

**UNCLASSIFIED**

**Exhibit R-2, RDT&E Budget Item Justification:** PB 2017 Office of the Secretary Of Defense **Date:** February 2016

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide / BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

COST (\$ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
Total Program Element	281.005	99.121	148.030	73.002	-	73.002	77.325	82.129	83.186	84.796	Continuing	Continuing
484: <i>Combating Terrorism Technology Support (CTTS)</i>	281.005	99.121	148.030	73.002	-	73.002	77.325	82.129	83.186	84.796	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

The Combating Terrorism Technical Support (CTTS) program identifies capabilities to combat terrorism and irregular adversaries and delivers these capabilities to U.S., interagency, and international users through rapid research and development, advanced studies, and technical innovation. CTTS is expanding its partnerships with other Defense rapid development and acquisition organizations to leverage their expertise as it tries to expedite and transition new and innovative capabilities for Defense and Interagency users.

CTTS major area of emphasis during FY16 and FY17 will be projects to Countering-ISIL. Projects are distributed among 10 mission categories, in line with the interagency Technical Support Working Group (TSWG): Advanced Analytics and Capabilities; Chemical, Biological, Radiological, Nuclear, and Explosives; Improvised Device Defeat; Investigative Support and Forensics; Personnel Protection, Physical Security; Surveillance, Collection, and Operations Support; Tactical Operations Support; Training Technology Development; and a new working group, Irregular Warfare and Evolving Threats.

Specific CTTS areas of emphasis in FY16 and FY17 include Counter-tunnel, Countering-UAVs, Countering-Violent Extremism, and Improving Digital Operations at the tactical level. The CTTS program is a diverse, advanced technology development effort that capitalizes on interagency and international participation to demonstrate the utility and effectiveness of technology when applied to combating terrorism requirements. It includes technology capability development, proof-of-principle demonstrations in field applications, and coordination to transition from development to operational use. CTTS manages approximately 450 individual projects in support of Defense, federal, state, local, and International customers and partners.

The CTTS program justified in the R-2 exhibit identifies the projects fully or partially funded by Congressional appropriations for the CTTS program. However, the Combating Terrorism Technical Support (CTTS) also develops technology and provides support using external funds provided by other DoD and other Federal Departments and International partnerships. These projects and support activities are not necessarily reflected in this justification R-2; but the number of activities do reflect positively on the trust and competence that CTTSO has earned throughout the Department and interagency to rapidly conduct critical RDT&E and provide innovative products.

In FY15, CTTS focused on DoD requirements that supported military forces in demanding or hostile environments such as Iraq, Syria, Afghanistan, and Africa; by rapidly developing and delivering leading edge products such as unmanned vehicles, personal and physical protection, user friendly apps for analytical tools and reference guides, and weapons, sights, and ammo modifications. Several of the highly successful products included a tactical single-man portable collapsible-wing UAV; an enhanced mobile 81mm mortar targeting system mounted on a vehicle; a vehicle mobile tactical tethered ISR system; a vehicle tracking, tagging, and locating device; and the initial OT&E on the Conflict Zone Tool Kit (CZTK) for OCONUS open source data for situation awareness and force protection.

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

For U.S. federal, state and local law enforcement and first responders, CTTS completed National Fire Protection Association (NFPA) Class 4 testing on newly developed clothing for emergency medical operations; a spatially offset Raman system to identify material through non-metallic packages; a modified commercial endoscope to collect and package a CB agent from tight spaces; a tool for remotely opening a vehicle trunk locking mechanism; and a field-deployable system for automated rapid processing of human DNA profiles. CTTS also hosted interagency and foreign partner information exchange seminars and capability exercises to share and enhance response techniques and procedures for first responders and data sharing related to Homemade Explosives.

At the tactical level, CTTS will increasingly address technology requirements requested from USSOCOM's field components as they increase their regional operations tempo in Iraq, Syria, and Africa. CTTS will address personnel and physical security for small forces deployed to austere and hostile environments. Another area of increased emphasis will be the protection of U.S. personnel, to include State Department personnel in embassy and consulate locations overseas that need increased security. Additionally, in response to congressional direction, CTTS will increase its partnership with Israel to address their tunnel threat and ensure the joint ventures are beneficial U.S. counter-tunnel activities.

