intended to be used in connection with this submission. See section 2 General Information, “Submission Handling/Rights in Technical Data and Computer Software/Patent Rights” in this document. For additional information on this topic, see DFARS 252.227-7013 and DFARS 252.227-7014.

**3.6.4.6.1. Patents and Patent Applications.**

Identify any existing, applied for, or pending patents that will be used in the conduct of this effort. Provide patent number with date of issue and title or patent application number with filing date and title. Any patent or patent application that resulted from prior government funding should be identified. If no patents or patent applications are relevant, so state. See section 2 General Information, “Submission Handling/Rights in Technical Data and Computer Software/Patent Rights” in this document.

**3.6.4.6.2. Rights in Technical Data and Software.**

Identify any technical data and/or computer software that will be delivered with less than unlimited rights as prescribed in DFARS 252.227-7013 and DFARS 252.227-7014. If unlimited rights in technical data are proposed, so state. See section 2 General Information, “Submission Handling/Rights in Technical Data and Computer Software/Patent Rights” in this document.

**3.6.4.7. Transition from Prototype to Production.**

Describe the overall strategy to transition the results of this development effort to production once the funded effort is concluded. Briefly describe the overall strategy for transition, potential partners, transition issues to include any obvious regulatory, liability, interoperability, or financing issues. Discuss the interaction with representative users and the concept for test and evaluation by those users and follow on support of a product resulting from this effort.

**3.6.4.8. Organizational Capability Statement.**

Describe the offeror’s capability and/or experience in doing this type of work. Identify technical team members or principal investigators and associated expertise. If applicable, include a description of co-participants’ capabilities and/or experience. State whether an agreement has been reached (or not) with the co-participants. The offeror is only required to submit past performance information in response to a request for Full Proposal.

**3.6.6. Phase 2 Status and Inquiries.**

Phase 2 is complete when all submissions have been accepted or rejected in accordance with this BAA. Inquiries by phone concerning the status of White Papers will not be accepted. After log in to the BIDS website, submitters are able to check the status of their submission(s) under **Past Proposals**.

**3.6.5. Phase 2 Notifications to Offeror.**

The Government will notify the offeror when a submission has been accepted or rejected. Notification of acceptance with a request to submit the next phase document will be

emailed to the offeror's contracting authority as *entered in the BIDS registration* and will indicate the next submission type, clarification requests, and due date and time. Likewise, rejection notifications will be emailed to the address provided in the BIDS registration. **Debriefings for White Papers will not be conducted due to the nature of BAAs.** In general, submissions are not considered for further review when they do not meet the basic requirement, are too costly, do not fit the mission, or funding is not expected. All White Papers are evaluated in accordance with Section 4, Proposal Evaluation, of this BAA.

### **3.7. Phase 3 Full Proposal Submissions.**

Offerors shall prepare and upload a Full Proposal, consisting of a Technical Proposal and a Cost Proposal, plus a cover page, in response to Phase 3 of this BAA. All pages shall be 8 ½ by 11 inches, double-spaced with fonts no smaller than 10 point; all margins shall be one inch. Each page of the submission shall contain the document identifier in the document header. The Technical Proposal must be no more than 50 pages including tables, charts, and figures. If the document contains more than 50 pages, only the first 50 pages will be evaluated. All paragraphs containing proprietary information must be clearly marked. The Cost Proposal has no page limit; however, unnecessarily elaborate or information beyond those sufficient to present a complete and effective response is not desired.

**Disclaimer** - To minimize the cost and effort for submitters, Phase 3, Full Proposals, will only be requested for qualifying solutions that have a high probability of award; however, the Government reserves the right to cancel requirements, or any request for proposals for this solicitation, at any time prior to award and shall not be liable for any cost of proposal preparation or submission.

#### **3.7.1. Phase 3 Due Date and Time.**

All unclassified Full Proposals must be received electronically through BIDS no later than the due date and time specified in the acceptance email. Likewise, classified submissions must be received by the due date and time. Offerors must create a placeholder record in BIDS with an unclassified cover page attachment. Refer to the "Special Handling Procedures for Classified Information" in this document for instructions on classified submissions. BIDS does not allow proposals to be uploaded or classified placeholders to be created after the due date and time. Any proposal, regardless of classification, submitted by any other means, or that is late, will not be considered by the Government.

#### **3.7.2. Electronic File Format.**

The Full Proposal shall be submitted in Microsoft Office (Word), or Adobe Acrobat (PDF – portable document format). The cost proposal may be submitted in Microsoft Office Excel, Word, and PDF formats. See specific cost proposal sections below for specific file requirements. ZIP files and other application formats are not acceptable. The document must be print-capable, without password, and no larger than 2048 KB. File names must contain the appropriate file name extension (.doc/.docx, .xls/.xlsx, or .pdf). File names cannot contain spaces or special characters. Apple users must ensure the entire file name and path are free of spaces and special characters. Submissions that

cannot be opened, viewed, or printed will not be considered.

**3.7.3. Phase 3 Document Upload.**

To upload a next phase document, locate and open the accepted record in BIDS and select **Create Next Submission**.

**3.7.4. Full Proposal Components.**

Full Proposals shall consist of two major sections described in this document, and can be uploaded to BIDS in two separate files each limited to 2048 KB each. The first section is the Technical Proposal and shall include all information related to the proposal as specified in this BAA including figures, charts, and tables plus the cover page. The second section is the Cost Proposal to include all cost data as well as an explanation of changes in cost greater than 10 percent from those proposed in the prior submission. Additionally, the offeror will include a cover page as follows:

A cover page template is provided at the BIDS website under Reference Materials. The cover page includes necessary contractual information including the offeror's contracting POC (name, telephone number, email address, facsimile number, mailing address) and business information (DUNS number, CAGE code, business type). Include the proposed contract type, total cost, and the duration of all phases/tasks.

**3.7.5. Technical Proposal Content.**

The Technical Proposal shall provide a technically detailed solution of the problem addressed in the requirement and fully expand the technology proposed in the prior submissions. The following sections and associated data are required. The offeror shall incorporate all clarification data requests in the Phase 2 acceptance email. Indicate clarification entries by footnote and reference the requested item(s) in the footer area.

**3.7.5.1. Reserved.**

**3.7.5.2. Abstract.**

The abstract is a one page (or less) synopsis of the proposal that includes the title and the basic approach to satisfy the requirement. Describe the overall scope of work to be performed for the entire POP inclusive of options. The abstract shall stand alone and be suitable for release under the Freedom of Information Act, 5 U.S.C. § 552, as amended.

**3.7.5.3. Executive Summary.**

An executive summary is a concise description of the technology and solution being proposed. Include key information that demonstrates how the proposed solution meets the published requirement. The executive summary should not introduce any new information not covered in the subsequent content.

**3.7.5.4. Technical Approach.**

Describe the technical approach for the proposed solution to meet the requirement. Include technical details of the solution and fully expand the technology proposed in

the prior phase submission. Include the methodology, underlying theory, system components, and operational scenario for the intended users. Include drawings, diagrams, charts, and tables needed to explain the effort. Describe relevant prior application of the proposed technology and/or solution, how it is being used, and by whom. Identify sponsoring agency and funding resources; or if none, so state. If subcontractors are proposed, include a detailed description of the effort that they will be performing in support of or in addition to the prime.

**3.7.5.5. Project Plan.**

The project plan shall be organized by phase and describe the work to be performed along with all associated requirements to successfully complete the proposed effort. Include a summary of the individual phases to follow.

**3.7.5.5.1. Phases.**

Phases shall be defined by the subset of tasks to be performed, phase objectives to be accomplished, and the required POP to completion. Phases shall be listed in order of occurrence. Identify phases that are optional. Each phase must contain clear exit criteria that is measurable evidence of completion and serves as a “go” or “no-go” decision point. Each phase shall include a total cost.

**3.7.5.5.2. Tasks within a Phase.**

For each task, provide a detailed description of the work to be performed. Identify any work that will be performed by other organizations or agencies; or if none, so state. Indicate if an agreement is in place for the resources.

**3.7.5.5.3. Products and Deliverables.**

Identify all deliverables - products as well as documentation and reports - for each Task/Phase. Refer to section 2.6 of this document “Product and Deliverable Requirements” for the minimum report requirements, and additional products and deliverables in performance of the effort proposed.

**3.7.5.6. Master Schedule.**

Develop a master project schedule that includes phase start and stop dates as well as major milestones, critical tasks, and report and product delivery dates. Assume a start date of January 2<sup>nd</sup>. Indicate any optional phases.

**3.7.5.7. Government Furnished Equipment.**

Reasonably identify all Government furnished equipment (GFE), materials, facilities, or information with the need date and suggested source at the time of proposal submission. GFE includes, but is not limited to: Government email accounts, SIPRNET access, Common Access Cards (CACs), and/or space at a CTTSO facility (either permanent residence, temporary residence, or testing). Upon identifying GFE, if an offeror’s proposal is selected for contract award, the proposed GFE will be identified in the resulting contract. Failure to adequately identify necessary GFE may result in contract termination due to the offeror’s inability to perform under this competitive source selection. If Government equipment, materials, facilities, or

information are not required, so state.

**3.7.5.8. Project Risks and Mitigation.**

Identify anticipated technical and management risks along with planned mitigation efforts. Indicate the risk assessment as high, medium, or low.

**3.7.5.9. Organizational Capability Statement.**

Include a brief description of the offeror's organization. Describe the offeror's capability and/or experience in doing the type of work being proposed. If applicable, include a description of co-participants' capabilities and/or experience. State whether an agreement has been reached with the co-participants. Provide at least three references, to include points of contact, for like or similar work.

**3.7.5.10. Organizational Resources.**

Identify key technical personnel and principal investigator(s) including alternates and co-participants, if applicable. Include a brief biography, relevant expertise, and a list of recent publications for each. Identify any team members with potential conflicts of interest. Possible conflicts of interest include personnel formerly employed by the federal Government within the past two years from the date of proposal submission. Provide name, duties, employing agency, and dates of employment; or if none, so state.

**3.7.5.11. Intellectual Property, Technical Data, and Software.**

All anticipated intellectual property, technical data or software rights shall be disclosed. See section 2 General Information, "Submission Handling/Rights in Technical Data and Computer Software/Patent Rights" in this document.

**3.7.5.11.1. Patents and Patent Applications.**

Identify any existing, applied for, or pending patents that will be used in the conduct of this effort. Provide patent number or application number and title. Any patent that resulted from prior Government funding should be identified. State if no patents or patent applications are relevant.

**3.7.5.11.2. Rights in Technical Data.**

Identify any technical data and/or computer software that will be delivered with less than unlimited rights as prescribed in DFARS 252.227-7013 and DFARS 252.227-7014. When less than unlimited rights are proposed, a data rights assertion table shall be provided as prescribed in DFARS 252.227-7017.

**3.7.5.12. Transition from Prototype to Production.**

Describe the approach and issues related to transition or commercialization of the results of this effort to an operationally suitable and affordable product for the intended users to include the following. The cost to prepare the Transition Plan should be included in the proposed costs. The cost to prepare the Transition Plan should be detailed in accordance with BAA Section 3.7.6.1. Additional information regarding the Technology Transition Guidance can be found at <http://www.cttso.gov>

NOTE – If the specific requirement will not reasonably result in a prototype (e.g., study, service requirement) so state “Not Applicable to this Requirement” and justify why.

**3.7.5.12.1. Transition Strategy.**

Provide the overall strategy for transition to production (licensing, partnering, or venturing) along with the associated timelines for actions associated with the transition. Describe the roles of current development partners, subcontractors, or other organizations that will be leveraged. If the offeror is not a commercial entity, indicate if a commercial partner has been identified. Discuss barriers to commercialization, such as anticipated regulatory issues (such as environmental, safety, health, and transportation), liability issues, interoperability, and financing, and planned steps to address these barriers.

**3.7.5.12.2. Transition Approach.**

Describe the type and level of effort envisioned to take the technology from its state at the end of the development effort to a production ready, affordable, operationally suitable product (such as size and/or weight reduction, packaging, environmental hardening, integration, additional test and certification). Provide an estimate of any costs to transition the prototype to low rate initial production. Provide the estimated production unit price for the end users.

**3.7.5.12.3. Test and Evaluation.**

Describe the plan to involve representative users during the design and development process and the general plan for test and evaluation by representative end users. If the phases of performance include representative user test and evaluation: (1) ensure coordination of user participation is thoroughly discussed in the technical approach; and (2) state “Representative User Participation will occur during contract performance.”

**3.7.5.12.4. Operational Support.**

Describe the estimated level of training needed to prepare users to utilize the product in an operational environment. Discuss the anticipated support concept such as level(s) of repair, spare parts, warranties, operation and maintenance technical manuals, simulators, and other logistics considerations.

**3.7.5.13. Human Subjects and Animal Testing.**

The proposal shall provide a statement regarding the anticipated use of human subjects or animals in testing; or if none, so state. If yes, procedures for complying with all laws and regulations governing the use of animals or human subjects in research projects shall be included in the technical proposal. See section 2.9, “Animal or Human Testing Compliance” in this document for details.

**3.7.5.14. Environmental Impact.**

The proposal shall provide a statement regarding the impact of the work proposed on the environment. State if no impact exists.

**3.7.5.15. Classification and Security.**

If the offeror is proposing to perform research in a classified area, indicate the level of classification of the research and the level of clearance of the potential principal investigator and all proposed personnel. The contractor shall include facility clearance information. Also, the contractor shall indicate the Government agency that issued the clearances. State if the proposed effort is unclassified.

**3.7.5.16. Subcontracting Plan.**

If the total amount of the proposal exceeds \$700,000 and the offeror is not a small business, the offeror shall submit a subcontracting plan for small business and small socially and economically disadvantaged business concerns. A mutually agreeable plan will be included in and made a part of the resultant contract. The contract cannot be executed unless the contracting officer determines that the plan provides the maximum practicable opportunity for small business and small disadvantaged business concerns to participate in the performance of the contract. The Subcontracting Plan/information is excluded from page count.

**3.7.6. Cost Proposal.**

The offeror and each significant subcontractor, if any, shall prepare and submit cost or pricing data, and supporting attachments in accordance with Table 15-2 of FAR 15.408. All spreadsheet formulas will be accessible. As soon as practicable after agreement on price, but before contract award, the offeror shall submit a Certificate of Current Cost or Pricing Data as prescribed by FAR 15.406-2 for contracts exceeding \$2,000,000.

[NOTE: To determine the reasonableness of the cost proposal, the Government may request additional supporting documentation for proposed costs.]

**3.7.6.1. Cost Summary Section.**

Provide a narrative discussing/substantiating elements of the cost proposal. Provide a separate summary of the total cost for each phase and for the total of the entire effort proposed. Indicate optional phases. Explain changes in cost greater than 10 percent from those proposed in the previous submission. The Cost Summary may be submitted in Microsoft Office Word or PDF with font no smaller than 10 point.

**3.7.6.1.1. Other Funding Sources.**

The proposal shall provide the names of other federal, state, or local agencies, or other parties receiving the proposal and/or funding or potentially funding the proposed effort. State if no other funding sources or parties are involved.

Additional information/documents to be included in the Cost Summary:

- *Business/Cost Checklist.* The offeror shall complete and include a copy of the Business/Cost Checklist found at the BIDS website under Reference Materials. Information and documents required in the Business/Cost Checklist shall be included in this proposal.

- *Terms & Conditions.* The offeror shall identify any anticipated/proposed contract terms and conditions in the proposal summary.
- *Proposal Validity.* The proposal shall remain valid for a period of no less than 180 days from submission.
- *Forward Pricing Rate Agreement.* If the offeror has an applicable rate agreement with DCAA (or another Federal Agency, e.g., HHS), please include a copy of the agreement and provide a point of contact to your cognizant DCAA office. If the offeror has not previously been audited by DCAA, the procuring office may request an audit to verify the proposal labor direct and indirect rates. This applies to both prime contractors and subcontractors.
- *ACH Form.* The offeror will submit a completed ACH Form. (Found upon BIDS log in.).
- *VETS-4212.* The offeror will submit the most recent VETS-4212 filing confirmation.
- *Subcontracting Plan.* If the offeror is a large business and work will be performed in the United States, a Small Business Subcontracting Plan shall be submitted if the contract is expected to exceed \$700,000.
- *Past Performance.* The offeror shall provide information on previous Federal Government prime or subcontracts featuring endeavors relevant (i.e., within the past three years and of similar size and complexity) to the specific requirement.

#### **3.7.6.2. Detailed Cost Estimate.**

Provide, in table format, a detailed cost breakdown by phase, of all items identified in the technical portion of the proposal for the following cost elements. Include all options. Submission of Detailed Cost Estimate spreadsheets and tables shall be in Microsoft Office (Excel) format with Font no smaller than 10 point.

##### **3.7.6.2.1. Direct Labor Costs.**

Detail the direct labor cost estimate by showing the breakdown of labor hours, rates, cost for each category, and furnish the basis for the estimates.

- *Labor Category.* Include a detailed description of the category.
- *Labor Hours.* Include a Basis of Estimate for the proposed hours. Detail hours to be worked by each labor category proposed per each task, per each fiscal year and cumulatively.
- *Labor Rates.* Rates shall be in accordance with established rate agreements. If no rate agreement exists, use payroll data with actual rates to substantiate the proposed rates. If fully loaded rates are proposed, the offeror shall identify the base rate and build up.
- *Escalation.* Identify the escalation rate, how the rate is applied, and provide justification for the rate used.

##### **3.7.6.2.2. Indirect Costs.**

Indicate how the offeror has computed and applied offeror's indirect costs (e.g., overhead, G&A, material burden). Indicate the rates used and provide an appropriate explanation.



**3.7.6.2.3. Other Direct Costs.**

Identify all other costs directly attributable to the effort and not included in other sections (e.g., special tooling, travel, computer and consultant services, preservation, packaging and packing, spoilage and rework) and provide the basis for pricing.

- *Travel.* The basis for travel estimates will include trip purpose, departure site and destination, number of persons traveling, number of days, ground transportation requirements, and detailed costs for airfare, hotel, rental cars, and per diem allowances per Federal Travel Regulations (FTR).