CTTS will continue to actively support the Department's Homeland Defense mission for advanced technology and capabilities that will (1) enhance security along the U.S. Southwest Border and (2) proactively address improvised devices and other chemical, biological, nuclear and radiological threats in a domestic environment. Additionally, CTTS will assist federal; state and local law enforcement in improving their capabilities investigate and mitigate acts of terrorism in CONUS.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017 Base</b>	<b>FY 2017 OCO</b>	<b>FY 2017 Total</b>
Previous President's Budget	94.541	71.171	73.706	-	73.706
Current President's Budget	99.121	148.030	73.002	-	73.002
Total Adjustments	4.580	76.859	-0.704	-	-0.704
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	77.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	6.365	-			
• SBIR/STTR Transfer	-1.748	-			
• Internal Adjustments	-0.037	-0.141	-0.704	-	-0.704

**Change Summary Explanation**

FY 2017 realignments and other reductions were in support of Departmental efficiencies and economic assumptions.

The FY 2016 increase is a result of \$37 million Congressional increase to the base and \$40 million in OCO funding.

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<b>Title:</b> Advanced Analytic Capabilities (AAC)	7.986	8.621	5.019

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
---	----------------	----------------	----------------

<p><b>Description:</b> The Advanced Analytics Capabilities (AAC) Subgroup's objective is to develop and deploy integrated analytic capabilities; enabling Warfighters and Mission Partners to make better/faster decisions at the "Tactical Edge". AAC projects improve sense-making, decision-making, and data management across a range of mission areas.</p> <p><b>FY 2015 Accomplishments:</b> Completed development of a prototype entity extraction/guided clustering software that significantly improves the quality and accuracy of data analyses by enabling analysts to change relationships in the data in real-time as part of a "guided clustering" capability while automating the actual analysis. Completed integration of Realistic Decision Models into Model Predictive Controller and demonstrated data injection capabilities and reduced Subject Matter Expert dependence with user communities. Completed Phase One study to determine a social sciences based method for the development of a measures of effectiveness tool that gauges the efficacy of inform and influence activities and allows Military Information Support Operations (MISO) to demonstrate measureable outcomes resulting from operations. Continued the development of an enhanced Critical Thinking Tool that supports the application of evidence-based reasoning for intelligence questions and captures analytic problem-solving approaches. Continued integration and initial operational evaluation of an Interagency analytic and situational awareness platform that enables fusion of existing sensors, social media, and analytic systems into a single platform. Continued initial operational assessment of the Model Predictive Controller and evaluated it with user communities in order to demonstrate significant improvements in identifying the quantity and quality of alternative courses of action, better decision making, and resource optimization. Continued development and assessment of a secure multi-intelligence collection and distributed processing platform with an open Application Programming Interface architecture capable of operating within a network. Initiated development of a target and asset management system to provide users that incorporates Intelligence, Meteorological, and Oceanographic information as well as adversary behavior to allow for the most efficient allocation of limited resources against an uncertain target set. Initiated development of a platform to support the quick reference and visualization of groups, group relationships, and evolving group dynamics that will enable analysts and field operators to quickly identify potential opportunities and risks in evolving operating environments. Initiated development of a visual information system for intelligence and operations networks in an easy to use mission planning tool that accounts for terrain and threats and is easy to use for the lowest echelon of user. Initiated development of an active methodology to collect structured data and messaging using crowdsourcing techniques which are integrated with passive monitoring of the web.</p> <p><b>FY 2016 Plans:</b> Complete the development of an enhanced Critical Thinking Tool that supports the application of evidence-based reasoning for intelligence questions and captures analytic problem-solving approaches. Complete technical integration, operational evaluations, and transition of an Interagency analytic and situational awareness platform. Complete initial prototype for field evaluation and testing with user communities of Model Predictive Controller by demonstrating significant improvements in identifying the quantity and quality of alternative courses of action, better decision making, and resource optimization. Continue development,</p>			
---	--	--	--