**3.7.6.2.4. Materials and Subcontractors.**

- *Materials.* Submit a detailed Bill of Materials identifying each discrete material component. Backup documentation must be submitted to explain the basis of estimate for at least 80 percent of the total material cost proposed. Backup documentation may include: actual production costs, catalog listings, supplier quotes, actual invoices, or other documentation from a third-party source which verifies the proposed price.
- *Consultants.* If any consultants are to be used, the offeror shall submit consultant quotes for hourly rates, estimated number of hours required, and justification.
- *Subcontractors.* If any subcontractors are to be used, the offeror shall submit complete subcontractor quotes or proposals as part of the proposal. Subcontractor proposals will be evaluated along with the prime's proposal, and they are expected to contain the same level of detail as a prime proposal. Subcontractors providing commercial items may submit a commercial quote instead of a detailed proposal. [NOTE: In order to protect proprietary data, subcontractors may submit their detailed cost proposals directly to the Contracting Officer instead of submitting to the prime contractor. If this occurs, the prime is responsible for ensuring subcontractor's submission is timely and is completed in accordance with these instructions.]

**3.7.6.2.5. Government Furnished or Contractor Acquired Equipment.**

Identify the external property or materials required to perform the task in the summary. Separate items to be acquired with contract funds and those to be furnished by the Government. Reasonably provide the description or title and estimated unit and total costs of each item (i.e., manufacturer, catalog price, or previous purchase price). When such information on individual items is not available, the items should be grouped by class and estimated values indicated. In addition, the offeror shall include a statement of the extent to which the offeror is willing to acquire the items. NOTE: The FAR generally prohibits providing an industrial contractor with facilities (including plant equipment and real property) with a unit acquisition cost of less than \$10,000.

**3.7.6.2.6. Profit or Fee.**

Include the profit or fee proposed for this effort. State if no profit or fee is proposed. Include a discussion, in the summary, of risk, technical difficulty, need for management/oversight, exceptional circumstances, etc.

**3.7.6.2.7. Competitive Methods.**

For those acquisitions (e.g., subcontract, purchase orders, material orders) over \$150,000 priced on a competitive basis, also provide data showing degree of competition and the basis for establishing the source and reasonableness of price. For inter-organizational transfers priced at other than cost of the comparable competitive commercial work of the division, subsidiary, or affiliate of the contractor, explain the pricing method (See FAR 31.205-26(e)).

**3.7.6.2.8. Established Catalog or Market Prices/Prices Set By Law or Regulation.**

When an exemption from the requirement to submit cost or pricing data is claimed, whether the item was produced by others or by the offeror, provide justification for the exemption.

**3.7.6.2.9. Royalties.**

If more than \$250, provide the following information on a separate page for each separate royalty or license fee:

- Name and Address of Licensor
- Date of the License Agreement (*See Note 1 below.*)
- Patent numbers, Patent Application Serial Numbers, or other basis on which the royalty is payable
- Brief description (including any part or model numbers of each contract item or component on which the royalty is payable)
- Percentage or dollar rate of royalty per unit
- Unit price of contract item
- Number of units
- Total dollar amount of royalties

**Note 1:** A copy of the current license agreement and identification of applicable claims of specific patents shall be provided upon request by the contracting officer. See FAR 27.204 and FAR 31.205.37.

**3.7.6.2.10. Facilities Capital Cost of Money.**

When the offeror elects to claim facilities capital cost of money as an allowable cost, the offeror must submit Form CASB-CMF and show the calculation of the proposed amount. See FAR 31.205-10.

**3.7.7. Phase 3 Notifications to Offerors.**

Notification of acceptance or rejection of a Phase 3 submission will be sent via email to the offeror's principal contact as entered in the BIDS registration. Acceptance of a Full

Proposal does not guarantee a contract will be awarded. If the Government does not accept the Phase 3 proposal, the offeror may request a formal pre-award debriefing in accordance with FAR 15.5.

### **3.7.8. Phase 3 Protests.**

Offerors are encouraged to see resolution within the agency before filing a protest. Offerors who choose to submit any protest, must do so directly to the CTTSO Contracting Officer. All such protests will be resolved promptly in accordance with FAR 33.103. Should the offeror choose to submit a protest to the GAO, the Offeror must clearly label protests to GAO as such and submit only to the CTTSO Contracting Officer who will then transmit the protest to GAO. The Government will deem receipt of the protest by the Contracting Officer as constituting receipt by the GAO for purposes of determining timeliness. Addresses for receipt confirmation can be requested via the BIDS Help function.

### **3.7.9. Phase 3 Status and Inquiries.**

Phase 3 is complete when the Government concludes technical evaluations of all submissions and awards any contracts considered under this BAA. Inquiries by phone concerning the status of Full Proposals will not be accepted. After log in to the BIDS website, submitters are able to check the status of any submission under **Past Proposals**.

### **3.8. Clarification Requests.**

Should the offeror be asked to submit clarifications to a Phase 2 White Paper or a Phase 3 Full Proposal, the BIDS email from the Contracting Officer will contain instructions on the specific request and associated requirements. BIDS will use CL (Clarification) instead of WP (White Paper), or FP (Full Proposal) as the Document Identifier designation (e.g., **CL** CB-1112-ABCORP-xxxx-CL; where xxxx-CL is the SIT entered by the submitter). The request will contain the due date and time and *can be less than the standard 30-day response* time depending on the nature of the request.

### **3.9. Instructions for Offeror “No-bid” and Submission Withdrawal.**

From time to time an offeror decides not to submit a subsequent Phase 2 or Phase 3 submission. If this is the case, the offeror shall indicate in BIDS that they are not providing the subsequent submission. The offeror shall follow the steps identified in BIDS to upload a submission and attach a document to indicate the withdrawal of the previous submission(s) and the intent to not participate in further submissions. If possible, the Document Identifier should reflect the submission status (e.g., CB-1112-ABCORP-xxxx-WD or xxxx-NoBid). To withdraw a submission after the due date and time, notify the contracting officer at BIDSHelp@cttso.gov.

## **4. PROPOSAL EVALUATION.**

This section describes the criteria that will be used to evaluate each submission. The phase of the submission will determine the extent that each criterion applies based on the information requirements described in Section 3. Criteria are not weighted, and submissions are not ranked.

**4.1. Evaluation Criteria.**

The criteria used to evaluate and select proposals for projects are described as follows. Each proposal will be evaluated on its own merit and relevance to the program requirements rather than against other proposals in the same general research area.

**4.1.1. Basic Requirement.**

The proposed solution must meet the letter and intent of the stated requirement; all elements within the proposal must exhibit a comprehensive understanding of the problem and the requirements of intended end users. The proposed solution must meet multiple user (U.S. Government or commercial) needs and be fully compliant with all elements of the solicitation including format, content, and structure as well as all BAA instructions.

**4.1.2. Technical Performance.**

The proposed technical approach must be feasible, achievable, complete, and supported by a proposed technical team that has the expertise and experience to accomplish the proposed tasks. Task descriptions and associated technical elements are to be complete and in a logical sequence. All proposed deliverables must clearly define a final product that meets the requirement and can be expected as a result of the award. The proposal must identify and clearly define technical risks and planned mitigation efforts. Those risks and the associated mitigation must be defined, feasible, and reasonable. The roles of the prime and other participants required must be clearly distinguished and pre-coordination with all participants (including Government facilities) fully documented. The requirement for and the anticipated use or integration of Government Furnished Equipment/Information (GFE/GFI) including all equipment, facilities, and information, must be fully described including dates when such GFE/GFI will be required. Intellectual property ownership and the planned transition to production must be adequately addressed, including a support concept for the product described. Similar efforts completed by the offeror in this area must be fully described including identification of other Government sponsors.

**4.1.3. Cost.**

The proposed costs must be both reasonable for the work proposed and achievable. The proposal must document all anticipated costs including those of associate, participating organizations. The proposal must demonstrate that the offeror has fully analyzed budget requirements and addressed resulting cost risks. The proposal must indicate all cost-sharing and leveraging opportunities explored and identified and the intellectual property expectations associated with that cost-sharing. Other sponsors who have funded or are funding this offeror for the same or similar efforts must be identified by agency, program manager name, phone number and email address.

**4.1.4. Schedule.**

The proposed schedule must be reasonable, achievable, and complete. The proposal must indicate that the offeror has fully analyzed the project's critical path and has addressed the resulting schedule risks.

**4.1.5. Contractor Past Performance.**

Past performance is a risk assessment based upon the probability of successfully performing the requirement. The offeror's past performance in similar efforts must clearly demonstrate an ability to deliver products that meet the proposed technical performance requirements within the proposed budget and schedule. The proposed project team must have demonstrated expertise to manage the cost, schedule, and technical aspects of the project. The Government's evaluation, at all phases of the BAA, of past performance will rely on evidence provided directly by offerors as well as independent sources of information. If applicable, the offeror shall state if it has no relevant past performance.

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## 5. TECHNOLOGY DEVELOPMENT REQUIREMENTS AND OBJECTIVES.

This section provides the requirement descriptions and overall technical objectives. CTTSO is interested in submissions in the following mission areas of combating terrorism (CbT). The intent of this BAA is to identify technologies and approaches that provide near-, mid-, and long-term solutions that enhance the capabilities of the U.S. Government to combat or mitigate terrorism. The main objective is to provide rapid prototype development focused on current and future critical multi-agency counterterrorism and antiterrorism requirements. The level of detail and order of appearance for a given requirement are not intended to convey any information regarding relative priority.

### 5.1. Advanced Analytic Capabilities (AAC)

#### **R4339 Project Apollo**

DoD data repositories that require analysts to perform labor-intensive pre-formatting and analysis of data inputs create manpower inefficiencies and limit the information-products and quick-response applications that can be refined from the latest data and analytics technologies.

Develop, test, and operationalize a data ingestion, storage, formatting and processing system which refines and stores information-products both in a high-throughput data and application environment, and is deployable as remotely accessible images. The platform must support advanced queries through web Application Programming Interface(s) (API), offering information-products, near real-time and real-time analysis which support edge analytics (e.g., mobile edge analytics through field programmable gate arrays), and other external tools of analysis. The automated data analysis platform shall be called “Apollo” and will harness commercial-off-the-shelf machine learning algorithm(s) to enable automated formatting, classification and processing of analyst and task specified text, image, video, and audio files, enabling follow-on use of information-products in edge analytics.

Apollo shall meet the following objectives:

1. Harnesses commercial-off-the-shelf open source products and machine learning algorithm(s) whenever possible to format and tag unstructured information, to include: text, image, video, and audio files;
  - a. Automated (on ingest) and manual (analyst input) file profiling and object classification (e.g., tagging);
  - b. Hashing algorithm(s) applied to files from new sources;
  - c. Automatically converts files to optimize optical character recognition (OCR) to extract and store text from images;
  - d. Utilizes image vectorization;
  - e. Labeling using open-source computer vision, natural language processing (NLP) and machine learning (ML) libraries and models;
  - f. Deploy learning models to edge devices;
  - g. Smart orchestration layer to determine resources required/available to process client specified tasks;
2. Easily configurable when adding and removing data structures, to include data schema and data fill, for various analytics;

3. Summarizes data source content (e.g., count by file type, file priority ranking, authors-to-file link analysis, file size, file importance segmentation, file-masking alerts) through an executive dashboard;
4. Data accessible through web API, allowing advanced data queries to support external tools of analysis at the edge;
5. Database(s) framework is open-source and scalable with end user data storage and throughput needs (e.g. transactional ingestion and processing of biometric waveform data per second requires  $n$  transactions per second (TPS));
6. Database consists of a mass storage distributed and elastic “data lake” that can span strategic and tactical storage requirements (e.g. Amazon Web Services (AWS) S3) to the tactical edge, (e.g. in garrison, Foreign Operations Base, and around the Warfighter) and a data store of structured information-products and models;
7. Provides a security architecture that is in accordance with DoD Cybersecurity policies and procedures, which initially provides Discretionary Access Control (DAC) with the capacity to provide Mandatory Access Control (MAC); and
8. Data export capable (e.g. both file, metadata, and reconstructed data);
9. Demonstrates increasing learning capabilities based on user defined requests (e.g. more than data discovery);
10. Has high availability and throughput capability; and
11. Has an intuitive interface for user-defined single-use, repeatable, and recursive queries.

#### **R4340 Ratline**

Develop, test, and operationalize software that models illicit pathways of travel in a given region, leveraging topographic, geographic, and cultural analytics to predict probable routes of movement and smuggling (e.g., CBRNE, narcotics, weapons, human trafficking). Ratline will support both the strategic and tactical mission sets. As a result, the Ratline user interface will need meaningful displays that are easy for the targeted user community to understand. The model shall:

1. Leverage topographic and geographic characteristics of a given illicit pathway, including the ability to attribute what kind of traffic can pass on each illicit pathway (e.g., it supports foot traffic, animals, trucks, tanks, etc.);
2. Leverage cultural and religious influences in the region of the illicit pathway to determine possible paths taken by a Person of Interest (POI);
3. Bound illicit pathways with embarkation and destination points and focus on known oases or way-points (e.g., small towns, regions, cities, etc.), considering the time required to travel between embarkation and destination points;
4. Consider all likely illicit pathways of travel, given an informed time frame necessary for POI to travel between locations, leveraging a fundamental understanding of the relationships among ethnic groups, local economics, trade flows, tribal customs, and logistics;
5. Enable users to track individuals (e.g., high value individuals and targets) through predictive analytics;
6. Account for specific maneuver modalities between localities or across international boundaries by means of: road, tunnel, foot, commercial and passenger aviation, ultra-light aircraft, shipping, boats and other surface watercraft, submersibles, and rail;

7. Have an elastic architecture based on open source and commercial-off-the-shelf products with an implementation following a Services Open Architecture or equivalent to provide easy integration and removal of new analytics and data structures;
8. Have a user interface developed as a browser-based capability;
9. Be accessible and usable from a connected environment, by a disadvantaged user, and in a disconnected environment;
10. Have a hosting and deployment strategy which support cloud, third party hosting and standalone; and
11. Be compliant with the DoD Cybersecurity Policies and Procedures to the level needed to integrate the capability into the DoD infrastructure.

#### **R4341 Super Computing Input and Output Nexus (SCION)**

In legacy architecture, computer processors submit queries to input or output (I/O) data from permanent memory, waiting for available data transfer pathways - called back-end storage area networks (BE SANs) - to be free of other tasks. This is an inefficient approach for moving large amounts of data and, in super computing applications, is often several orders of magnitude slower than the processors.

Develop and test a solution that enhances data I/O in battlefield mobile supercomputers to accelerate data throughput to and from permanent memory to the Central Processing Unit/Graphics Processing Unit (CPU/GPU) via data transfer pathways. The solution must reduce or eliminate bottlenecks that occur when traffic exceeds the capacity of the data transfer pathways.

SCION must deliver the following capabilities:

1. Improved efficiencies that enable data input/output throughput speeds to meet or exceed 10 TB/s in transfer pathways between permanent memory and CPU/GPU;
2. Improved efficiencies in queries submitted for an available SAN controller to transfer data between CPUs/GPUs and permanent memory which result in latency that is less than 0.01 ms;
3. Reduced power demands in all processing tasks that allow a battlefield mobile supercomputer to operate at or below a threshold of 5 kW power consumption; and
4. The implemented solution must be compatible with commonly used architectures including but not limited to:
  - a. A single BE SAN controller;
  - b. A dedicated FE SANs linked to a dedicated BE SANs; and
  - c. Multiple FE SANs and BE SANs connected in parallel.

#### **R4343 Electronic Warfare Support Tool (EWST)**

Electronic Warfare Support (EWS) operators must detect, intercept, identify, locate, record, and/or analyze sources of radiated electromagnetic energy for the purposes of immediate threat recognition or longer-term operational planning. The goal of this requirement is to improve the capability of EWS operators by providing a radio frequency (RF) computing capability, signal library, and software that takes advantage of parallel processing.

Design and develop an Electronic Warfare Support Tool (EWST) by integrating a commercial-



off-the-shelf RF signals platform that has push-to-talk HF/VHF/UHF capability, with an Artificial Intelligence (AI) capability, to produce an EWST solution capable of autonomous RF signal collection management (e.g., detecting, locating, recording, and analyzing sources of radiated electromagnetic energy). The EWST solution must conduct autonomous RF signal collection at the edge, without reach-back to the cloud, compiling multi-sensor data to cross reference detected signals to a known signals reference library. The system shall leverage machine learning to enhance signal-processing performance and develop a supplemental signals reference library to assist ongoing machine learning tasks.

The EWST shall have the following capabilities:

1. Compiles data from multiple distributed sensors (e.g., 2 to 3 sensors);
2. Leverages commercial-off-the-shelf and open source products; AI and machine learning algorithms(s) whenever possible;
3. Characterize the detected unknown signal along key metrics and cross-reference it to a signals reference library for identification and/or classification:
  - a. Frequency (e.g., HF, VHF, UHF), bandwidth, mode, duration, power, directional attributes, point of origin, noise floor, general effect of current atmospheric conditions, modulation (e.g., Frequency Modulation, Frequency Shift Keying);
  - b. Functional use description;
4. Assigns new unknown detected signals a name or detection sequence number;
5. Learns and incorporates new unknown signals into the system's supplemental reference library in less than 8 hours; and
6. Includes a signals reference library to inform and assist AI and machine learning analysis of unknown signals.

#### **R000-AAC-FY20 Unspecified Requirement**

Develop new or improved technologies or emerging technological capabilities pertaining to advanced analytics that may be of interest to the CTTSO but were not specifically requested in this BAA and are not commercially available. Proposals submitted shall be timely and relevant, and further combating terrorism.

Although not limited to the following concepts, the Government is interested in the following:

1. *Integrated Solutions:* Advanced analytic platforms, tools, and training for integrated solutions that fuse a variety of data sources, tools, and models (including socio-cultural dynamic models) into advanced counterinsurgency and domestic combating terrorism analytical systems useable by interagency and coalition operational communities at the strategic, operational, and tactical levels. This can include near real-time integrated analytical and knowledge management systems that utilize a variety of sensors, devices, and architectures that address a variety of threats and scenarios.
2. *Tactical Edge Analytics:* These capabilities are rapidly developed and deliver simple customized analytic tools that allow tactical edge operators to quickly compute and analyze information. Tools utilize advanced analytic processes while delivering a streamlined user friendly interface thereby reducing process time penalty and distractions so that operators can better allocate mental resources and attention. All capabilities are

intended to be low cost to acquire and maintain and have an easy to learn user interface; therefore, are replaceable as technology or user needs progress. Although not limited to, it is anticipated the majority of solutions that fit user needs will be in application “app” format.