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<p>assessment, and accreditation of a secure multi-intelligence collection and distributed processing and sensor fusion platform with an open Application Programming Interface architecture. Continue development of a target and asset management system to provide users that incorporates Intelligence, Meteorological, and Oceanographic information as well as adversary behavior that allows for the most efficient allocation of limited resources against an uncertain target set. Complete development of a platform to support the quick reference and visualization of groups, group relationships, and evolving group dynamics that will enable analyst and field operators to quickly identify potential opportunities and risks in evolving operating environments. Complete development of a visual information system for intelligence and operations networks that results in an easy to use mission planning tool that accounts for terrain and threats that is easy to use for the lowest echelon of user. Continue development of user centric campaign design and planning interface that provides operational users the ability to quickly design, launch, and adjust a structured data collection and analysis campaign at the operational edge. Initiate the development of simple, friendly interface, customized analytic capabilities that allow tactical operators to quickly compute and analyze information in order to reduce process time penalty and distractions so that operators can better allocate mental resources and attention. Initiate development of Operate to Know CONOPS and tools necessary to create a continuous receive-respond and collect-pulse connection between intelligence and operations to investigate, test, and understand the environment in order to take decisive action. Initiate development of Geo-centric Social Media Exploitation (GeoSME) System to improve social media exploitation efficiency and accuracy, which will selectively collect data from either original sources or archived data according to existing intelligence requirements (IR) allowing analysts to set up alerts and to receive reports when new social media information becomes available.</p> <p><b>FY 2017 Plans:</b> Complete development, assessments, and support transition of a secure multi-intelligence collection and distributed processing and sensor fusion platform with an open Application Programming Interface architecture. Complete testing, integration, and transition support of a target and asset management system for users by incorporating Intelligence, Meteorological, and Oceanographic Information as well as adversary behavior that allows for the most efficient allocation of limited resources against an uncertain target set. Enhance Model Predictive Controller to identify and assess indirect strategies as well as develop response options against associated types of Gray Zone conflicts. Complete development of user centric campaign design and planning interface that provides operational users the ability to quickly design, launch, and adjust a structured data collection and analysis campaign at the operational edge. Initiate development of a Tactical Micro Cloud Server (T-MCS) that will be a secure, rugged, man-packable or fixed mount data server that connects to tactical network devices. Continue the development of simple, friendly interface, customized analytic capabilities that allow tactical operators to quickly compute and analyze information in order to reduce process time penalty and distractions so that operators can better allocate mental resources and attention. Continue development, integration, evaluation, and field testing required to apply Operate to Know CONOPS and tools necessary to create a continuous receive-respond and collect-pulse connection between intelligence and operations to investigate, test, and understand the environment in order to take decisive action to field operations. Continue the development of Geo-centric Social Media Exploitation (GeoSME) System to improve social media exploitation efficiency and accuracy, which will selectively collect</p>			

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z I <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
---	----------------	----------------	----------------

data from either original sources or archived data according to existing intelligence requirements (IR) allowing analysts to set up alerts and to receive reports when new social media information becomes available.			
--	--	--	--

<b>Title:</b> CHEMICAL, BIOLOGICAL, RADIOLOGICAL, NUCLEAR, AND EXPLOSIVES (CBRNE)	12.096	15.100	11.049
---	--------	--------	--------

**Description:** The CBRNE subgroup’s objective is to improve defense capabilities to meet tomorrow’s CBRNE threats. To meet this objective, the subgroup focuses on rapid research, development, test and evaluation on threat characterization; materials attribution; personal protective equipment; detection of CBRNE materials at trace and bulk levels at point, proximity and stand-off distances; development of information resources and decision support tools to assist response elements with risk-based decision making; and consequence management for post-event activities.

**FY 2015 Accomplishments:**

Completed National Fire Protection Association (NFPA) 1999 and NFPA 1994 Class 4 testing on protective clothing for emergency medical operations. Completed development of a decision support tool for determining proper work/rest cycles for response personnel in chemical and biological (CB) protective clothing to mitigate heat-related illnesses. Completed the revision process for the American Society for Testing and Materials (ASTM) enhanced liquid tight integrity testing method/procedures for the evaluation of CB protective ensembles. Completed development of a spatially offset Raman technology capable of identifying materials through non-metallic packaging. Completed development of a handheld, explosives particulate detector for inorganic homemade explosives threats. Completed an evaluation of the effects of decontamination products on deoxyribonucleic acid (DNA) signatures of interest. Completed development of a next generation portable glove box suitable for working with chemical, biological, radiological, and nuclear (CBRN) materials in field operations. Completed development of a modified commercial endoscope capable of CB agent collection that can be manipulated into tight spaces. Initiated and completed a study on the stability of the Ebola virus variant from the 2014 outbreak on surfaces of interest in clinical matrices. Initiated and completed a study on the effects of commercial off-the-shelf decontamination products of the Ebola virus variant from the 2014 outbreak on surfaces of interest, in temperatures representative of clinical settings both in the United States and West Africa. Continued field evaluations of a next generation CB glove for improved comfort and dexterity. Continued field evaluations of a next generation CB sock for improved comfort. Continued development of analytical and sampling procedures for the non-destructive evaluation of CB protective clothing for key contaminants in the field. Continued development of a powder material with imbedded chemical detection and decontamination properties. Continued development of a radio-frequency identification (RFID) detection technology for explosives, solid oxidizers, and fumigants in packages and cargo. Continued development of a miniature, hand-portable mass spectrometer for the detection of chemical and explosive threats. Continued development and validation of an apparatus suitable for studying biological aerosols under environmentally realistic conditions to update source terms for hazard prediction models. Continued development of an unobtrusive, colorimetric detection system capable of discreetly notifying the operator of a positive detection of select chemical warfare agents (CWAs).

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<p>"Continued to conduct a feasibility study on a novel, miniaturized chemiresistor wearable sensor which enables detection of low concentrations of chemicals in an urban environment. Continued development of a novel bio-sensor based upon pyroelectric transducer technology for the detection of biological warfare agents. Continued the evaluation of advanced analytical platforms, tools, and databases for the analysis and incorporation of improvised CB agent production methods. Continued to evaluate potential methods of production of threat materials, and identify key indicators and warnings for response personnel. Continued field evaluations of a new CB protective mask capable of interoperability with tactical equipment for use in tactical environments. Continued development of decision support tools to provide on-scene responders with evidence-based information to support decision making for emergency medical response to chemical events, chemical detection, radiological response, firefighting guidance, and countering improvised explosive threats. Continued development of an optimized sampling media for the collection of trace explosive materials. Continued development of next generation sensors for use in trace, bulk, proximity, and stand-off detection of explosives-based threats. Continued development of enhanced sampling materials and systems for CBRNE threats. Continued development of a risk-based decision support model for skin decontamination in the case of dermal exposures to CWAs. Continued support of the Quadrilateral Group on Chemical, Biological and Radiological (CBR) Counterterrorism. Initiated development of a water filtration system capable of producing potable water for 20-50 operators in austere conditions. Initiated a study on the deposition and transport of CWAs in organs post mortem to support science-based decision making procedures when handling/preparing bodies that have been exposed to CWAs. Initiated a study to systematically evaluate gas forming reactions that could be used in improvised chemical devices. Initiated development of a low cost, handheld Raman system for the detection of explosive and chemical threats. Initiated development of a microfluidic paper-based analytical device for in-field screening of organic explosives. Initiated testing and evaluation of colorimetric fabrics for the detection of bulk explosive materials. Initiated development of a standardized, evidence-based fire literacy program to address shortcomings of current approaches in current fire safety and survival training. Initiated development of a ruggedized garment which provides NFPA 1994 Class 3 and NFPA 1992 protection. Initiated development of new algorithms that increase the specificity and improve the overall utility of commercial Raman explosive detection systems. Initiated development of a flexible, versatile, and easily transportable platform for detection of small amounts of explosive materials hidden inside of portable electronic devices using a combination of passive and active technologies. Initiated development of a modular computer/web-based training package for hand-held explosive detection technologies. Initiated development of a scalable vacuum evidentiary collection device for the collection and preservation of known or suspected biological agent powders. Initiated a study to update urban dispersion models to improve the ability to characterize deposition patterns in realistic radiological dispersion device (RDD) events. Initiated a study of clean-up procedures for contaminated areas after a RDD event. Initiated a study to demonstrate, measure, and understand the mechanisms of improvements in defeat or disablement of CB threats using weapons that employ structural reactive materials (SRMs). Initiated development of a National Institute for Occupational Safety and Health (NIOSH) certified 15-min CBRN protection escape hood capable of fitting in the pocket of a suit jacket that also passes the flammability, heat resistance and carbon monoxide (CO) protection requirements for a combination CBRN/CO capability.</p>			