3. *Motion Imagery and Multi-Intelligence Activity Modeling*: There is currently a lack of activity modeling that provides detection, classification (defining), and understanding of an individual or group activity as observed in motion imagery sources such as wide area motion imagery (WAMI), full motion video (FMV), ground-based surveillance, and handheld video. It is necessary for these abilities to support robust search and discovery of motion imagery content, where primitive actions (e.g., vehicle track) and combinations of activities can be representative of higher level activities. Current efforts for activity modeling require an exorbitant amount of manual activity for analysis to review video from a specific event. This requirement is for the development of an automated prescreening tool in order to decrease the amount of mundane video viewing and allow analysts to work more efficiently in target analysis. For collaboration and development of community ontologies, activity modeling must be integration-focused, utilizing standard formats and compliance to the Motion Imagery Standards Board (MISB) and standardization agreement (STANAG) 4676 which is the format of interoperable exchange and fusion of multiple ISR sources and tracks.
4. *Block-chain technology for national security applications.*

Unspecified requirements (R000s) are for proposing unique innovations that have not yet been identified by CTTSO. Submissions against an unspecified requirement shall be responsive to the topics noted in the requirement. Proposed technologies from the unspecified requirements will be competing against proposed technologies for identified and prioritized interagency requirements. Because CTTSO does not budget for unspecified requirements, awards may not be made against the unspecified requirements. Note: Quad charts submitted in response to a Subgroup’s R000 may be shared with other CTTSO Subgroups if the submission demonstrates relevance to more than one focus area.

## **5.2 Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNE)**

### **R4315 Open Architecture Handheld Raman Spectrometer Kit**

Develop a cost efficient handheld Raman spectrometer for identification of threat materials using COTS hardware and open-source software capable of importing a Government developed Raman library. All aspects of the system, including but not limited to drawings, components, computer code, etc. shall be documented to allow for acquisition, fabrication, assembly, and maintenance by the government.

The hardware system shall have the following characteristics:

1. Spectral range of  $200\text{ cm}^{-1}$  to  $3400\text{ cm}^{-1}$
2.  $8\text{ cm}^{-1}$  spectral resolution or better
3. Targeted cost of all hardware components not to exceed \$5,000
4. Graphical user interface

5. Total weight for unhardened system not to exceed 2 pounds
6. Capable of scanning materials in vials or as visible residue on surfaces
7. Vials shall be enclosable to allow for Class 1 operation
8. Four hour battery time and AC power capability
9. The system must be operational in temperatures of 32 °F to 122 °F and up to 95% relative humidity (non-condensing) and be able to be stored in temperatures from -4 °F to 140 °F and up to 95% relative humidity (non-condensing)

The system software shall have the following characteristics:

1. Output and algorithms be written in an open source software format
2. Use spectral data files in an ASCII file format (e.g., JCAMP-DX)
3. Capable of importing and exporting spectra individually or in batch
4. Use a material verification algorithm with Pass/Fail results
5. Perform material identification based on spectral library searching
6. Multi-component identification with mixture matching
7. Customizable acquisition parameters such as laser power, countdown timer, etc.
8. Fluorescence rejection algorithm (if necessary)

Performers shall deliver five complete systems at TRL 6 demonstrated using a Government provided library. The Raman system must demonstrate uniformity and repeatability, with onboard materials identification algorithms reaching 90% detection at a 90% confidence level. Performance testing will be performed through CTTSO. Only minimal spectral library development for the purposes of demonstrating system capability will be supported under this requirement:

1. Acetone
2. Acetonitrile
3. Cyclohexane
4. Acetaminophen
5. Naphthalene
6. Methyl Ethyl Ketone (2-butanone)
7. Ethyl Alcohol (non-denatured)
8. Granulated Sugar
9. Potassium Perchlorate
10. Sodium Perchlorate

#### **R4316 Chemical/Biological Containment System**

Develop a packaging system for rapidly containing and safely transporting chemical warfare agents (CWAs), biological warfare agents, explosive samples, and other substances harmful to human health to include chemical filled military munitions. Containment shall be maintained without release or breakthrough for at least two weeks (336 hours) and shall function while containing solid, liquid, and/or gaseous harmful substances.

Before use, the solution shall fit in a uniform trouser cargo pocket. When deployed, the packaging shall be able to encapsulate at least a 155MM projectile (155 mm × 833 mm) or similarly sized disarmed improvised explosive device (IED). IEDs come in variety of shapes,

and therefore, solutions shall provide versatility to contain irregularly shaped objects. After encapsulation, the solution shall fit into an approved performance oriented packaging container.

Ideally, securing the encapsulation shall be self-sealing (Objective). Additional resources may be used for sealing, however, the form factor shall still fit in a uniform trouser cargo pocket and/or leverage resources typically carried by maneuver forces (Threshold). Materials used shall not neutralize, absorb, or otherwise interact with the contained harmful substance, as that may create safety hazards or interfere with laboratory analysis. Operators shall have the capability to contain contaminated objects safely in less than a minute and a half (Threshold); and ideally in less than one minute (Objective). Operators shall be capable of encapsulating and transporting the contaminated object with minimal contact to the harmful substance, and demonstrate no contamination on the outside of the packaging.

Ideal packaging solutions should also function, with little to no modification, to seal off an area (i.e., doors, windows, vents) surrounding contaminated objects when items of concern cannot be moved (Objective).

Encapsulation shall undergo evaluation for permeation and penetration resistance to all classes of CWAs (Threshold), viral sized particles (Threshold), and toxic industrial chemicals (Objective).

The packaging shall maintain physical integrity when under duress representing various operational conditions. This shall include resistance to tearing, punctures, abrasion, including when transporting objects up to 100 pounds. Packaging shall maintain functionality when compressed, over-packed, and/or when moisture is present inside the sealed encapsulation. The solution shall be operational in a temperature range of 32 °F to 122 °F and up to 95% relative humidity (non-condensing) and shall be able to be stored in temperatures ranging from -4 °F to 140 °F and up to 95% relative humidity (non-condensing).

#### **R4317 Tactical HazMat Boots**

The National Fire Protection Association (NFPA) Standard on Protective Ensembles for First Responders to Hazardous Materials Emergencies and CBRN Terrorism Incidents (NFPA 1994) permits, with some conditions, configurations where multiple elements can provide the required comprehensive chemical and physical footwear protection. Certified CBRN suits either already have protective booties attached, or can be worn with certified CBRN protective socks. Therefore, the boots only need to provide the complementary physical protection component. Currently however, operators have limited approved options that many end users consider expensive, uncomfortable (leads to blisters), lack stability, and build up moisture.

Develop a next generation HazMat Boot that provides NFPA 1994 protection for all classes (Class 1-4), and provides a more comfortable, functional, and cost-effective solution than available certified products. The HazMat Boot's design must demonstrate commercialization capability in a cost-effective way. The HazMat Boots shall:

1. Meet the NFPA 1994 footwear design requirements;
2. Meet, and be capable of being certified, to the NFPA 1994 performance requirements when worn with certified CBR socks/booties;

3. Demonstrate minimal degradation due to chemical exposure (Threshold) including NFPA 1994 performance requirements continue to be met (Objective);
4. Demonstrate contamination resistance;
5. Demonstrate improved comfort and performance compared to current certified solutions;
6. Be designed and available in at least eight sizes between U.S. men's 6-14; and
7. All boot sizes shall be available in wide sizes.

The effort shall include small-scale manufacturing of the HazMat Boots during the project to support limited user trials. User trials shall reflect various potential operational and functional scenarios, including prolonged wear in different environments (e.g., partially submerged in water). User trials shall evaluate the performance and comfort of the HazMat Boot solution. The final design of the next-generation HazMat Boot shall incorporate feedback from end users.

### **R4318 Canine Respiratory Protection**

Develop an escape respiratory protective device designed for canines that can fit the general working dog population. The respiratory protective device shall provide nasal, oral, and ocular protection from chemical warfare agents, toxic industrial chemicals, and emerging threats. The mask shall provide 2,000 protective factor (Threshold) or higher, with best candidates demonstrating a 10,000 protection factor (Objective). Protection factors shall be maintained during canine movements. Measures will be included to prevent inadvertent removal of the device. The mask shall maintain at least the Threshold protection factor for at least 15 minutes (Threshold) with the ideal solution providing 60 minutes of protection (Objective).

The device shall be rugged enough for use during operations, and capable of demonstrating durability. This includes the following:

1. Hot Diurnal Conditioning (Mil-Std 810F);
2. Cold Constant Conditioning (Mil-Std 801F);
3. Humidity Conditioning (Mil-Std 810E);
4. Transportation/Vibration Conditioning (Mil-Std 810F); and
5. Continued functionality after a three-foot drop onto a bare concrete surface.

The respiratory protective device must be interoperable with existing collars, full canine torso vests, and muzzles. Only currently available chemical, biological, radiological, and nuclear (CBRN) filters are acceptable, and must be adaptable to broad positive sealing surfaces along with exhaust assisted drainage. The visor/viewing window shall be anti-fog when moving from ambient conditions ( $72 \pm 2$  °F at  $40 \pm 5\%$  Relative Humidity [RH]) to more extreme conditions ( $13 \pm 2$  °F, as well as  $90$  °F at  $60 \pm 5\%$  RH).

The weight of the mask shall not exceed 4 pounds with the head-borne weight being less than 12 ounces. Additionally, the mask shall come in a configurable transport case that can easily attach to the canine handler in both a drop holder and MOLLE attachment. Together with the transport case, the entire weight shall not exceed 5 pounds.

Donning the mask shall take less 30 seconds from package to protection, with a minimum wear time of 2 hours. The final product cost shall be comparable with currently available human respiratory protective devices.

**R000-CBRNE-FY20 Unspecified Requirement**

Develop new or improved technologies or emerging technological capabilities pertaining to CBRNE that may be of interest to CTTSO, but were not specifically requested in the BAA and are not commercially available. Proposed projects shall be timely, relevant, and further worldwide combating terrorism efforts. Areas of particular interest include: explosive detection technologies; next generation materials for personal protective clothing and respiratory protection; methods for chemical and biological material attribution; and biological or chemical threat detection.

Medical applications (vaccines, pharmaceuticals, clinical diagnostics, and syndromic surveillance systems) will not be considered. These areas and other areas that do not directly relate to CBRNE will be rejected without consideration or comment.

Unspecified requirements (R000s) are for proposing unique innovations that have not yet been identified by CTTSO. Submissions against an unspecified requirement shall be responsive to the topics noted in the requirement. Proposed technologies from the unspecified requirements will be competing against proposed technologies for identified and prioritized interagency requirements. Because CTTSO does not budget for unspecified requirements, awards may not be made against the unspecified requirements. Note: Quad charts submitted in response to a Subgroup's R000 may be shared with other CTTSO Subgroups if the submission demonstrates relevance to more than one focus area.

**5.3 Improvised Device Defeat/Explosives Countermeasures (IDD/EC)**

**R4387 Color Night Vision for EOD Operations**

Develop a digital night vision system capable of producing full color images of items, reflective of their actual coloring. The system shall be designed to be wearable as a standalone system with a head harness and helmet mountable using current military mounting hardware. The system should be able to operate in all environments and weather and use commonly available batteries such as AA or CR123. Additionally, the system should have the ability to attach an external battery pack that uses the same batteries to extend the battery life. The system should not suffer any damage if batteries are installed improperly. In addition to a wearable device, a robot mountable configuration shall be developed to facilitate robotic operations when visibility is limited due to deficient lighting. This system would be used to complement current daylight robot cameras. The design shall allow the system to easily transition from helmet mount to robot mount with minimal reconfiguration.

The system shall have the following characteristics:

1. Monocular (Threshold) or binocular (Objective)
2. Weigh between 835 grams (Threshold) and 430 grams (Objective), not including the external battery pack
3. Field of view is between 40 degrees (Threshold) and 97 degrees (Objective)
4. Image resolution has a minimum figure-of-merits (FOM) of 2000
5. Capable of 1× and 3× magnification
6. Capable of operating after being decontaminated of CBRN agents

## 7. Ruggedized

**R4389 Screen for Bright Light/Outdoor Conditions**

Develop a screen add-on device that can be temporarily attached or simply placed in front of an electronic screen (e.g., computer monitor, robot OCU, smartphone, tablet, etc.) to mitigate degraded visibility caused by ambient bright light. The threshold capability of the system must prevent direct sunlight/bright light from reflecting off of the screen while permitting images coming from the screen to be viewed by the operator. The objective solution should also have the ability to intensify the light/images emitting from the screen to the operator. If the system allows for screen output intensification, the system must have the ability for the operator to increase and decrease the intensity.

The system shall have the following characteristics:

1. Internal rechargeable power source
2. Recharged via USB connection
3. Operate for 8 hours minimum on a single charge
4. Weigh less than 2 pounds
5. System dimensions are between 10 inches high × 14 inches wide (minimum) and 16 inches high × 24 inches wide (maximum)
6. Minimum IP rating of 54 (protected from limited dust ingress and water spray)
7. Operating temperature range of 30 °F to 130 °F

**R4390 Mapping Robot for Complex Urban Environments**

Develop a small, wireless, ground robot with the ability to autonomously map the interior of a structure. The system should use a combination of imaging systems to create a 3D map of the scanned area. Once the area is mapped, the system must “return-to-station”. The system shall have sufficient processing capacity to support continuous image rendering during scanning so that when it is recovered by the operator a 3D map of the area can be viewed within 1 minute. The system shall have the ability to record and operate in a variety of conditions to include standing water (less than the height of the system), urban environments (including the interior of residential dwellings), and outdoors. The system must be able to traverse the interior of typical single story residences in the United States.

The system shall have the following characteristics:

1. Scan a 2,000 square-foot, single-story residence in 30 minutes (Objective) to 60 minutes (Threshold)
2. Weighs 5 pounds (Objective)
3. Allows discrimination of objects between 2 in<sup>2</sup> (Threshold) and 1 in<sup>2</sup> (Objective)
4. Battery life during continuous operation is between 4 hours (Threshold) and 8 hours (Objective)

**R4391 Firing System for Underwater Remotely Operated Vehicles (ROVs)**

Develop an underwater firing system that is ROV platform agnostic and can be easily removed and replaced by the ROV operator. The firing system must be able operate at depths up to 99 feet of sea water (fsw) (3 atmospheres) and have the ability to fire a minimum of two (2) commercial or military electric blasting caps, electric breach for the Percussion Actuated Non-electric (PAN)

Disruptor, and other underwater electrical breeches. The system's software should be interrupt driven and have an internal battery. The system can be controlled by an electrical or acoustic link but must be able to be initiated via the ROV's Operator Control Unit (OCU)/Man-Machine Interface (MMI) and must not interfere with basic ROV functions.

#### **R4392 Rail Robot for Subterranean Operations**

Develop a robotic platform that is designed to operate on rail systems and in underground infrastructures. Operators should be able to configure the robot for multiple track gauges to accommodate use on both heavy and light rail systems. The Rail Robot should also be able to move within the inner portion of the rails (within the railroad track) to allow operators to inspect the undercarriage of rail cars and locomotives.

The system shall have the following characteristics:

1. Operate under its own power for 4 hours (Threshold) to 8 hours (Objective) on a single charge
2. Multiple communication configurations, to include: wireless mesh network capable of using repeaters, and fiber optic tether
3. Tether should incorporate a self-winding reel, and not tangle during recovery
4. Multiple cameras and lights to support high and low search operations
5. Wireless operational range of 1000 meters (unrepeated signal) and tethered range of 500 meters
6. Include provisions to employ a wide range of sensor technologies including an IR camera
7. Be able to manipulate, pick-up/drop off, and transport items of interest up to 15 pounds

#### **R4393 E-Library of Printable Circuits**

Develop a library of improvised explosive device (IED) circuits for training that contains components lists, assembly instructions, and files for making associated printed circuit boards (PCBs). The library shall include items from simple series-circuits, up to and including complex circuits using programmable components. The library shall include textual instructions, images, and videos on circuit assembly, programming, PCB creation, and types of tools that can aid in circuit assembly. The vendor shall propose solutions for permanent hosting of the final library as well as provisions and procedures for data protection.

#### **R000-IDDEC-FY20 Unspecified Requirement**

Develop new technological capabilities for use in bomb disposal operations. These capabilities must be of interest to the IDD/EC Subgroup but were not requested as a specific technology requirement by TSWG end users. Proposed projects should be not commercially available. Proposed projects shall be timely, relevant, and further world-wide efforts for countering terrorist and criminal use of explosives, and combating terrorism.

Unspecified requirements (R000s) are for proposing unique innovations that have not yet been identified by CTTSO. Submissions against an unspecified requirement shall be responsive to the topics noted in the requirement. Proposed technologies from the unspecified requirements will be competing against proposed technologies for identified and prioritized interagency requirements. Because CTTSO does not budget for unspecified requirements, awards may not be made against the unspecified requirements. Note: Quad charts submitted in response to a Subgroup's R000



may be shared with other CTTSO Subgroups if the submission demonstrates relevance to more than one focus area.

#### **5.4 Investigative and Forensic Science (IFS)**

##### **R4322 Optimizing Recovery of DNA and Latent Fingerprints from Adhesive Tape**

Develop chemical procedures and techniques to forensically optimize the collection of latent prints and DNA from the adhesive side of tape and to create a workflow that technically exploits this type of evidence while adhering to laboratory standards. The procedures shall focus on applications of latent print detection and DNA recovery involved with forensic modalities in combating terrorism such as tape associated with improvised explosive devices (IEDs) and related devices found around the world.

The final deliverable shall include the following specifications:

1. For DNA, the minimum yield shall be 250 picograms (pg) (Threshold), where amounts greater than 500 pg (Objective) are optimal. For latent print development, the target shall be that the latent print development technique results in a print that is suitable for comparison.
2. For DNA recovery, the detectable target using the novel chemical procedures or techniques shall be a full or a partial profile (with a minimum of 8 loci for CODIS database searching).
3. The defined detection limit for DNA shall be an Analytical Threshold (AT) of 150 relative fluorescent units (RFUs).
4. Stochastic Threshold level for DNA shall be 725 RFU using the 3500xL Globalfiler Amplification Kit.
5. For latent prints, the target shall be a full or partial latent print (with a minimum of 3 minutia for AFIS database searching).
6. Instrumentation, reagents, and DNA kits shall be generally accepted products, commercial-off-the-shelf (COTS) shall be used when possible, such as those used by the FBI Laboratory, to allow for any recommendations to be implemented without extensive validation efforts.
7. All procedures and techniques shall comply with forensic validation standards and adherence to FBI quality assurance system documents, scientific working group on DNA analysis methods (SWGDM) validation documents, and the scientific working group on friction ridge analysis, study and technology (SWGFAST) standard for the validation and performance review of friction ridge impression development and examination techniques (latent/tenprint). These can be found at <https://www.swgdam.org/publications> and <http://clpex.com/swgfast/Documents.html>.
8. A comprehensive training manual that includes a clearly defined workflow associated with all procedures and techniques. It shall be in an electronic format for mass distribution as well as in a specified amount of hard copies for delivery.
9. In the event the final deliverable includes a newly developed chemical or reagent, the Government shall receive a specified amount.
10. The Government shall only consider proposals for which it receives unlimited intellectual property rights to all final deliverables.