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
---	----------------	----------------	----------------

<p>Initiated development of wireless communications that provide the ability to communicate without breaching the CBRN suit integrity or requiring an electrical pass-through. Initiated development of a ruggedized one piece garment which provides NFPA 1994 Class 2 protection from exposure to the harmful effects of all traditional CB warfare agents and toxic industrial chemicals (TICs) listed in NFPA 1994, 2012 edition while allowing for communication and interoperability with tactical equipment. Initiated testing of new methods to more effectively and efficiently collect nanogram quantities of commercial, military, and homemade explosives that are present near improvised explosive devices.</p> <p><b>FY 2016 Plans:</b>                  Complete field evaluations and integrate a next generation CB glove into an ensemble for NFPA 1994 Class 3 certification testing. Complete field evaluations and integrate a next generation CB sock into an ensemble for NFPA 1994 Class 3 certification testing. Complete incorporation of analytical and sampling procedures for the non-destructive evaluation of CB protective clothing for key contaminants in the field into a decision support matrix. Complete development of a powder material with imbedded chemical detection and decontamination properties. Complete development of a RFID detection technology for explosives, solid oxidizers, and fumigants in packages and cargo. Complete development of a miniature, hand-portable mass spectrometer for the detection of chemical and explosive threats. Complete development of an apparatus suitable for studying biological threat aerosols under environmentally realistic conditions to update source terms for hazard prediction models. Continue test and evaluation of an unobtrusive colorimetric detection system for the detection of CWAs. Continue testing and evaluation of a novel, miniaturized chemiresistor wearable sensor which enables detection of low concentrations of chemicals in an urban environment. Continue testing and evaluation of a novel bio-sensor based upon pyroelectric transducer technology for the detection of biological warfare agents. Continue development of a database and advanced analytical tools for the analysis of improvised CB agent production methods. Continue evaluation of potential methods of production of threat materials, and identify key indicators and warnings for response personnel. Continue field evaluations of a new CB protective mask capable of interoperability with tactical equipment for use in tactical environments. Continue development of decision support tools to provide on-scene responders with evidence-based information to support decision making for emergency medical response to chemical events, chemical detection, radiological response, firefighting guidance, and countering improvised explosive threats. Continue testing and evaluation of optimized sampling media for the collection of trace explosive materials. Continue testing and evaluation of next generation sensors for use in trace, bulk, proximity, and stand-off detection of explosives-based threats. Continue evaluation of enhanced sampling materials and systems for CBRNE threats. Continue development of a risk-based decision support model for skin decontamination in the case of dermal exposures to CWAs. Continue support of the Quadrilateral Group on CBR Counterterrorism. Complete development of a water filtration system capable of producing potable water for 20-50 operators in austere conditions. Complete a study on the deposition and transport of CWAs in organs post mortem to support science based decision making procedures when handling/preparing bodies that have been exposed to CWAs. Complete the systematic evaluation of gas forming reactions that could be used in improvised chemical devices. Complete development of a low cost, handheld Raman system for the detection of explosives and chemical threats. Complete development</p>			
---	--	--	--

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<p>and commercialize a microfluidic paper-based analytical device for in-field screening of organic explosives. Complete transition colorimetric fabric technology to a commercialization partner. Complete development of a standardized, evidence-based fire literacy program to address shortcomings of current approaches in current fire safety and survival training. Continue development and initiate field evaluations of a ruggedized garment which provides NFPA 1994 Class 3 and NFPA 1992 protection. Continue development of new algorithms that increase the specificity and improve the overall utility of commercial Raman explosive detection systems. Continue development of a flexible, versatile, and easily transportable platform for detection of small amounts of explosive materials hidden inside of portable electronic devices using a combination of passive and active technologies. Continue development and evaluation of a modular computer/web-based training package for hand-held explosive detection technologies. Continue development of a scalable vacuum evidentiary collection device for the collection and preservation of known or suspected biological agent powders. Continue updating source terms for urban dispersion models to improve the ability to characterize deposition patterns in realistic RDD events. Continue best practices for clean-up procedures for contaminated areas after a RDD event. Continue demonstrating, measuring, and understanding the mechanisms of improvements in defeat or disablement of CB threats using weapons that employ SRM. Continue development of a NIOSH certified 15-min CBRN protection escape hood capable of fitting in the pocket of a suit jacket that also passes the flammability, heat resistance and CO protection requirements for a combination CBRN/CO capability. Continue development of wireless communications that provide the ability to communicate without breaching the CBRN suit integrity or requiring an electrical pass-through. Continue development of a ruggedized one piece garment which provides NFPA 1994 Class 2 protection from exposure to the harmful effects of all traditional CB warfare agents and TICs listed in NFPA 1994, 2012 edition while allowing for communication and interoperability with tactical equipment. Continue testing new methods to more effectively and efficiently collect nanogram quantities of commercial, military, and homemade explosives that are present near improvised explosive devices. Initiate CBRN respirator testing against additional TICs representative of the current threats encountered. Initiate development of multiple use biological personal protective equipment which provides NFPA 1999, Standards on Protective Clothing for Emergency Medical Operations, protection, with dual certification to NFPA 1994, Standard on Protective Ensembles for First Responders to CBRN Terrorism Incidents, Class 4 protection. Initiate development of a hazmat technician level, skills-based training program to prepare hazmat operators to use risk-based selection mechanisms to determine the appropriate level or personal protective equipment. Initiate development of a hazmat technician level, skills-based training program to prepare hazmat operators to use evidence-based selection mechanisms to develop and/or choose the appropriate mass decontamination protocols for a given situation. Initiate development of assessment tools and criteria to properly rank and qualify commercial cooling systems to use with CBRNE PPE. Initiate development of a small, low-cost, disposable sampler, containment vessel, and adapter to be used in sampling of broad spectrum chemical residues on operational surfaces. Initiate development of a portable, non-contact small baggage scanner for positive identification of explosives and firearms. Initiate development of next generation evidence packaging for the safe transport of CBRN materials. Initiate an international assessment of a novel genomic sequencing standard for forensic DNA metagenomics. Initiate a study on a next generation sequencing technology for potential applications in field deployed</p>			