**R4323 Automated Expeditionary Site Documentation System (AESDS)**

Develop and produce an automated expeditionary site documentation system that accurately documents event and crime scene sites at indoor and outdoor locations. The system shall produce accurate high resolution photographic images in well-lighted as well as very low-lighted situations. Additionally, full and accurate computer assisted drawing (CAD) level site sketches shall be produced with precise measurements of all major objects and dimensions of the site. The scanning and photographic processes shall also produce three-dimensional (3D) images and representations. The scanning process shall not impinge on the search performance at the scene by recognizing personnel movement during the documentation process. The scanning and photographic processes shall include extensive and highly accurate GPS data of all outdoor scenes and, whenever possible, indoor scenes. The instrumentation shall allow the operator to monitor the status of the initial photographing and scanning by the system. The system shall have communication capability to send the data, metadata, images, sketches, and other information to a site exploitation monitor hub (SEMB). The finished documentation shall be a set of images, sketches, and associated data that fully records visually and graphically the entire event or crime scene site with complete integrity. The Government shall only consider proposals for which it receives unlimited intellectual property rights to all final deliverables.

Key specifications of the system shall include the following:

1. Hardware that is rugged and of a small compact size.
  - a. Fits into a dump pouch (under 10 inches long).
  - b. Easily portable by one person.
  - c. Fully function in temperatures from -30 degrees Celsius to 55 degrees Celsius and in rainy and windy conditions (wind speeds of up to 50 kilometers per hour).
  - d. Operate in hilly, dusty terrain.
  - e. Waterproof.
  - f. Drop tested to 1.5 meters.
2. External/outdoor site documentation shall fulfill base requirements of four corner site imagery and utilize a component system with one or more cameras which can be still, video or both.
3. Internal/indoor site documentation shall successfully negotiate structural and architectural features without loss of visualization, documentation, and measurement collection.
4. Produce high-resolution color photographs and CAD sketches of the scene, under all conditions, which are accurate to two millimeters and include:
  - a. Interactive data items such as photographs, videos, and links automatically inputted via searcher and recorder cameras.
  - b. Contextual annotations which are either typed or through voice-to-text and inputted afterwards or automatically via voice-to-text.
  - c. Measurements of all documented scenes and all significant objects or items within the scene, such as room dimensions, evidence, and other physical features.
5. Integrate the external documentation system into the SEMB.
6. Integrate the initial internal documentation system into the SEMB.
7. Visualization and voice recording to document the undisturbed nature of crime scenes.
  - a. Visualization shall include at least a hands free integrated high-resolution camera or, at a minimum, a hand operated integrated camera.

- b. Voice recording that includes voice-to-text to enable accurate and quick report making and contextual annotations.
8. Integrate evidence photography into a SEMB
  - a. Integrates evidence photography which accomplishes the scene visualization and evidence documentation requirement into the SEMB.
  - b. Automatically and accurately measures evidence within the CAD site sketch and permits voice-to-text notes.
9. Automatically integrate all into an intelligence site diagram in the SEMB that includes
  - a. Three dimensional model and CAD drawing from expeditionary 3D site scanner.
  - b. Geo-referenced external and initial site documentation photos/videos.
  - c. Geo-referenced evidence photos.
  - d. Voice-to-text contextual annotations.
  - e. Voice-to-text site documentation notes.
10. All imaging, processing, and report creation to include 3D imaging shall be completed within 20 minutes.
11. Easy to use and maintain.
  - a. Minimal maintenance procedures.
  - b. Simplified user interface and intuitive operational procedures.

#### **R4324 Battlefield Inorganic Material Elemental Analysis Capability**

Develop, produce, and deliver a battlefield instrument that can conduct chemical elemental analysis of small samples of material to determine the inorganic elements present and any inorganic threat compounds. Techniques, procedures, and protocols associated with the instrument to conduct efficient, accurate analyses shall also be developed and validated. Users of the instrument shall be able to analyze unknown threat material from post-blast events, improvised explosive devices (IEDs), IED caches, suspected IED facilitation sites and for specified collection efforts. After analyzing a sample, the device shall provide the end user with immediate identification of the threat substance. The device shall produce and store a raw data file of the analysis and enable transmission of the file from an overseas location back to the United States for further analysis, verification, interpretation, and population of other forensic databases. The analysis and subsequently produced raw data file shall support attribution to geolocations, production facilities, individuals and threat networks facilitating the proliferation of the threat substance. The output shall provide actionable intelligence and evidence about the origin of the tested sample and likely persons associated with it.

The device or instrument shall be based on an inorganic detector built on a microwave plasma-atomic emission spectrometer or similar technology, complemented by forensically validated procedures, to perform elemental analysis of inorganic substances. Technicians shall be able to use the instrument and associated procedures in non-laboratory environments for extended periods of time. The size and weight shall be suitable for two-man lift, near the threshold of 30 inches by 30 inches by 20 inches and 50 pounds or less with one man lift desirable. The instrument shall require a minimal amount of maintenance and calibration. The consumables and items required for calibration, maintenance, and operation shall be readily obtained, have a shelf life of at least one year in ambient conditions ranging from -10 degrees to 140 degrees Fahrenheit, and not be classified as hazardous transportation or handling. The exported files shall be non-proprietary, not involve any licensing on the part of the U.S. Government, and shall be

comparable to other such profiles to support ingestion into future databases. The maximum amount of sample required to perform an analysis shall not exceed .5 gram. The qualitative error rate of analysis shall not exceed 2%. The processing of a sample shall not take more than three hours of laboratory analysis to complete. The operator interface shall be intuitive and guided by onboard operating aids or displays. Exploitation results/alerts shall be provided to the operator with raw data files being easily accessible.

The device shall operate under indoor, non-clean room conditions between 40 degrees and 100 degrees Fahrenheit. It shall operate on 120/240 volt power source supplied by shore/generator as a threshold. The operator shall be able to disable on demand any GPS tagging, Wi-Fi, Bluetooth, or other wireless communications features. The cost per sample analyzed shall not exceed \$25.00. The training time for an exploitation technician to prepare and process a sample shall not exceed eight hours. The associated software shall be compatible with Microsoft and Linux systems. The device shall be able to create, store, and easily export an output data results file that is readable in standard Window applications (e.g., flat file formats like .csv and .txt as well as Excel-based formats). The output shall provide both raw data and include any user added information such as metadata, GPS location, date/time stamps, and directory signature. The output shall accommodate acceptable and normal methods of data movement to include CDs, SD cards, and other common storage media.

#### **R4325 Symbols, Weapons, and Extensible Search Targets**

Develop an automated detection and classification software capability that runs in batch mode for media exploitation and the triage and retrieval of symbols, weapons, and extensible search targets. The media sources that it shall analyze include digital evidence collections, intercepted communications/data streams, body cameras, forensically recovered audio-visual media, and other commonly encountered image and video collections. The objects to be detected may be not well represented in general object labeling problems.

The software capability shall detect and classify the following from any media:

1. symbols including flags, insignias, and media production logos;
2. weapons to include ranged weapons, large and small; casings and ammunitions; and melee weapons, such as knives, machetes, clubs;
3. military insignia;
4. gang tattoo and signs;
5. bomb and detonation equipment; and
6. new search targets based upon user input.

The software shall include the capability to add additional domain-specific detection classes through retraining with the goal to be as reliable as mature detection tools such as used for faces and vehicles. Retraining the software model shall allow for the addition of new object classifications with limited class examples and shall require no recompilation or integration of the software.

Other parameters that the application shall have are:

1. false alarm rate of less than 10% at a true hit rate of 90% for targets in excess of 30 pixels across;

2. a processing rate of 60 frames per second;
3. ability to operate on Linux, Windows, and GPU type platforms;
4. one time training of a class from a set as small as one image;
5. software shall be delivered as source code, a software development kit, and an integrated Open Media Processing Framework component.

The Government shall receive unlimited intellectual property and use rights to the software, applications, and data developed or delivered for this project.

#### **R4326 Long Range Facial Identification System**

Develop a secure, deployable and scalable system that captures still and video facial images at distances up to 300 meters and then conducts facial identification and comparisons. The comparisons shall be conducted against selected databases in near-to-real time using identity verification parameters that result in a high true acceptance (90%) rate and a low false acceptance rate (10%). The system shall handle and process partial, incomplete and occluded views of the subject obtained in an unconstrained environment. The systems shall include a camera with zoom type lens (commercial-off-the-shelf) linked to a laptop computer. The laptop shall contain the developed software to process the captured facial images and immediately make comparisons to images contained in Department of Justice databases accessed via the GovCloud. It shall be easy to use in counter-surveillance and surveillance detection operations to provide proactive deterrence and detection of potential criminals and terrorists in harsh and difficult urban and rural conditions. The system shall be Federal Risk and Authorization Management Program (FedRAMP) certified and the Government shall receive full intellectual property rights to the system.

Other features and functions that the system shall possess are:

1. is easily man portable, weighing less than 35 pounds and able to fit in a backpack (collapsible permissible);
2. be concealable, yet able to mount to a standard camera tripod;
3. be compatible with a wide range of commercially available cameras and their accessories;
4. employ JPEG format for images stored and used;
5. operate under communications disadvantaged conditions;
6. maintain an onboard matching capability with a stored watch list;
7. edit onboard watch lists, to include adding and deleting images and creating new watch lists;
8. synchronize and update stored data and watch lists when communications are available;
9. ruggedizes image stabilization for field use;
10. correct for atmospheric effects, including turbulence for ranges up to 300 meters; and,
11. compare captured images from photos and video feeds taken from tollbooths, closed circuit television cameras, and social media.

#### **R4327 Large Scale Digital Forensics in Cross-Domain Environments**

Develop a comprehensive automated application, providing cross domain digital forensics capabilities. The application shall utilize smart filtering, artificial intelligence, data representation, multimedia analysis and malware detection to create a comprehensive “clean”

and relevant view of document and media exploitation data that is exportable and available on other operational networks. The application shall analyze data, data sets, files, and documents of any format that come from many different unknown sources. Data and files to be ingested may contain computer viruses, malware, classified material, and data deemed illegal. The application shall enable a general analyst to tap into “near-raw” documents and media exploitation (DOMEX) intelligence, freely correlate with other intelligence reports and assessments in familiar tools, and rapidly produce all-source products avoiding intermediate steps and domain knowledge such as digital forensics expertise.

The software shall have the following capabilities or features:

1. apply sound digital forensics principles to extract files, artifacts and content;
2. scale to petabyte level processing;
3. use artificial intelligence, filtering hash sets, and similar capabilities to identify subsets of relevant systems and user generated data such as user files, geolocations, IPs, and multimedia;
4. apply minimization to identified content and selector scanning (e.g., turn video into storyboards or clips, package selectors, converted files);
5. employ a comprehensive scan content capability for malware and convert where needed to a different format, while maintaining search capability;
6. build data schema and analyst interfaces that expose content and provides basic search, link analysis, visualization capability;
7. provide document and media exploitation (DOMEX) data transition into relevant repositories (e.g., geospatial into Google Earth layers, IP addresses into other databases, documents searchable in native and target (English) language);
8. display an intuitive user interface such that a user with a basic search and link analysis skill set may use the system;
9. run on Azure or Amazon Web Services (AWS) clouds;
10. fully function on commercial hardware;
11. keep the representation of the DOMEX data under 10% of the original volume;
12. prepare analytics and data conditioning data on the dirty network;
13. ingest and transform one terabyte of forensics data in six hours assuming no cloud cost limitation (unconstrained art of the possible); and
14. convey unlimited intellectual property rights to all delivered applications, software, and algorithms to the Government.

#### **R4328 Automated Sound Detection and Classification**

Develop an automated software application for sound detection, identification, and classification in a variety of media for exploitation, triage, analysis, and retrieval. The application shall run in batch mode to discover, identify, and link common sounds and environments. Representative media sources that it shall analyze include intercepted communications/data streams, secure facility recordings, body cameras, telephone recordings, collected audio-visual media, and other commonly encountered sound recordings. The application shall analyze media that may contain non-audible signals and shall work with a wide range of recording quality, codecs, noise types, and channel characteristics.

The application shall analyze the media and detect and classify the following:

1. live versus recorded voice activity to distinguish between actual speech and television/radio content;
2. number of speakers present in a recording or given section of audio;
3. speaking styles, such as conversation, giving a speech or monologue, chanting, shouting and raised voices, screaming, whispering, and related styles;
4. impulsive sounds consistent with explosions or gunfire;
5. sources of background noise, such as traffic, wind, babble, 50 or 60 hertz hum and similar type noises;
6. types of background noise, such as variable or steady and areas containing only representative noise samples for use in automated enhancement processes;
7. presence and severity of reverberation;
8. type of recording environment (indoor, outdoor, moving vehicle, restaurant, telephone); and
9. other common acoustic events, such as opening and closing of doors, animal noises, handling noise consistent with walking or running, music, and related activities.

The application shall allow a user to train a model of a particular type of acoustic event from an example audio and search for that event. The application shall also have the capability to search for commonalities in the background and environment between recordings in order to identify and time-align separate recordings of the same events.

In addition to detecting the sound, the analytic output shall classify the type and origin of the sound and provide a level of confidence. Other parameters that the application shall possess are:

1. equal error rate of 5% or less, or false alarm rate of less than 5% at a true hit rate of 95%;
2. processing time from 1:1 to 100:1;
3. functionality on Linux, Windows, and GPU supported platforms;
4. processing and analysis that works with standard audio encoding ranging from  $\mu$ -law 8-bit to whatever audio channels may be contained in the multimedia data;
5. operate on commonly available commercial hardware; and
6. deliver software as source code, a software development kit (SDK) with documentation, and an integrated OpenMPF component.

The Government shall receive unlimited intellectual property rights to the software, applications, and data developed and delivered for this project.

#### **R4329 Improving Automated Latent Fingerprint Quality Metrics**

Develop software to improve Latent Fingerprint Quality Metrics (LQMetric) resulting in a better more standard and efficient latent print comparison business process. The new technology or refinement of existing software tools shall automate and standardize latent print quality metrics. The software shall lead to better definitions and characterizations of latent quality and improve efficiency. The software shall systematically and reliably determine suitability using quality metrics to streamline manual fingerprint comparisons as well as work with an Automated Fingerprint Identification System (AFIS). Levels of verification shall be established based on quality metrics. By establishing a threshold for quality of the suitability of latent prints for comparison, there is the potential to lower any error related risk. Additionally, improved quality metrics may be used in research and validation of fingerprint development techniques.

The final deliverable shall meet the following specifications and performance parameters:

1. Perform a gap assessment on current latent quality metrics;
2. Create standard thresholds for determining suitability of latent prints;
3. Work efficiently and be user friendly;
4. Distinguish among “grey” areas for latent print quality (not only distinguish between very high and very low quality but also in between);
5. Be compatible with Next Generation Identification (NGI) systems;
6. Adhere to National Institute of Standards and Technology (NIST) standards for latent prints;
7. Include a training manual and training session for end user agencies;
8. Provide technical support for any future required software upgrades and system upgrades; and
9. Provide installation service of the software for end users agencies.

The final deliverable shall be available in both an electronic format and a specified amount of hard copies, which shall be determined to later to provide to end user agencies.

The Government will only consider proposals for full intellectual property rights to the final product.

#### **R4330 Alternative Light Source Enhancement System (ALSES)**

Develop a universal alternative light source enhancement system to recognize, enhance, and identify all types of forensic evidence on-site. The system shall use a powered broad spectrum continuous-light source that reduces on-site assessment time, increases overall safety, and enables quick decision making on what collection process to proceed forward. The system shall effectively enhance potential evidence using a mission safe laser that has adjustable power and light spectrum capabilities. The system shall categorize potential evidence on-site using knowledge of forensic fluorescence. The system shall be easy to operate, rugged, capable of full functionality in military expeditionary operations, and operate in various environmental conditions.

The alternate light source enhancement system shall meet the following specifications and performance parameters:

1. operational in night, daytime and tactical environments and in temperatures ranging from -30 degrees Celsius to 50 degrees Celsius;
2. waterproof and suitable for rugged conditions, drop tested to 1.5 meters, weigh between 2 pounds to 6 pounds, and be small enough to fit in a dump pouch (under 10 inches long);
3. easy adjustable power switch, 3 watts to 4 watts, 60 lumens to 300 lumens, wavelength adjustable, laser control for enhancing forensic evidence, which shall include hair, fibers, blood, bones, teeth, gunshot residue, drugs, fingerprints, and other bodily fluids;
4. wavelengths in the ranges of 260 nm to 600 nm (with orange filter goggles);
5. battery life that provides a minimum of four hours of continuous use;
6. provide a comprehensive training and user manual and a training session for end user agencies in conjunction with final delivery;
7. laser safety that complies with federal regulations in addition to the laser being labeled but not exceeding class 3B;



8. mitigate risk of destroying potential biological evidence by being capable of presuming biological characteristics using the light spectrum;
9. enable quality fingerprint photographs by using an effective laser enhancement mode that is safe and covers the light spectrum; and
10. provide a safe recognizing mode for identification of potential evidence and an enhancement mode to use in tandem with photograph.

The Government shall at a later time specify the number of alternate light source enhancement units required to be delivered. The Government shall only consider proposals that grant it unlimited intellectual property rights to the final deliverables.

### **R4331 Image Super Resolution**

Develop a software super resolution algorithm to enhance image clarity. The algorithm shall help with the interpretation and comparison of low-resolution images by increasing image resolution and adding useful pixel information to increase the usefulness of images. The software shall improve image details and significantly reduce analytic time required of manual image analysis.

The final deliverable shall meet the following specifications and performance parameters:

1. Increase resolution in an image by a factor of at least 9× while maintaining the high-frequency information contained within the image. Low-resolution images shall be considered images at least at 72 dots per inch (dpi) and optimal resolution shall be considered at least 300 dpi.
2. Minimize blurring of the image.
3. Maximize usable information in the image for an analyst to examine. Usable information which shall include but is not limited to the detail geographical information from the background for geolocation purposes, weapons, face recognition, vehicle details, buildings and surrounding areas, details of the clothing of individuals for unit/group identification purposes, flags, and/or symbols within pictures that would allow analysts to identify units/group affiliation.
4. Analyze images captured from personal cameras, surveillance cameras, and cellphones.
5. Interpolate and present sub-pixel resolution to increase the resolution of an image for human interpretation.
6. Provide a training manual and training session for end user agencies.
7. Work on standard social media images, including color (RGB) images.
8. Batch process at least 10 images in a single upload.
9. Small batch uploads of 10 images or less shall have a processing time of less than 10 seconds.
10. Large batch uploads of 10 images or more shall have a processing time of 1 minute or less.
11. Analyst visual accuracy rate of at least 80%.
12. Provide installation of software for end user agencies.
13. Provide technical support for any software update and/or upgrade.

The deliverables shall be in an electronic format and a specified amount of hard copies shall be provided for end user agencies. The Government will only consider proposals that provide it unlimited intellectual property rights to the final product.

**R000-IFS-FY20 Unspecified Requirement**

Develop new, advanced, or improved technologies or capabilities related to investigative and forensic science that are not specifically requested in this broad agency announcement and are not commercially available. Any proposals shall directly relate to and advance combating terrorism efforts within agencies of the federal Government. The proposal shall be based upon one or more of the following focus areas:

1. **Digital and Multimedia Forensics:** Develop computer forensics hardware, software, decryption tools, and digital methods to investigate terrorism. Enhance audio recording, video images, and other forensic information from analog and digital sources. Specification examples include but are not limited to the following:
  - a. More technically advanced or inclusive detection, retrieval, extraction, analysis, authentication, and interpretation of permanent, perishable, or temporary information and digital data within computer and automated systems, communication systems, embedded computer systems, and the cloud-base data and systems and their storage media.
  - b. Faster, more effective, comprehensive, accurate, low-cost methods of video and audio forensic analysis which significantly advance present technological capabilities.
  - c. Rapid data extraction and full imaging from portable electronic data devices and their storage media. Any proposed tool or technique shall fully function in austere, severe, or remote physical environments; be suitable for employment by covert entry personnel; be undetectable by the device user; and be compatible with commonly used digital forensic hardware and software platforms.
2. **Criminalistics:** Create advanced capabilities in the traditional forensics science disciplines to identify individuals and improve the recovery, identification, evaluation, and analysis of material traces. Develop benchtop and handheld instrumentation that shall decrease analysis time and automates interpretation. Specification examples include but are not limited to the following:
  - a. Develop advanced technologies and processes that reveal identification attributes, such as fingerprints, palm prints, iris, facial, DNA, other phenotypical traits of individuals or groups to distinguish persons-of-interest, terrorists, criminals, and anyone posing a potential threat to the United States.
  - b. Fast, low-cost methods for profiling and analyzing DNA, including nuclear DNA, mitochondrial DNA, rDNA, short tandem repeats, Y-chromosomal, and single nuclear polymorphisms from mixed multiple or contaminated sources.
  - c. Non-DNA related technology that can identify, individualize, categorize, or compare biological evidence, materials, or organisms for forensic-enabled identity intelligence activities. Technologies are especially desired which provide information beyond that obtained from genomic methods including those related to proteomics.
3. **Forensic Exploitation:** Develop taxonomy, common operating procedures, and advanced techniques for material and personnel exploitation of sensitive sites, caches, targeted objectives, and incident scenes. Improve and advance technical surveillance methods and

intercommunication exploitation analysis capabilities. Specification examples include, but are not limited to, the following:

- a. Improve and develop advanced scientifically validated technologies and processes for the collection, analysis, exploitation and management of identity attributes. Interest areas include forensic predictive analytics, biometric-enabled intelligence, and sensitive site exploitation.
- b. Other areas of interest are data collection and integration with all-source intelligence to locate, track, and follow unidentified persons and activities geographically and through cyberspace. This includes efforts to provide the military special operations and the intelligence communities a continual analytic capability in near-real time evidence collection response and remote support.

Proposals pertaining to data mining; report writing; data compilation; detection of concealed bombs, explosives, or weapons; intrusion detection or access control; cybersecurity; or any other technical solutions that are not objective, repeatable, and verifiable should not be submitted and will be rejected without consideration. Solutions and proposals which are proprietary and require the Government to pay licensing fees are not desired and shall be rejected.

Unspecified requirements (R000s) are for proposing unique innovations that have not yet been identified by CTTSO. Submissions against an unspecified requirement shall be responsive to the topics noted in the requirement. Proposed technologies from the unspecified requirements will be competing against proposed technologies for identified and prioritized interagency requirements. Because CTTSO does not budget for unspecified requirements, awards may not be made against the unspecified requirements. Note: Quad charts submitted in response to a Subgroup's R000 may be shared with other CTTSO Subgroups if the submission demonstrates relevance to more than one focus area.

## **5.5 Irregular Warfare and Evolving Threats (IW/ET)**

### **R4321 Expeditionary MISO Tool Kit Requirement**

Military Information Support Operations (MISO) require specific tool sets that can be used in all environments. Whether conducting information operations (IO) in austere or highly technical, contested or uncontested environments, MISO requires a standardized, interchangeable, influence-specific tool kit of advanced equipment that reflects the technology and communications infrastructure in which they will operate.

The Combating Terrorism Technical Support Office seeks a tailorable Expeditionary MISO Tool Kit (EMTK) that can advance MISO operations into the 21<sup>st</sup> century to disseminate information in any environment (permissive, non-permissive, denied, etc.). The EMTK shall encompass a tailorable package of expeditionary capabilities, enabling operators to adapt to a diverse set of operating environments, develop compelling content, and reach designated audiences with cutting edge private sector technologies. The EMTK proposed solution shall include but not be limited to technologies that provide: payload enabled lift capability, overhead Full Motion Video (FMV), digital content development, disposable media readers, podcast and recording, micro-print, content software packages enabling podcasts, meme generators, and deployable signaling devices. The EMTK shall be built in a plug-and-play manner using commercial-off-the-shelf

(COTS) technology with components that may be substituted with equivalent items sourced from local or regional economies.

Specific EMTK requirements:

1. System weight: Objective: 35 pounds; Threshold: 60 pounds
2. System size: Objective: Man packable; Threshold: Two-man packable (e.g., TSA approved carry-on bag)
3. All components are interoperable
4. Low visibility/hide in plain sight
5. Air droppable
6. The EMTK and each component shall be weather proof: Objective: 4 hours; Threshold: 2 hours
7. Can operate in ambient temperatures of 10 °F to 120 °F
8. Unmanned Aircraft System (UAS):
  - a. Vertical takeoff and landing capable
  - b. Collapsible
  - c. Loiter time: Objective: 30 minutes; Threshold: 15 minutes
  - d. Minimum lift capability of aerial payload: Objective: 30 oz.; Threshold: 15 oz.
  - e. Camera
    - 1) Minimum real-time full motion video: Objective: 1080p HD; Threshold: 720p HD
    - 2) Pixel resolution: Objective: 20 MP; Threshold: 16 MP
9. Digital content development minimum capability:
  - a. 10" view screen
  - b. RAM: Objective: 16 GB; Threshold: 8 GB
  - c. Nonvolatile Storage: Objective: 1 TB; Threshold: 500 GB
  - d. Pentium i5 quad core processor or equivalent
  - e. Bluetooth/Wi-Fi/GPS
  - f. Latest version of MS Office
  - g. Easy to use image/video capture and editing software./apps
  - h. USG recognized virus/internet protection
  - i. Battery life: Objective: 10 hours; Threshold: 6 hours
10. Portable color printer:
  - a. Print quality: Objective: 4800 × 1200 dpi; Threshold: 1200 × 1200 dpi
  - b. Print paper size: maximum: 8.5" × 14"; minimum 3" × 5"
  - c. Wireless print capable
  - d. Accepts standard card readers
  - e. Scan, copy, print capable
  - f. Page per minute: Objective: 20 B/W, 5 Color; Threshold: 10 B/W, 3 Color
  - g. Battery powered with battery life: Objective: 225 pages; Threshold: 150 pages
11. Portable mini color photo printer:
  - a. Print quality: Objective: 400 × 400 dpi; Threshold: 300 × 400 dpi
  - b. Print paper size: maximum: 4" × 6"; minimum 3" × 5"
  - c. Wireless print capable
  - d. Can print from a smart phone
  - e. Accepts standard card readers

- f. Page per minute: Objective: 2 Threshold: 1
- g. Battery powered with battery life: Objective: 30 pictures; Threshold: 15 pictures
12. Minimum Internet/Wi-Fi/Bluetooth capability
  - a. Security: WPA2
  - b. Wi-Fi bubble: Objective: 300 ft from the source (outdoors); Threshold: 100 ft from the source (outdoors).
  - c. Allow access up to: Objective: 20 users; Threshold: 10 users
13. Projector
  - a. Minimum lumens for projection: Objective: 10,000; Threshold: 5,000
  - b. Can be operated remotely or off of a memory card/stick
  - c. Can be set to operate off a timer
  - d. Contains its own power source: Objective: 30 minutes; Threshold: 15 minutes
14. The EMTK shall include a power source that can recharge all components in the kit without external power. Objective: 2 × per component; Threshold: 1 × per component.
15. The EMTK shall include a solar panel that can be used to recharge the EMTK kit and each of the subcomponents of the kit requiring power.
16. The EMTK shall plug into local power sources, A/C 110-120 volts, include international adapters
17. Each component of the EMTK shall be capable of directly plugging into local power sources, A/C 110-120 volts, include international adapters
18. The EMTK shall provide surge protection from dirty power sources

The contractor shall provide technical specifications for each individual COTS component of the UAS platform and ground control station including but not limited to the following:

- Name of the hardware
- Manufacturer of the hardware
- Country of origin
- Model number of the hardware
- Hardware configuration
- Software/firmware configuration and version number
- Network connection interfaces
- Data link interfaces
- Frequency utilization

The vendor shall mitigate and remove any external vulnerabilities whenever possible, and mitigation solutions shall be in compliance with DoD UAS cyber security policy 8500.01, Risk Management Framework. Any software developed in association with the airframe and ground control station shall be in compliance with Application Security and Development Security Technical Implementation Guide, Version 4, dated 27 April 2018.

Individuals working on this requirement must be U.S. citizens and hold at least a secret clearance.

#### **R4360 Multilateral Irregular Threats Simulator (MITS)**

DoD requires an effective multilateral wargaming platform that can accurately depict the complex and trans-regional nature of irregular warfare threats from a strategic viewpoint. In

order to accurately deter and defeat a spectrum of new and challenging adversarial threats, decision makers must explore, develop, and validate their Course of Action (COA) options in the face of the enemy's newest and most damaging COAs. At the same time, decision makers must often evaluate these COAs with respect to how our partners will act in the face of fast breaking and, at times, difficult to grasp threats. The physical coordination of current wargaming practices limit how frequently and how realistically multilateral exercises can reflect this reality. In addition, in-person wargaming exercises do not take advantage of advancements in large databases ("big data") that can enhance the realism of multilateral exercises in the same way virtual environments can. This leads to a gap in response time and unity of effort.

This effort shall produce a multiuser, near real-time wargame that can be loaded onto an existing platform and simulate irregular threats, adapt to user actions, challenge the user's ability to respond to those threats, and create an After Action Review (AAR) detailing what happened during the simulation for review. The simulation shall:

1. Establish the capability for human v. human wargaming scenarios, in a way that challenges user ability to respond to threats in a coordinated manner.
  - a. Retain the option to build human vs. Artificial Intelligence (AI) wargaming scenarios.
2. Leverage large all-source data sets to add empirical fidelity to various wargaming scenarios and graphic user interfaces with built-in parameters.
3. Provide modular capabilities to develop data sets that:
  - a. Realistically simulate human social dynamics in cyberspace (such as the development of topic groups, echo chambers, botnets, and troll networks);
  - b. Enable players to play using existing technologies that they would normally use in real-world information operations, public affairs or other scenario involving operating in the information environment (e.g., Humanitarian Assistance/Disaster Relief).
4. Require scripting tools to enable military exercise developers to plan so that it can be played creatively and accommodate novel courses of action.
5. Accommodate white-cell judging, storytelling and scenario adjustment to account for creative, novel courses of actions that players might initiate.
6. Enable organizers to virtually invite stakeholders, SMEs, and relevant partners and form a secure user base.
7. Provide participants with the ability to collaborate in real time for COA development, refinement, and assessment while interacting with all other users.
8. Generate summaries and statistics of each wargame immediately after conclusion, as set by the organizers, to facilitate post-game discussion.
9. Platform shall be either web-accessible with on premises servers, or cloud-based with a secure use base.
10. Record all wargaming interactions and generate a secure cloud-based database.
11. Support organizers' ability to review, evaluate, and expunge the archived wargaming data at will in support of after action reporting.

#### **R4397 Blockchain Risks and Opportunities to the U.S.**

CTTSO seeks proposals for the research and evaluation of the risks and opportunities inherent in the encrypted ledger (blockchain) technologies to the United States and partner countries. The

proposed solutions shall consider factors such as the following:

1. Relevant case studies from the last 20 years and explore how various cryptocurrency instruments support the flow of funds in support of threat finance networks. Determine the extent to which the nature, trajectory, velocity, and decision making supporting funds flows change with the introduction of cryptocurrencies into the systems.
2. The types of 'red flags' that have emerged during the introduction of blockchain technologies. Determine how these warning signs are being incorporated into future efforts to track illicit activities. Determine how blockchain technologies alter or subvert existing institutions and whether it is possible to predict changes in its architecture.
3. The technologies, business sectors, and/or institutions that have yet to be affected by blockchain technologies but offer opportunities to the US Government, as well as policy recommendations to support investments in such areas.
4. Other ideas welcome.

### **R000-IWET-FY20 Unspecified Requirement**

CTTSO seeks proposals for the research and demonstration of technologies to detect, disrupt, degrade, and dismantle adversarial influence on the U.S. and partner countries. Many areas of the world are plagued by adversaries who survive in some measure due to problems of poor governance, corruption, militant resistance, ethnic conflicts and criminality. The global web of adversary activity requires concepts and technologies that enhance and innovate strategies, and provide actionable insights to respond to evolving threats.

Proposals shall include solutions that not only counter and degrade the ability for adversaries to influence, persuade, and recruit, but also to enhance the ability for operators to achieve mass influence and agility in both the physical and the information environment. These projects shall advance high-technology readiness level (> TRL 6) prototypes, demonstrate new concepts and solutions that reduce risk to the U.S. and partner forces while eroding adversary sanctuaries, motivation, organizations, and enterprises.

Unspecified requirements (R000s) are for proposing unique innovations that have not yet been identified by CTTSO. Submissions against an unspecified requirement shall be responsive to the topics noted in the requirement. Proposed technologies from the unspecified requirements will be competing against proposed technologies for identified and prioritized interagency requirements. Because CTTSO does not budget for unspecified requirements, awards may not be made against the unspecified requirements. Note: Quad charts submitted in response to a Subgroup's R000 may be shared with other CTTSO Subgroups if the submission demonstrates relevance to more than one focus area.

### **5.6 Personnel Protection (PP)**

#### **R4270 High Fracture Toughness Ceramic**

Modern small arms projectiles have become increasingly capable of penetrating contemporary body systems due to the use of extremely hard, dense penetrator cores. Most current armor systems designed to defeat these threats use ceramic strike faces to erode the projectile core allowing the damaged projectile to be captured by ballistic composite backing layers. Often the initial impact causes system wide cracking which degrades the performance of the ceramic for

subsequent shots. New advancements in ceramic technology are required to enhance the ballistic performance of body armor systems. Optimization of composition, grain size, sintering aids and sintering techniques is necessary to increase the overall performance, decrease first shot damage, increase multi-shot performance, and decrease the areal density of body armor systems.

Develop techniques to enhance the fracture toughness of ceramic materials that have been or may be used in armor applications. Modify parameters such as grain size, composition, sintering aids, sintering techniques or other processing that will provide enhanced mechanical properties with increased performance of ballistic ceramics. Solutions shall increase the ballistic performance against .30 caliber, M2AP, 166 grain projectiles at an impact velocity of 2,880 feet per second. Ballistic performance shall be quantified with depth of penetration testing. Ten percent (Threshold) to fifteen percent (Objective) reduction in depth of penetration testing shall be required. Solutions shall provide 200 feet per second (Threshold) to 300 feet per second (Objective) increase in second shot V50. Both impacts shall be of .30 caliber, M2AP, 166 grain projectiles. The first shot shall occur at an impact velocity of 2,880 feet per second with a minimum shot to edge distance of 2 inches. The second shot shall occur in a location with a minimum shot to edge distance of 2 inches and maximum shot to shot spacing of 4 inches.

#### **R4273 Advanced Armor Material**

Material development of ballistic fibers has been at a standstill with much of the research and development in the ballistic materials being devoted to optimization of the existing fiber/resin systems. Para-aramid and ultra-high molecular weight polyethylene materials are the mainstays of the ballistic textile industry with little development of new materials. Recent advancements in armor performance and weight reduction have primarily been due to novel and/or improved processing techniques, or advancements in composite materials by industry.

Leverage the most recent developments and advancements in armor material technology to develop novel armor materials possessing increased performance and reduced weight. Advancements shall be made through materials science at the molecular or microstructure level to yield higher mechanical properties. Solutions shall be capable of providing National Institute of Justice 0101.06 Level IIIA protection with an areal density of .54 pounds per square foot (Threshold), .48 pounds per square foot (Objective).

#### **R4344 7.62 × 39 mm Surrogate Test Round**

7.62 × 39 mm rifle ammunition is a prevalent threat for U.S. law enforcement and military personnel alike. However, most 7.62 × 39 mm ammunition is manufactured overseas, and samples of this ammunition vary to such a degree that it presents a challenge to identify which ammunition should be used as a test threat. The rounds can have similar physical appearance but different ballistic characteristics, meaning that two rounds appearing to be the same can yield different results when testing ballistic-resistant products. A 7.62 × 39 mm surrogate round is needed to test a wide variety of ballistic-resistant equipment, such as body armor, helmets, and shields, consistently across testing laboratories for research, development, and certification purposes. The surrogate should demonstrate terminal ballistic characteristics with a high degree of similarity to widely produced foreign factory ammunition. A U.S. supplier with adequate quality assurance should be capable of consistently producing the surrogate.



Leverage previously conducted projectile characterization research and the fully developed technical data package produced for the United Kingdom's Defence Science and Technology Laboratory to identify a United States based ammunition manufacture that is willing and capable of consistently producing a  $7.62 \times 39$  mm PS Ball projectile. The manufacturer shall employ a high degree of quality control to ensure the projectiles consistently meet the provided specification and terminal ballistic behavior.