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<p>laboratories. Initiate an effort to establish a network/infrastructure, including enhancing existing in-county laboratory capabilities, for the collection of environmental samples in Ebola virus endemic regions of Africa for subsequent genomic analysis.</p> <p><b>FY 2017 Plans:</b>                      Complete development of an unobtrusive, colorimetric system for the detection of CWAs and TICs of concern. Complete development and commercialize a novel, miniaturized chemiresistor wearable sensor which enables detection of low concentrations of chemicals in an urban environment. Complete development of a novel bio-sensor based upon pyroelectric transducer technology for the detection of biological warfare agents. Complete development of an advanced analytical database for the analysis of improvised CB agent production methods. Complete evaluation of potential methods of production of threat materials, and identify key indicators and warnings for response personnel. Complete field evaluations and certify a ruggedized garment which provides NFPA 1994 Class 3 and NFPA 1992 protection.                      Complete development of new algorithms that increase the specificity and improve the overall utility of commercial Raman explosive detection systems. Complete development of a flexible, versatile, and easily transportable platform for detection of small amounts of explosive materials hidden inside of portable electronic devices using a combination of passive and active technologies. Complete development of a modular computer/web-based training package for hand-held explosive detection technologies. Complete development of a scalable vacuum evidentiary collection device for the collection and preservation of known or suspected biological agent powders. Complete source term development for urban dispersion models to improve the ability to characterize deposition patterns in realistic RDD events. Complete best practices for clean-up procedures for contaminated areas after a RDD event. Complete evaluation of SRMs. Continue to conduct verification and validation testing of a new CB protective mask capable of interoperability with tactical equipment for use in tactical environments. Continue decision support tools to provide on-scene commanders with evidence-based information to support decision making for emergency response to CBRNE events. Continue testing and evaluation of optimized sampling media for the collection of trace explosive materials. Continue testing and evaluation of a next generation sensors for use in trace, bulk, proximity, and stand-off detection of explosives-based threats. Continue evaluation of enhanced sampling materials and systems for CBRNE threats. Continue development of a risk-based decision support model for skin decontamination in the case of dermal exposures to CWAs. Continue support of the Quadrilateral Group on CBR Counterterrorism. Continue testing of a NIOSH certified 15-min CBRN protection escape hood capable of fitting in the pocket of a suit jacket that also passes the flammability, heat resistance and CO protection requirements for a combination CBRN/CO capability. Continue testing of wireless communications that provide the ability to communicate without breaching the CBRN suit integrity or requiring an electrical pass-through. Continue to conduct field evaluations of a ruggedized one piece garment which provides NFPA 1994 Class 2 protection from exposure to the harmful effects of all traditional CB warfare agents and TICs listed in NFPA 1994, 2012 edition while allowing for communication and interoperability with tactical equipment. Continue testing new methods to more effectively and efficiently collect nanogram quantities of commercial, military, and homemade explosives that are present near improvised explosive devices. Continue CBRN respirator testing against additional TICs representative of the current threats encountered. Continue development of</p>			

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<p>multiple use biological PPE which provides NFPA 1999, Standards on Protective Clothing for Emergency Medical Operations, protection, with dual certification to NFPA 1994, Standard on Protective Ensembles for First Responders to CBRN Terrorism Incidents, Class 4 protection. Continue development of a hazmat technician level, skills-based training program to prepare hazmat operators to use risk-based selection mechanisms to determine the appropriate level of personal protective equipment. Continue development of a hazmat technician level, skills-based training program to prepare hazmat operators to use evidence-based selection mechanisms to develop and/or choose the appropriate mass decontamination protocols for a given situation. Complete development of assessment tools and criteria to properly rank and qualify commercial cooling systems to use with CBRNE PPE. Continue development of a small, low-cost, disposable sampler, containment vessel, and adapter to be used in sampling of broad spectrum chemical residues on operational surfaces. Continue development of a portable, non-contact small baggage scanner for positive identification of explosives and firearms. Complete development of next generation evidence packaging for the safe transport of CBRN materials. Continue assessment of novel genomic sequencing standards for forensics DNA metagenomics. Continue development of a next generation sequencing technology for potential applications in field deployed laboratories. Continue establishment of a network/infrastructure, including enhancing existing in-county laboratory capabilities, for the collection of environmental samples in Ebola endemic regions of Africa for subsequent genomic analysis.</p>			
<p><b>Title:</b> IMPROVISED DEVICE DEFEAT (IDD)</p> <p><b>Description:</b> The IDD/EC Subgroup’s objective is to deliver capability to defeat and neutralize the full spectrum of terrorist explosive devices. IDD/EC improves the operational capabilities of federal, state, and local bomb squads and the U.S. military Explosive Ordnance Disposal (EOD) community delivers by developing and delivering advanced technologies, tools, and information to defeat explosive devices. In collaboration with military, federal, state, and local agencies, the IDD/EC Subgroup identifies and prioritizes multi-agency user requirements through joint working groups. IDD/EC then actively works with vendors and end-users to deliver advanced prototype systems that provide more efficiency and greater safety for Bomb Technicians to investigate, access, evaluate, and if needed render safe or dispose of suspect devices whether emplaced, person borne, vehicle borne or water borne. The Subgroup supports the Homeland Security Presidential Directive (HSPD) 19 – Combating Terrorist Use of Explosives in the United States and the National Strategic Plan for Bomb Squads.</p> <p><b>FY 2015 Accomplishments:</b> In support of PPD 17 – Countering Improvised Explosive Devices, the Improvised Device Defeat (IDD) subgroup transitioned to a new name, Improvised Device Defeat/Explosives Countermeasures (IDD/EC), but continues to support requirements of both military Explosive Ordnance Disposal (EOD) technicians and Public Safety Bomb Squads. Explosives Countermeasures encompasses other explosive threats and hazards that are encountered by other first responders. The remaining projects under EOD/LIC transitioned over to IDD/EC at the beginning of FY15. The IDD/EC subgroup completed development and evaluation to commercialize an explosively initiated tool for remotely opening vehicle trunk locking mechanisms. Continued development and operational evaluation of a submersible remotely operated vehicle to counter water borne IEDs. Completed development and</p>	3.478	5.100	4.422