#### **R4345 Multi-threat Helmet**

U.S. law enforcement officers (LEOs) face increasing aggression and violence when tasked to maintain safety and security while citizens and communities hold protests and demonstrations. Civil disturbance unit (CDU) officers do not know the threats they will encounter until they are on scene and their equipment must protect against the most likely and injurious hazards. Impaired vision or head injury both can make an officer vulnerable and unable to perform. For example, in the 2015 Baltimore riots, more than 150 officers were injured, with the most seriously injured officer downed when struck in the head with a projectile. Furthermore, a crowd event that may become an active shooter situation introduces ballistic hazards in a time frame that does not permit officers already on scene to transition to different equipment.

Develop a multi-threat, lightweight, modular head protection system that allows law enforcement officers to perform regular duties safely while being prepared for any potential increase in threat for the duration of an event. Helmets shall include a face shield and shall be designed to provide a balance of comfort, coverage, and protection.

The helmet system must attenuate energy of common blunt objects that can be forcefully thrown by hand (e.g., rocks, bricks, glass bottles, frozen plastic water bottles, unopened soda cans) impacting the helmet with an energy of up to 40 J. The helmet system must attenuate energy of small hard objects launched by slingshots impacting the helmet with an energy of up to 40 J. The helmet system must limit head acceleration due to impact of blunt object to no greater than 150 times the standard acceleration of free fall (150g).

The helmet (but not face shields), at a minimum, shall provide ballistic resistance to the following: Handgun threats at a level of proposed NIJ HG2; 9 mm Luger FMJ RN 124 grain (Remington #23558) at a reference velocity of 1470 ft/s, .44 Mag JHP 240 grain (Speer #4453 or #47361) at a reference velocity of 1430 ft/s. In addition to the minimum requirement, as an option during the course of the contract, the contractor shall develop a helmet capable of providing resistance against rifle threats at a level of proposed NIJ RF1;  $7.62 \times 51$  mm M80 FMJ 147 grain at a reference velocity of 2780 ft/s,  $5.56 \times 45$  mm M193 56 grain at a reference velocity of 3250 ft/s, and  $7.62 \times 39$  mm mild steel core (MSC) at a reference velocity of 2380 ft/s. Ammunition such as M1943 or Type 56, or an appropriate surrogate test round may be used. However, the ammunition used for research and development shall be declared at the time of submission along with physical characterization of the ammunition. Ballistic resistance shall be demonstrated by testing in accordance with ASTM E3111, *Standard Test Method for Ballistic Resistant Head Protection*, using the threats referenced above.

Helmet and face shield designs should balance, to the extent possible, the competing requirements to provide the desired protection versus the comfort required for extended hours of wear. Helmet and face shield designs should endeavor to optimize the distribution of weight. In

addition to the weight distribution, helmets shall have a robust retention system and shall provide a means to individualize fit, which should aide in relieving strain on the neck and contribute to the overall wearability over time. The retention system shall also ensure that helmets remain firmly harnessed to the head of the wearer during blunt force or ballistic impacts. Face shields shall be detachable, and designs should factor that into consideration. Helmets alone shall not exceed 3 pounds, and accessory features including face shields should not add substantially more to the overall weight. Helmets and face shields shall be water repellent, provide splash resistance, and shall direct fluids away from the face and neck. Helmets and face shields shall be petroleum shedding, resist ignition when briefly exposed to fire or flame, resist burning, and self-extinguish if in contact with a burning substance. Helmets and face shields shall allow for clear vision, sufficient field of view, and interoperability with other equipment (e.g., communications, respirators), and shall be compatible with secondary eye protection (e.g., sunglasses). In addition, face shields shall provide sufficient optical clarity and resist moisture accumulation (e.g., “anti-fog”).

Helmets and face shields shall include attractive ergonomic, usability, and durability characteristics, such as adjustability for size and fit; quick don/doff; resistance to degradation from sunlight, sweat, and cleaning products; and vision and hearing protection. Helmets and face shields shall be capable of being used in an operating temperature range of at least 14 °F to 104 °F. Helmet and face shield designs should balance, to the extent possible, the competing requirements to provide the desired protection versus the overall weight and comfort required for hours of wear.

Helmets and face shields shall meet relevant standards related to specific functional and performance requirements, where such standards exist.

#### **R4352 Embassy-Aide**

U.S. embassies in high threat environments overseas are under constant threat of attack. In order to provide warning to embassy personnel inside the compound and in the local vicinity, a notification system was developed to immediately alert personnel of a perceived or actual threat. The system generates an audible alert and allows personnel the ability to respond to a perceived threat in the shortest possible time without additional human intervention, alerting mission personnel to the threat as quickly as possible.

Current embassy warning systems rely on audible alerts. To notify personnel without an audible signature a body worn patch shall be developed to notify personnel of a threat silently as well as provide personnel the ability to alert the command center of a threat discretely. The body worn patch shall be a discrete self-adhesive film like form factor that can be adhered to the operator’s skin. The device shall provide tactile alerts to the user in the form of pressure, vibration, or other stimulation to provide silent notification to the user of an event. The patch shall be IPX7 rated. The patch thickness shall be less than 0.1 inch. The adhesive system shall be capable of enduring perspiration and abrasion sufficient to provide reliable adhesion and function for a one-week period. The adhesive system shall not cause irritation to the user when applied directly to the skin for one week. The adhered device shall have a unit cost low enough to be considered expendable with the objective to be reusable.

### **R4376 Mobility Situational Awareness**

To enhance situational awareness, mission integrity, and incident response capabilities, there is a requirement to provide streaming video, and automated anomaly detection for threat detection to vehicle occupants and to a remote command center.

Develop a 360-degree real-time sensor system that features anomaly detection through artificial intelligence (AI). The system shall fuse multiple sensors for anomaly detection within 250 meters. The system shall provide approximate range to the anomaly. The system shall provide an audible and visual alert upon an AI detection. The system shall have manual and AI targeting. The system shall be a kit that can be installed and removed from any commercial vehicle in one hour or less. The system shall provide 360-degree coverage. The image shall be disseminated in real time to vehicle occupants and command center personnel. The video shall have an overlay of AI and manually selected targets. All transmissions outside of the system shall be AES 128-bit encrypted. The system shall automatically identify potential threats using AI and allow occupants the ability to asynchronously scan images and mark additional targets or identify additional threats. The system shall detect threats as small as a short shotgun (12-inch barrel) (Threshold), concealable handgun (3-inch barrel) (Objective). The system shall track all marked targets with AI or enter a last known position. The system shall reduce latency and provide a high frame rate to prevent nausea to the operator. The system shall provide 1080p HD quality video. The system itself shall not change the overall payload capability of the vehicle or interfere with standard operation of the vehicle. The system shall be powered by the vehicle's existing power system. System training, including operator maintenance training, shall not exceed one week.

## **5.7 Physical Security (PS)**

### **R4372 Relocatable Towers**

The current eighty-foot (80') tall static video surveillance towers have a nominal communications capability to send/receive tactical radio signals, data and imagery, and do not provide persistent surveillance out to required ranges. As such, they provide limited situational awareness for Command and Control (C2) personnel and field operators, particularly in austere locations, challenging terrains, and inclement weather. This effort shall develop a relocatable tower system with additional mast height and updated surveillance and communications technologies capable of transmitting real-time imagery and geolocations between C2 sites and field operators. The relocatable tower shall provide an improved remote monitoring capability and persistent surveillance for DHS Customs and Border Protection (CBP) and deployed military forces in locations where there is an ongoing threat or critical assets to protect.

Specifications:

1. The tower shall be mounted on a trailer and have a total maximum weight of 8500 pounds (Threshold); 6500 pounds (Objective). This does not include any equipment mounted to the tower, only the tower itself and trailer.
2. The tower shall support loading of up to 600 pounds of equipment. The tower will support multiple sensors and a communications repeater.
3. The tower shall have a mounted 4G LTE network repeater or equivalent solution for extended communications connectivity and data sharing.

4. The tower shall have a mounted radar that must track multiple targets simultaneously.
5. All sensors will be gyro stabilized.
6. The tower shall have mounted electro-optical and infrared (EO/IR) sensors. The EO/IR sensors must automatically detect up to ten (10) human targets or two (2) vehicles (cars, trucks, dirt bikes, motorcycles, etc.) using object recognition. The EO/IR sensors must send alarm notifications to a remote location upon detection of a human or vehicle.
7. The tower shall have a mounted laser range finder and a mounted laser designator.
8. Set-up/stowage time: When fully up and operational, the system shall be capable of being shut down and stowed, moved to a new location (relocation time not included), and set back up and fully operational within three (3) hours (Threshold); one and a half (1.5) hours (Objective).

### **R4373 Subterranean Training Fixture**

Currently the DoD does not have an adequate subterranean training fixture that closely resembles operational conditions or meets focused U.S. Army readiness requirements. Operators require a system of tunnel components that closely simulates the subterranean environment. This effort shall develop a realistic subterranean training fixture made of novel materials and configured above ground. The subterranean training fixture shall be a modular system to allow customized configurations by DoD and interagency users, and shall replicate a communications and GPS-denied environment.

#### Specifications:

1. System individual components (straight and curved 'building blocks') shall fall in the following size ranges:
  - a. Height: six feet to eight feet
  - b. Width: three feet to six feet
  - c. Length: five feet to ten feet
  - d. **Note:** Size ranges are estimates based on common building materials. Novel material may allow individual component size increase.
2. System components shall be completely lightproof when connected (no external light leaking in).
3. System material shall be weather-resistant, as components are to be configured outside, above ground, uncovered and exposed to rain, snow, sun, and temperature variation.
4. System shall replicate a GPS- and communications-denied environment.
5. The system shall include a main tunnel path of at least six hundred feet (600') in length.
  - a. Main tunnel path shall include a straight section of at least three hundred feet (300') with six or more large rooms, each connected to the main tunnel by a smaller tunnel branch.
  - b. Remainder of main tunnel path shall include a combination of curved and straight sections, with four or more large rooms, each connected to the main tunnel by a smaller tunnel branch.
6. A twenty-four inch (24") diameter tunnel shall connect two of the large rooms.
7. System shall include a room configured for weapons firing, connected to the main tunnel by a smaller tunnel branch.
8. System shall include at least one, three-way intersection and one, four-way intersection.
9. System shall include multiple tunnel entrances and exits.

- a. One entrance/exit shall be elevated, requiring ropes or ladders.
- b. One entrance/exit shall be circular and 20 feet in diameter.

#### **R4374 Personnel and Material Subterranean (SubT) Transporters**

Currently, the DoD and interagency operators cannot expeditiously move back and forth through subterranean confined spaces for prolonged periods. Additionally, it is difficult to transport equipment, personnel, or other heavy loads through subterranean confined spaces. There is an operational requirement for a motorized personnel transporter and a non-motorized material transporter to move personnel or materials through confined spaces over various surfaces (e.g., sand, mud, cement, rock).

##### Common Specifications for Personnel and Material SubT Transporters:

1. Capable of operating individually or in tandem.
2. Able to operate in confined space width of 36 inches (Threshold (T)); 24 inches (Objective (O)).
3. Utilize replaceable COTS components.
4. Ruggedized for subterranean operations.
5. Able to be assembled and deployed in less than 15 minutes (T); less than 5 minutes (O).
6. Modular mobility options (wheels, tracks, etc.) for different tunnel surfaces (e.g., sand, mud, cement, rock, rails).

##### Personnel SubT Transporter Specifications:

1. Electric motor with variable transit speed and forward/reverse drives.
2. Minimal interference with other RF devices (e.g., communications, air quality meter, laser rangefinder).
3. Total weight of transporter not to exceed (NTE) 100 pounds (T); 50 pounds (O).
4. Able to carry one person with gear, total weight 250 pounds (T); 300 pounds (O).
5. Collapsible for easy storage and transport, with minimal storage footprint (i.e., foldable) 60 inches in length (T); 48 inches in length (O)

##### Material SubT Transporter Specifications:

1. Total weight of transporter NTE 125 pounds (T); 75 pounds (O).
2. Able to carry total load weight of 350 pounds (T); 500 pounds (O).
3. Collapsible for easy storage and transport, with minimal storage footprint (i.e., foldable) 72 inches in length (T); 48 inches in length (O).
4. Capable of multiple configurations for carrying various loads (e.g., medical or life support equipment, contraband material, collapsed earth, shoring material, injured or rescued personnel).

#### **R4382 Handheld Anomaly Detection Wand**

Current security checkpoint screening operators at DoD and interagency facilities use physical searches to resolve alarms from anomaly detection body scanners. Metal detector wands are used to resolve walk-through metal detector alarms, but current wands only detect metal. There is no capability to resolve non-metallic alarms without making physical contact with individuals undergoing additional screening. A handheld anomaly detection wand is needed to detect both non-metallic and metallic objects concealed under clothing or in pockets. The

wand shall be used by checkpoint screening and security personnel.

Specifications:

1. The wand shall weigh less than 1.5 pounds.
2. The wand shall be simple to operate with a visual and audio cue to indicate presence of an anomaly.
3. The wand shall detect anomalies without making physical contact with the person being screened.
4. The wand shall detect anomalies through clothing such as shirts, pants, and light outerwear (Threshold); heavy jackets (Objective).
5. The wand shall display a binary light indicator, showing a red light to indicate the presence of an anomaly.
6. Detection of an anomaly shall occur within one (1) second of being placed over the anomaly.
7. The wand shall detect anomalies through clothing and without making physical contact with the person being screened.
8. The wand shall operate on battery power for up to 4 hours.
9. Any radio frequency or radiation emitters shall comply with Federal Communications Commission regulations and not be harmful to operators or people undergoing screening.

**R000-PS-FY20 Unspecified Requirement**

Develop new or improved physical security technologies that may be of interest to CTTSO, but were not specifically requested in the BAA and are not commercially available. Proposed projects shall be timely, relevant, and further the worldwide combating terrorism effort.

Request submissions that support the following Physical Security focus area:

Subterranean Activities: Develop capabilities to detect, locate, map, monitor, survey, and disrupt subterranean infrastructure and activities in permissive and non-permissive environments.

Unspecified requirements (R000s) are for proposing unique innovations that have not yet been identified by CTTSO. Submissions against an unspecified requirement should be responsive to the topics noted in the requirement. Proposed technologies from the unspecified requirements will be competing against proposed technologies for identified and prioritized interagency requirements. Because CTTSO does not budget for unspecified requirements, awards may not be made against the unspecified requirements. Note: Quad charts submitted in response to a Subgroup's R000 may be shared with other CTTSO Subgroups if the submission demonstrates relevance to more than one Subgroup's focus area.

**5.8 Tactical Operations Support (TOS)**

**R4197 Affordable Assault Vertical Take-Off and Landing (VTOL) Aerial Munition**

Tactical Operators require an affordable, lethal capability to engage targets in defilade, behind cover, as well as screen and concealment, along with the ability to engage targets surrounded by substantial vertical obstacles, or targets maneuvering in complex channelized terrain found in urban environments. Current solutions require aerial munitions be launched by an individual

from a temporary fixed launch area, control site, as well as an increase in setup time normally requiring an assistant. In addition, there are no current fielded affordable VTOL loitering aerial munition solutions for tactical operators designed to launch, identify, and engage targets. A true affordable VTOL loitering aerial munition should possess enough endurance and adequate sensors to find, fix, and finish targets in a single, man-portable platform.

Through this capability, Tactical Operators seek an increase in lethality, range, precision and survivability in an affordable, combat-expendable sUAS for use by small maneuver elements across the range of military operations.

Desired characteristics:

- Entire system kit shall weigh less than 20 pounds (Threshold (T)); less than 5 pounds (Objective (O)).
- Each kit shall include two (2) airframes (T).
- Size shall allow a single operator to transport entire kit on foot using only a rucksack or assault backpack. Launched and operated in all modes / functionalities by a single operator during dismounted maneuver (T=O).
- Shall utilize an integrated ground control station (GCS) and fire controller in the form of a small laptop or tablet (T); wearable handheld device (O).
- Telemetry link between the GCS and airframe shall utilize AES 256 encryption (T=O).
- Shall allow operator to simultaneously control both kit airframes from the same integrated GCS and fire controller (T); to perform simultaneous attacks (O).
- Shall allow for Vertical Takeoff or Landing (VTOL) with no external launching or recovery mechanism/device and capable of direct attack, mid-course navigation based on target coordinates and direct controller input, and hover (T=O).
- Shall have an endurance time of 15 minutes (T); 1 hour (O).
- Shall be capable to engage stationary and moving targets from 50 meters to 5 kilometers (T); 20 meters to 10 kilometers (O).
- Shall be capable of transitioning from outdoors flight through an open door or window in order to engage targets in a standard 10' × 10' (T); 20' × 20' room (O).
- Platform shall be expendable with an abort and safe ditch ability allowing the operator to cancel/abort an attack (T); platform shall be recoverable, reloadable, reusable, and capable of return to base if engagement not required (O).
- Shall utilize an EO/IR optic (T); multispectral optic (O).
- Optic shall be mounted on a gimbaled mount in order to provide a steady image allowing the operator to quickly and effectively identify, track and engage targets (T=O).
- EO optic shall have a resolution of 720p (T); 1080p or higher (O) with sufficient zoom and magnification to achieve a National Imagery Interpretability Rating Scale Level 8 Full Motion Video resolution.
- IR optic shall be an uncooled Long-Wave Infrared (LWIR) or Mid-Wave Infrared (MWIR) and have a resolution of 320×240 lines (T); 640×480 lines or better (O).
- Shall be capable of updating or switching targets after launch (T=O).
- Shall have a target tracking ability to assist operator in terminal guidance (T); shall employ image tracking to prevent inadvertent break lock and to maintain positive ID throughout a target engagement (O).

- Shall have the ability to operate autonomously and/or employ artificial intelligence to operate in intelligent swarms (O).
- Shall be capable of operating and engaging targets in a GPS denied environment (T). Shall have the capability to use non-GPS satellite navigation (e.g., GLONASS, Baidou, Galileo) to correlate accuracy of GPS in a potential jamming environment (O).

Ten (10) system kits with new equipment training are requested for operational test and evaluation.

A Firm Fixed Price proposal is preferred.

#### **R4277 Window Breaching Capability**

Tactical operators have no means to rapidly, quietly, and safely remove a glass obstruction with 100% surety no glass remains to obstruct their view or to cause a safety concern to personnel in the immediate area. Many tactical operations require the removal of glass prior to mission completion and this removal occurs in close proximity to friendly forces prior to mission execution. Glass in varying types, thickness, and reinforcement are encountered and must be removed rapidly and precisely in order to enable access and to ensure mission success.

Tactical operators are seeking the development of a means, capability, or mechanism to rapidly defeat all types of residential, commercial, or industrial glass encountered during operations with minimal noise signature ensuring maximum safety for all immediate personnel.

#### *Material Performance Specifications*

- Shall be a clean and complete cut with a minimum cut diameter of 18 inches on each or a combination of the following:
  - Shall defeat up to three (3) panes at once
  - Shall defeat coated glass
  - Shall defeat reinforced glass (wire or other means)
  - Shall defeat high grade safety glass
  - Shall not become a safety hazard
  - Shall defeat any layered films (reinforcing or tinting)
- The kit shall be carried and employed by one operator
- Shall be prepared and emplaced in five (5) minutes or less
- Shall be initiated by one operator and function in two (2) seconds or less
- Shall provide a failsafe mechanical activation from up to 15 feet away from the operator
- Device shall not obstruct the operator's view while employed
- Apparatus shall be self-contained and not rely on external power sources

Delivery of a minimum of ten (10) kits for operational evaluation

A Firm Fixed Price proposal is preferred.

#### **R4282 Affordable Small Unmanned Aerial System (sUAS)**

There are currently no readily available, cost-efficient and small, man-packable sUAS that keep pace with COTS offerings and comply with cyber hardening DoD policy. Tactical operators seek the development of a lightweight, easy to employ, easy to fly, and low-cost sUAS that complies



with current and future DoD policy regarding the employment of sUAS for training and combat operations.

The Affordable sUAS shall:

1. Weigh less than six (6) pounds with battery and payload (Threshold (T)) = (Objective (O)).
2. Have an operational flight time of 45 minutes (T) / 90 minutes (O) with onboard ISR payload operating.
3. Take-off and land within a confined space of one (1) meter square or less (T).
4. Have an AES 256 encrypted communications and data link (T=O)
  - 4.1 With a range of five (5) kilometers (T); seven (7) kilometers (O).
5. Have a quick change, modular stabilized, and gimbaled payload that can be controlled by a single ground control station (GCS). If the airframe is a multi-rotor platform, the gimbal shall be at least two axis; if the airframe is a fixed/hybrid wing platform, the gimbal shall be at least three axis. Each modular payload shall consist of:
  - 5.1 A 1920 × 1080 or greater color day video sensor (T)
  - 5.2 A 640 × 480 or greater infrared video sensor (T)
  - 5.3 An infrared laser illuminator/pointer (O)
  - 5.4 Common, non-proprietary electrical connections (T)
6. Operate in rain up to one quarter (1/4) inch per hour (T).
7. Utilize a single hand controller for GCS interface with the aircraft that is STANAG 4586 and Android Tactical Assault Kit (ATAK) compliant (T). The hand controller shall have an integrated high definition display and joysticks (T).
8. Flight modes that include:
  - 8.1 Standard pilot-controlled flight with assistive software enhancements (T).
  - 8.2 Point and click map-based navigation (T).
  - 8.3 Point and click full motion video sensor navigation (T).
  - 8.4 GPS-based waypoint navigation (T).
  - 8.5 Automatic take-off and recovery (T).
  - 8.6 Vision-based navigation systems (O).
9. Operate utilizing Digital Terrain Elevation Data (DTED) maps.

Each Affordable sUAS kit requires: one (1) GCS, two (2) full airframes with two (2) payloads, required chargers, three (3) power packs, spare parts, new equipment as well as video training, and a hard case with exterior dimensions not to exceed 25 in × 25 in × 12 in. All components of the system (2 x airframes, 2 x payloads, GCS, chargers, spare parts, and power packs) must fit within the required case. Responses to this requirement must include a proposed end unit cost for the system after development is complete. If batteries are proposed as a power pack, the batteries must be United Nations (UN) certified for hazardous material transport, and UL certified for safety before delivery to the Government.

Delivery of a minimum of four (4) Affordable sUAS kits for operational evaluation.

A Firm Fixed Price proposal is preferred.

**R4283 Sense Through-the-Wall**

Tactical operators require a capability to discern humans behind an opaque structure without entering the structure with personnel or any physical instrumentation. Current technology requires teams to either physically enter a structure with personnel or utilize surveillance equipment that must have a line of sight into the structure to determine human locations and structure layout. This method puts team members at risk by having to be close to a potential threat to emplace the equipment or to enter a structure with unknown personnel with an unfamiliar layout. Tactical operators seek a solution that should provide:

1. Real-time or near real-time three-dimensional location of humans behind building walls. Walls include structural exterior walls of varying types and interior walls of varying types.
2. The ability to determine whether or not a person is armed or unarmed.
3. An easy to interpret interface that clearly distinguishes humans from other potential objects (e.g., furniture, fans).
4. Stand-off from the structure being interrogated to reduce risk to operators and reduce potential compromise before dynamic entry with a remote viewing capability on a tablet or smartphone.
5. Man-portable, less than 35 pounds inclusive of the sensor, processing requirements, and attachment/employment fixtures, and employed by one operator.
6. Onboard recording of the operational picture utilizing standard solid-state removable drives.
7. Distribution of the operational picture to the rest of the team by an app-based distribution system.
8. A self-contained power source capable of operating for multiple hours without recharge. Recharging capability shall be compatible with both AC and DC power sources from 110 to 220 volts.

Offerors shall provide information on system radio frequencies in responses.

Deliver a minimum of four (4) prototypes for operational evaluation.

**R4285 Remote Light Kit for Canines**

There are currently limited options for tactical canine handlers to visually identify their dogs while working off-leash missions in periods of darkness. Current solutions are limited to single lights that cannot be remotely activated or remotely activated lights that do not provide the ability to toggle to different wavelengths of light. Tactical canine handlers require an integrated lighting kit for their working dogs that is remotely toggled and activated depending on mission requirements. The kit must include a strobe for identification friend or foe (IFF) requirements as well as a front-facing flood light to aid the canine and handler with illumination in different wavelengths.

The Remote Light Kit for Canines shall:

1. Include two (2) different light types:

- 1.1 A back-mounted remotely activated and remotely toggled wavelength strobe light in visible white light and near-infrared wavelengths for detection with the naked eye and standard end-user image intensifying night vision devices.
- 1.2 A chest or collar mounted remotely activated and remotely toggled wavelength floodlight in visible white light and visible red light wavelengths to aid the dog and tactical team members with area illumination.
2. Be remotely operated with a small one-hand use hand controller that can be attached to the handler's equipment with an operating range of at least 200 meters in open terrain, and through multiple walls in a building. The controller shall be ergonomically designed and include haptic feedback to the operator.
3. Be impact and environmentally hardened to MIL-STD-810G and commercially rated IP-67.
4. Be easily attached to standard military working dog / tactical canine vests without the need for permanent modification of the vest.
5. Be designed to reduce snag hazards and account for canine behavior and body positions for visibility, communication link, and intended use.
6. Utilize standard commercial batteries that are easily replaced without removing the lights from the canine with a lifespan of at least two (2) hours without needing to be replaced.
7. Not interfere with current tactical communications systems.

Deliver a minimum of 20 prototypes for operational evaluation. A firm fixed price proposal is preferred.

#### **R4287 Subterranean and Complex Urban Terrain (SCUT) Electronic Warfare Capabilities**

Tactical operators are seeking electronic warfare (EW) equipment that will provide an organic electronic attack, electronic warfare support, and spectrum analysis with playback capability in a small form factor software defined radio (SDR). The SDR shall be interoperable with current C4I systems, capable of being re-configured, re-programmed, and multispectral to greatly enhance operational and program objectives. Tactical operators seek an EW capability that, when paired with an Android smartphone or tablet, will allow operators to conduct EW in SCUT environments.

Desired characteristics:

1. Signals processing optimized for SCUT environments.
2. Software Defined Radio operating from 3 MHz – 3 GHz (T); 100 KHz – 6 GHz (O). HF converter with interchangeable antennas.
3. Size shall allow a single operator to transport on foot using only a rucksack or assault backpack (T); on their person (O).
4. Weight shall be 10 pounds or less without batteries (T=O).
5. Shall have an ingress protection rating of IP67 (T); IP68 (O).
6. Shall be capable of operating in all weather conditions (T=O).
7. Shall have a power output of 10 watts (T); 20 watts (O).
8. Shall be compatible with currently fielded tactical mobile ad-hoc network (MANET) radio systems to allow the transfer of voice, data, and video (T=O).
9. Shall be capable of processing and displaying a variety of wireless signals on a graphic user interface (GUI).
10. Shall have a GUI that allows for pre-mission, mission, and post-mission operations and

- spectrum display (T=O).
11. Gathered information shall be disseminated through an ATAK application or plugin (T=O).
  12. Shall be capable of search, collection, direction finding, and suppression against AM, FM, CW, HF, UHF, VHF (T=O).
  13. Shall possess and build a library based on soft digital RF memory waveforms and modulation recognition (T=O).
  14. Software suite for modeling and analysis (T=O).
  15. Reprogrammable in less than ten (10) minutes by a trained operator.
  16. GPS M-Code compatible, LORAN.
  17. Battery power of two (2) (T); six (6) hours (O).
  18. COTS rechargeable by both AC, DC, and solar sources (T).

Deliver six (6) prototype kits for operational evaluation. A Firm Fixed Price proposal is preferred.

#### **R4288 Subterranean and Complex Urban Terrain (SCUT) Communications Kit**

Tactical operators are seeking a robust communications node that provides assured communications between tactical operators in subterranean and complex urban terrain (SCUT). This capability shall provide operators with position location information (PLI) and navigation in GPS-denied environments, uninterrupted communication (voice, data, video streaming), and capable of bridging disparate communication devices in order to communicate across multiple waveforms and frequency bands. Through this capability, tactical operators seek an edge when operating in SCUT environments to ensure they have constant communication with higher echelon forces in order to execute missions to their full requirements.

Desired characteristics:

1. Full system shall bridge together disparate communications platforms operating in the frequency range from 3 MHz – 5 GHz (T); 300 kHz – 40 GHz (O).
2. Hub / Server
  - 2.1 Size shall fit inside a 1630 Pelican case or case of similar size and durability (T=O).
  - 2.2 Weight shall be light enough for a two person lift and carry (T); one person lift and transport (O).
  - 2.3 When secured, shall have an ingress protection rating of IP67 (T); IP68 (O).
  - 2.4 Shall be capable of operating in all weather conditions (T).
  - 2.5 Shall have the capability to operate on either AC or DC power (T).
  - 2.6 Shall utilize 5590 or 2590 batteries when operating on backup power (T).
  - 2.7 One (1) 2590 battery shall power the system for two (2) hours or more (T).
  - 2.8 Two (2) 2590 batteries shall power the system for 4-6 hours (T); two (2) 2590 batteries shall power the system for 8 or more hours (O).
  - 2.9 Shall be able to operate on either 110-127 volts at 60 Hz, or 220-240 volts at 50Hz (T).
  - 2.10 System shall be compatible with current DoD program of record tactical radio systems (PSC-5, 117G, 117F, 148 Family, 152, 163, MPU-5, Trellis, Silvus

- Streamcaster, Link-16 ) to allow the transfer of voice, data, and video (T).
  - 2.11 System shall be compatible with the following tactical communication waveforms:
    - 2.11.1 AM, FM, HPW, DAMA, IW, ANW2C, Trellisware TSM – (E,X, etc.), Wave Relay, Silvus, Tactical Rover Enhanced, MUOS, SATCOM (T)
  - 2.12 Shall be compatible with common COTS radios used by law enforcement agencies (O).
  - 2.13 Shall support VOIP and ROIP protocols (T).
  - 2.14 Shall be capable of communicating with higher echelon forces using local internet service (wired or wireless), 2G/3G/4G LTE cellular service (GSM and CDMA), commercial satellite network, HF or TACSAT (T).
  - 2.15 Shall be equipped with a Cradlepoint router capable of utilizing standard GSM or CDMA SIM cards (T).
  - 2.16 Shall be equipped with an ATAK server (T).
  - 2.17 Shall use AES 256 encryption or better (T); Type 1 encryption (O).
  - 2.18 Shall provide PLI of individual operators in a GPS denied environment (T).
  - 2.19 Shall contain a 20 watt RF amplifier (T); variable 5-20 watt amplifier (O).
  - 2.20 Shall contain two of the following connection interfaces: USB 3.0, Ethernet/RJ-45, HDMI (T).
  - 2.21 Shall have cooling fans (T) or liquid cooling system (O) to allow operation with the lid secured.
3. Radio
- 3.1 Shall be a Mobile Ad-Hoc Network (MANET) Radio (multi-in, multi-out) (T).
  - 3.2 Channel Bandwidths shall be configurable at 5/10/20 MHz increments (T).
  - 3.3 Shall support a data rate of greater than 100 Mbps with unlimited hops (T).
  - 3.4 Shall support AES 256, Suite B encryption (T); Type 1 encryption (O).
  - 3.5 Shall be anti-jamming capable (T).
  - 3.6 Shall support 1-6 watt variable transmit power (T); 1-15 watt (O).
  - 3.7 Shall have a latency rate of 7 ms or less (T).
  - 3.8 Size shall be 1.5" × 2.6" × 4.6" or smaller (T=O).
  - 3.9 Weight shall be 15 oz. or less without battery (T=O).
  - 3.10 Shall support frequency ranges of 400 MHz- 6 GHz, 1 Band (T); 3 Bands (O).
  - 3.11 Shall support interchangeable modules (T); non-removable bands (O).
  - 3.12 Shall operate in temperatures from -40 °C to 65 °C (T); -40 °C to 85 °C (O).
  - 3.13 Shall be interoperable with current and future program of record tactical radio systems (T)
  - 3.14 Shall support simultaneous voice, data, and/or video (T).
  - 3.15 Shall be compatible with ATAK
  - 3.16 Shall be networked through easy to use GUI (T).
  - 3.17 Shall support remote wiping of encryption and all programmed data (T).
  - 3.18 Shall contain 32GB (T) or 512GB (O) of internal storage.
  - 3.19 Shall support the following connectors: Ethernet, USB (Mini, Micro), HDMI (T).
  - 3.20 Shall operate at 6-20 VDC (T); 9-30 VDC (O).
  - 3.21 Battery life shall operate for 12 hours or longer (T); 16 hours or longer (O).
  - 3.22 Vehicle mounting: proprietary mount (T), vehicle Program of Record mount (O).
- Deliver six (6) prototype kits for OPEVAL. A Firm Fixed Price proposal is preferred.

**R4289 Individual Weapon Overmatch Optic (IWOO)**

Tactical operators require the ability to rapidly identify and engage multiple static and moving targets at unknown ranges from 5 – 600 meters day and night. Individual shooters need a rapid means to determine the range to targets, an accurate firing solution on moving or static targets displayed in the scope. IWOO shall include current best training practices and support combat environment engagement of rapid exposure and moving targets day or night. IWOO will make the force stronger, faster, and more lethal.

IWOO shall:

1. Operate on and withstand the shock of all current program of record individual weapons in 5.56mm, 6.5mm, 6.8mm, and 7.62mm calibers.
2. Be an analog see through optic with an internal display in the first focal plane.
3. Support tagging and tracking multiple static and moving targets at unknown distances during day and night out to 600 meters.
4. Be individually mounted without tools, zeroed, and trued on any individual weapon system by the soldier in the field. The mounting interface shall be a MIL-STD-1913 rail adapter with quick release.
5. Not exceed 3 pounds (T) 2 pounds (O) with power source.
6. Not exceed a length of 10 inches (T) 6 inches (O), a width of 3.5 inches (T) 2.5 inches (O), a height of 4.5 inches (T) 3.5 inches (O).
7. Provide continuous or binary variable magnification 1×8 (T) 1×10 (O).
8. Onboard power shall be provided by standard batteries, such as L123 or AA. The sight shall provide a laser range, an environmentally corrected ballistic solution for range, a displayed disturbed reticle, and tracking for a moving target for 24 hours and up to 210 engagements (T); 72 hours and up to 600 engagements (O).
9. The sight shall “sleep” after ten (10) minutes of no movement, and shall be ready to target within 50 ms by the activation of a single button. The close quarters illuminated reticle shall remain illuminated while in sleep mode (T).
10. Provide a disturbed reticle ballistic solution from 5-600 meters within two (2) seconds (T) one (1) second for static targets (O).
11. Provide a static or mover target tagging process that, once tagged, continually updates the correct windage and elevation correction on the display even as the target changes location, speed and direction. The shooter must be able to continuously track and instantly change tag if alignment of tag is faulty.
12. Provide a constantly updated disturbed reticle ballistic solution from one (1) to ten (10) mph (T) one (1) to 15 mph (O) from 0-200m within (T) three (3) seconds (O) one (1) second for moving targets.
13. Have a see-through rapid interdiction close quarters combat (CQC) sight to support target interdiction from 0-200 meters within one (1) second without technical targeting, in the event of targeting systems failure or power loss (T=O); shall not interfere with unaided normal shooter activities. The CQC sight shall have a reserve battery power of a minimum of 72 hours.
14. Provide a ballistic reticle that adjusts to match density altitude (T=O).

15. Display to scale a ballistic solution driven disturbed reticle overlay at all magnification levels within the sight picture.
16. Include a disturbed reticle that will account for cant, inclination, and a density altitude correct ballistic solution and reticle overlay that will provide the shooter a means to hold wind or mover leads left and right of the disturbed aim point.
17. Support using current program of record night vision clip-on devices (T) and be interoperable with all emerging DoD clip-on devices (O).
18. Pixel pitch and resolution of the display will allow clear edge identification of targets and observation of impacts, where the background allows, to make proper target identification and rapid second shot corrections out to 600 meters both day and night.
19. Incorporate a laser range finder capable of ranging a 10% reflective E-type silhouette target to 1000 meters.
20. Display numerical value of range, density altitude corrected range for ballistic reticle use, wind, inclination, cant, direction of fire. Allow the user to toggle on and off display information as needed. The user must also be able to toggle on and off onboard sensors when data is not needed or desired.
21. Always have a laser range finder aiming reticle in the display to promote rapid ranging.
22. Have an onboard means for the shooter to ballistically true (type of weapon, barrel length/muzzle velocity, twist rate) any issued ammunition that is used. The shooter must also have the ability to manually override values if the optic will not resolve correct values and the values are known.
23. Allow remote viewing the IWOO display on a tablet or phone for operational and training use. Individual training with onboard training simulation and record capability via removable flash storage device (e.g., Micro SD card).
24. Enable rapid zeroing by adjusting the reticle on the zero point of aim after shooting a group and then moving a digital mark to the group.
25. The system will allow connection via Bluetooth Low Energy (BLE) and the ability to use onboard system to input weapon and ballistic data equal to currently fielded Government issued ballistic computers.
26. Shall include a “drone kill” mode capable of targeting small, multi-rotor unmanned aerial systems out to 300 meters during the day, 200 meters at night, with 80% accuracy (T); moving drones up to a maximum speed of 15 meters per second with 70% accuracy (T).

Deliver a minimum of 12 IWOO prototypes for operational evaluation. A Firm Fixed Price proposal is preferred.

#### **R4292 Mid-Range Dual Channel Weapon Sight**

Tactical operators are limited to employing either a near infrared (NIR) in-line sight or a long wave infrared (LWIR) in-line sight for specific missions. Each technology has merits that can be leveraged if combined into a single, dual channel sight. A combined capability allows the tactical operator to gain the advantage of being able to detect heat signatures at long distances, while retaining the high resolution of current image intensifying NIR night vision devices for shorter ranges. A dual channel in-line weapon sight will provide a superior means to detect, identify, and engage enemy forces when conducting combat operations. NIR with a LWIR overlay will allow the operator to obtain greater resolution of potential targets using one system from 50 to 600 meters during the hours of darkness. The Mid-Range Dual Channel Weapon Sight shall:

- 1.1 Be able to resolve an object at 2 cm/pixel resolution at 200 meters in the LWIR channel.
- 1.2 Meet the following size and weight specifications:
  - 1.2.1 Length: Not to exceed 8 inches.
  - 1.2.2 Width: Not to exceed 3.25 inches.
  - 1.2.3 Height: Not to exceed 3.5 inches above the mounting rail.
  - 1.2.4 Weight, including battery: Not to exceed two (2) pounds.
- 1.3 Environmental: The sight shall be capable of operation and storage under temperature conditions in accordance with MIL-STD-810G.
- 1.4 Power Source: Maximum of four (4) commercially available lithium AA or 123 batteries.
  - 1.4.1 External power: BA5590.
  - 1.4.2 All batteries must be hot-swappable to maintain internal memory settings.
- 1.5 Color: TAN (FED STD 595C-20180).
- 1.6 Mounting: Capable of mounting to a MIL-STD 1913 rail with 4 points of contact.
- 1.7 Buttons (minimum):
  - 1.7.1 ON/OFF
  - 1.7.2 NIR; LWIR; fused
  - 1.7.3 Focus
  - 1.7.4 Polarity; white hot; black hot; outline
  - 1.7.5 Ability to display text within the Field of View and general ballistic data
- 1.8 Remote Control: The sight shall incorporate an intuitive wired remote control that provides the user the same basic features to effectively operate the sight. The control shall be small and ergonomic, with a way to stow the cable so as to prevent snags or inadvertent detachment.
- 1.9 NIR tube performance characteristics:
  - 1.9.1 White Phosphor Tube
  - 1.9.2 SNR of 33
  - 1.9.3 Line Pair of 72
  - 1.9.4 Aviation-grade quality

Deliver a minimum of eight (8) prototypes for operational evaluation.

A Firm Fixed Price proposal is preferred.

#### **R4295 Passive Wind Sensor (PWS) for Snipers**

Snipers on modern battlefields require a means to accurately predict and monitor wind conditions, at ground level, at ranges up to three (3) kilometers, without active emitters such as lasers and radars in a configuration that can be easily deployed and employed by an individual or a two-man team.

PWS will be carried in dismantled, small formations in non-permissive environments. The solution should be incorporated into the team's optical equipment and shall provide a capability



to passively calculate the speed of winds from the shooter's location to target without any active emitters. The solution shall be interoperable with presently fielded sniper equipment and shall provide the wind correction for shooters at user defined ranges, within the cone of fire of the round in use. Information shall be displayed in a position convenient for a shooter to read while in the prone position and without disturbing their position.

The system shall use common power sources, and shall network with ATAK, present, and future digitally aided soldier systems. The system shall be hardened and optimized for operations that may involve high impact insertion methods, adverse climactic conditions, and GPS-denied environments. The system would be used to provide the crosswinds and range of targets down range so that the shooter would be able to take the readout provided, apply the correction to their ballistic solution, and increase their first round hit probability.

Specifications and Key Performance Parameters (KPPs):

<b>KPPs</b>	<b>Threshold (T)</b>	<b>Objective (O)</b>
<b>Dimensions</b>	Less than 10" × 5" × 5"	Less than 8" × 2.5" × 2.5"
<b>Weight</b>	Less than 10 pounds	Less than 5 pounds
<b>Range</b>	Accurate to one (1) kilometer	Accurate to three (3) kilometers
<b>Accuracy</b>	Detect wind direction and speed within margin of error of ± 2 mph at one (1) kilometer	Detects wind direction and speed within margin of error of ± 1 mph at three (3) kilometers
<b>Latency of information</b>	Near real-time data distribution	Real-time data distribution
<b>Cone of detection</b>	75 ft wide × 90 ft high × 3280 yards	T=O
<b>Weather Conditions</b>	Operate in all weather conditions	Submersible for up to four (4) hours
<b>Endurance</b>	Four (4) hours of sustained operation	12 hours of sustained operation
<b>User Correction</b>	Displayed in milrad	T=O
<b>Software</b>	ATAK and Applied Ballistics ballistic solver	Interoperable with ATAK, APASS, Kestrel, and Applied Ballistics software solutions
<b>Configurable from tablet</b>	Wind sense readout displayed on end-user display	User has full access to menus and sub menus from EUD
<b>Power</b>	Government off-the-shelf / commercial-off-the-shelf power sources	T=O

Summary of Deliverables:

Minimum of six (6) prototypes for operational evaluation.  
Ancillary equipment to support training and integration.  
A Firm Fixed Price proposal is preferred.

**R4297 Super Match Sniper Ammunition**

Snipers have received new weapons platforms but are still using ammunition from previous generations of sniper weapons. The tactical community has upgraded its sniper rifles but have not done the same with ammunition. With new ballistically efficient ammunition, increasing the maximum effective range is possible. New super match grade ammunition would fill the gaps of external ballistic potential for extended targets. Controlling the manufacturing processes of the cartridge case, projectile, primer, powder, and all facets of the loading, assembling, and packing (LAP) procedures will allow this requirement to be met. Ultimately it will provide a sniper to hit extended-ranged targets with higher first shot probabilities.

System Attributes:

1. Calibers: .300 Norma Magnum (NM) and 6.5mm Creedmoor (CM)
2. Muzzle Velocity: 7 FPS (T), less than 4 FPS (O) standard deviation (SD)
3. Extreme Spread: 21 FPS (T), less than 12 FPS (O) SD
4. Ballistic Coefficient: 1% (T), less than 0.5% (O) SD

Quad charts shall specify manufacturer-specific approaches to reduce variances on the following variables as performance characteristics in manufacturing techniques:

5. Concentricity
6. Cartridge Base to Ogive (CBTO)
7. Powder:
  - 7.1 Powder moisture content
  - 7.2 Powder grain size
  - 7.3 Powder homogeneity
8. Cartridge case consistency (thickness and volume)
9. Neck tension
10. Projectile meplat consistency
11. Projectile surface finish

Deliver a minimum of 10,000 rounds of .300NM and 10,000 rounds of 6.5mm CM for operational evaluation. A Firm Fixed Price proposal is preferred.

**R000-TOS-FY20 Unspecified Requirement**

Develop new, innovative technologies that enhance the capabilities of DoD and interagency special operations tactical teams engaged in finding, fixing, and finishing terrorists. This includes the development of capabilities for state and local law enforcement agencies to combat domestic terrorism.

Technologies for the following focus areas:

Offensive Systems

Develop advanced equipment and capabilities that enhance the effectiveness of small tactical units engaged in direct action operations. Develop specialized weapons, munitions, detonators, distraction/diversion devices, unmanned aerial systems, and other unique tactical equipment.

Unconventional Warfare, Counter-Insurgency Support

Develop advanced tools and equipment specifically for small tactical units conducting a broad spectrum of military, paramilitary, special warfare, and digital operations focused on force protection, assisted and unassisted recovery, and operational preparation of the environment.

Tactical Communications

Develop flexible, enhanced, full spectrum communications capabilities specifically designed for tactical forces, with emphasis on reducing operational load while improving operator mobility and efficiency. Develop secure and assured tactical communications connectivity in challenging complex urban, subterranean, and maritime environments.

Tactical Reconnaissance, Surveillance, and Target Acquisition Systems

Develop technologies to assist small tactical teams in conducting organic reconnaissance, surveillance, and target acquisition missions by tactical operators. Develop systems that enhance the visual perception or other imaging capabilities of tactical operators in all conditions and environments.

Specialized Infiltration, Access, and Exfiltration Systems

Develop technologies that assist tactical assault forces in gaining rapid insertion, access and egress to and from objectives. Improve evaluation of tactical options, and support efficiency and stealth, including remote operations. Develop enhanced target analysis, manual and dynamic breaching technologies for small tactical assault teams.

Survivability Systems

Develop man portable tools and equipment to enhance operator survivability during the conduct of tactical missions and law enforcement operations.

Unspecified requirements (R000s) are for proposing unique innovations that have not yet been identified by CTTSO. Submissions against an unspecified requirement shall be responsive to the topics noted in the requirement. Proposed technologies from the unspecified requirements will be competing against proposed technologies for identified and prioritized interagency requirements. Because CTTSO does not budget for unspecified requirements, awards may not be made against the unspecified requirements. Note: Quad charts submitted in response to a Subgroup's R000 may be shared with other CTTSO Subgroups if the submission demonstrates relevance to more than one focus area.

**5.9 Training Technology Development (TTD)**

**R4346 Photorealistic Immersive Virtual Training System**

Recent experience in military operations has highlighted the need to modernize pre-deployment explosive ordnance disposal (EOD) training curriculum through advanced instructional delivery

methods. The goal is to accelerate the acquisition and retention of knowledge for initial reconnaissance procedures that develop threat assessment and decision making skills. This requirement is for the design, development, and delivery of an immersive, photorealistic, virtual training system for EOD units of action (UoA). The system shall consist of ocular-viewed, interactive photorealistic 3D training environments in which users are immersed and able to manipulate via virtual reality (VR) hardware, software, and peripherals. Within these simulated environments, the UoA must be able to identify and react to the presence of components and precursors from a user-defined library that includes homemade explosives (HMEs), chemical, biological, radiological, and nuclear (CBRN) precursors, and improvised threats. Each environment will be unclassified and developed to meet training objectives currently delivered via slide shows or instructor-led practical exercises.

The deliverables shall meet the following criteria and/or specifications:

1. Immersive, head-mounted display with a minimum refresh rate of 90 Hz and latency of 12 milliseconds or less.
2. Highly accurate representation of at least three (3) unique, Government-defined operational environments (e.g., residence, bunker, and public or private gathering place) using photo-generated or video-generated renderings, with minimal use of animations and/or animated objects.
3. Interactive and customizable; with dynamic movement of individuals, visual and auditory feedback, embedded points of interest, interactive virtual objects, knowledge assessments, timekeeping, scorekeeping, voiceovers, branching sequences, and decision points.
4. Resident analytic capabilities and performance dashboard that will display synthesized feedback in real time using data points such as head and eye tracking, decision outcomes, time standards, and hazard identification.
5. Networking capability for intra-team scenarios in the same environment for up to eight (8) participants with selectable roles of Operator, Evaluator, and/or Observer.
6. Capability to export data onto a networked computer and a Government-based cloud environment.
7. Training system shall support home station training and be capable of being packaged as a man-portable system, with a minimum of: mobile computer, head-mounted display, requisite peripherals, and a travel case modified for system deployment in rugged or austere environments.
8. Open architecture software to support future updates and expansion.
9. Plug-and-play set up with minimal required training.

The performer shall include a testing phase to ensure 100 percent functionality at the Government end user site. The performer shall support an evaluation period to evaluate the training system in terms of instructor and student usability and effectiveness for achieving the project objectives. The performer shall work with the Government to coordinate instructor and student participation in the evaluation.

The Government will provide subject matter experts through the duration of the project to guide development and transition to desired IT delivery platforms. At the conclusion of the contract, all systems and software required to conduct the training will be transitioned to the Government.

The final products meeting the above specifications shall be delivered to the Government, along with training and support materials for system use, maintenance, and storage. The delivered instruction and materials shall sufficiently enable end users to properly assess individual and team profiles as well as operate and troubleshoot the system.

#### **R4348 AC-130J Virtual Reality Combat Mission Trainer**

Develop an AC-130J (AC-J) virtual reality (VR) combat mission trainer (VR-CMT) to enable operational crews to engage in mission tasks within a simulated environment. The VR-CMT shall replicate visual and auditory information of real-world mission performance of AC-130J joint mission essential tasks (JMET). The VR-CMT shall replicate AC-130J crew stations, including mission systems' operational fidelity and functionality, for the Pilot (P), Co-Pilot (CP), Weapon System Operator (WSO), Combat Systems Operator (CSO), Sensor Operator (SO), and Special Mission Aviator (SMA). The VR-CMT shall allow automated and intelligent instruction and performance evaluation on all checklist items, to include emergency procedures, for all crew stations above. It shall enable all crew stations to interact with multiple replicated crew stations. It shall provide the ability to fly as a single integrated aircraft that replicates AC-130J combat mission environments. This includes conducting secure distributed network operations with a geographically displaced Joint Terminal Attack Controller (JTAC) such as Joint Close Air Support (JCAS) operations in hostile environments. This VR-CMT aims to optimize crew performance through effective, efficient, and adaptable initial mission qualification training and operational unit, Joint Mission Essential Task List (JMETL) training and evaluation.

The AC-J VR-CMT will incorporate the latest VR gaming computers, gaming software, and modeling/programming tools replicating aircraft system states functionality and environment models typical of a mission task environment. These shall be integrated with VR head mounted displays, hand tracking technology, and JMET human performance measurements software. The following hardware specifications apply:

1. VR Goggles
  - a. Minimum resolution of  $1440 \times 1600$  (per eye),  $2880 \times 1600$  pixels total, or highest available market resolution is required
  - b. Minimum refresh rate of 90 Hz
  - c. Minimum field of view of at least  $110^\circ$  while stationary and a 360-degree environment view with head rotation
  - d. Latency of 12 milliseconds or less
  - e. VR tracking technology, grand accurate movement activity sensor, gyroscope sensing, approach sensor, pitch sensor
  - f. Adjustable distance from the lens (for the user to wear eyeglasses)
  - g. Earphones
  - h. USB-C 3.0, DP 1.2, Bluetooth capable
2. Human-VR Environment Interface
  - a. Allows the user to interact with the environment such as reaching out, pushing buttons, and flipping switches
  - b. Real time feedback for finger motion with accurate position and movement representation at greater than, or equal to, 90 Hz.

- c. Tracking 10 fingers up to one (1) millimeter at a minimum rate of 30 frames per second
  - d. 150-degree field of view
3. Portable Laptops
- a. Integrated high performance capacity gaming laptops capable of hosting high definition game engine graphics and the peripherals associated with the VR displays, human interfacing, and support the required processes (including, but not limited to, Intelligent Tutor, applications, and interfaces)

The final VR-CMT shall consist of twelve (12) AC-130J crew stations replicating aircraft and mission systems functionality that are integrated to form a single interactive AC-130J weapon system. The offeror shall support an evaluation period to evaluate the training simulator in terms of instructor and student usability and perceived effectiveness for achieving the training objectives. The offeror shall work with the Government to coordinate instructor and student participation in the evaluation.

The offeror shall deliver the AC-J VR-CMT in accordance with DoDI 8510.01 “Risk Management Framework (RMF) for DoD Information Technology (IT),” and DoDI 8500.01, “Cybersecurity.” The offeror will provide a fully detailed Enterprise Mission Assurance Support Service (eMASS) RMF package to obtain an Authorization to Operate (ATO). The VR-CMT shall be interoperable supporting industry Distributed Interactive Simulations (DIS), High Level Architecture (HLA) and Test and Training Enabling Architecture (TENA) protocols for Distributed Mission Operations (DMO) / Distributed Mission Training (DMT) on Modeling & Simulation (M&S) and exercise architected networks. Special Operations Forces Training and Exercise Network (STEN) and Joint Training Exercise Network (JTEN) provides global connectivity to support full-mission profile readiness training supporting deployment mission rehearsals, mission preview, Combatant Commander Exercise Engagement programs, and the Joint National Training Capability certified programs.

The Government will provide subject matter experts for the duration of the project to guide development and transition to desired IT delivery platforms. At the conclusion of the contract, all training simulators and all software required to conduct the training shall be transitioned to the Government. The final products meeting the above specifications shall be delivered to the Government, along with training and support materials for system use, maintenance, and storage. The delivered instruction and materials shall sufficiently enable end users to properly assess individual and team profiles as well as operate and troubleshoot the system.

#### **R000-TTD-FY20 Human Performance Optimization**

Being prepared, becoming elite, and maintaining peak performance requires well-designed training and human performance initiatives. The Training Technology Development subgroup strives to provide users with innovative solutions to optimize performance, including advanced training technology, based on an understanding of that user and the user’s job requirements. This unspecified requirement (R000) seeks innovative cognitive and physical human performance solutions to increase mission readiness and enhance the operational capabilities of all elements, to include military and civilian communities involved in combating terrorism. The focus should

be on addressing the most challenging problem sets associated with developing knowledge, skills, and abilities to deter, defeat, prevent, protect against, mitigate, and respond to terrorist threats. All submissions shall identify the anticipated end user and/or endorsing organization.

Areas of interest include:

1. Monitoring and exploiting human performance data (e.g., physiological state) within a training environment
2. Human performance data analytics
3. Wearable technology and operator state assessment
4. Measuring and mitigating stress and mental workload
5. Novel applications of immersive technology including virtual reality, augmented reality, and mixed reality for training
6. Natural language processing (e.g., conversational interaction) within immersive, simulation based training technology (e.g., virtual reality)
7. Cognitive skills development and assessment for those encountering complex problems and making high risk decisions
8. Human factors/usability for operational systems
9. Human-machine teaming
10. Subterranean detection and operations training, especially leveraging virtual, augmented, and/or mixed reality

Unspecified requirements (R000s) are for proposing unique innovations that have not yet been identified by CTTSO. Submissions against an unspecified requirement shall be responsive to the topics noted in the requirement. Proposed technologies from the unspecified requirements will be competing against proposed technologies for identified and prioritized interagency requirements. Because CTTSO does not budget for unspecified requirements, awards may not be made against the unspecified requirements. Note: Quad charts submitted in response to a Subgroup's R000 may be shared with other CTTSO Subgroups if the submission demonstrates relevance to more than one focus area.