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<p>delivered for operational test and evaluation a Force Feedback Retrofit Kit to provide enhanced visual awareness of pressures exerted on object held in a robot gripper. Initiated development of a robotically conducted on-site desensitization and disposal of sensitive homemade explosives (HMEs) achieved by mixing small quantities of the target HME with a flammable liquid followed by incineration. Initiated development of a mobile device application for worldwide incidents involving improvised explosive device technical data accessible to bomb technician. Initiated development of a decision support tool that covers the full range of issues involved in vehicle-borne improvised explosive device (VBIED) response by bomb disposal personnel. Continued development of a modified and environmentally hardened remotely delivered and operated pan-and-tilt render safe capability for IED disruption. Completed development of a threat analysis on the use of additive manufacturing processes for construction and concealment of devices containing explosives or their precursors. Initiated development of a system that can employ X-ray image analytics at the scene of a bomb or IED incident to instantly and automatically identify bomb or IED components from a database of exemplars. Initiated development of a lightweight IED protective suit and ballistic helmet to allow increased freedom of movement during counter-IED operations.</p> <p><b>FY 2016 Plans:</b> Complete development and deliver prototypes for operational testing and evaluation of a submersible remotely operated vehicle to counter water borne IEDs. Complete development and commercialize a capability to robotically conduct on-site desensitization and disposal of sensitive homemade explosives (HMEs) by mixing small quantities of the target HME with a flammable liquid followed by incineration. Complete development of a mobile device application for worldwide incidents involving improvised explosive device technical data accessible to bomb technician. Complete Development of a decision support tool that covers the full range of issues involved in vehicle-borne improvised explosive device (VBIED) response by bomb disposal personnel. Complete development and delivery of a compact, high-power next generation X-ray generator for EOD use. Continue development of an environmentally hardened, remotely delivered and operated pan-and-tilt render safe capability for IED disruption. Complete development of a compact, high-power next generation X-ray generator for EOD use. Complete development of a system that can employ X-ray image analytics at the scene of a bomb or IED incident to instantly and automatically identify bomb or IED components from a database of exemplars. Complete development of a lightweight IED protective suit and ballistic helmet to allow increased freedom of movement during counter-IED operations. Initiate development of a low cost, disposable RF firing system for firing commercial blasting caps. Initiate development of a scalable 3D Computer Assisted Design (CAD) models on non-patented bomb squad render safe tools. Initiate development of a device defeat application that allows bomb technicians to select disruption tools based on automated X-ray diagnostics. Initiate development of a detailed analysis of the use of additive manufacturing to build and conceal explosive devices. Initiate exploitation of improvised electric detonators and igniter components.</p> <p><b>FY 2017 Plans:</b> Complete development and commercialize an environmentally hardened, remotely delivered and operated pan-and-tilt render safe capability for IED disruption. Complete development of a low cost, disposable RF firing system for firing commercial blasting</p>			

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<p>caps. Complete development of a scalable 3D Computer Assisted Design (CAD) models on non-patented bomb squad render safe tools. Complete development of a device defeat application that allows bomb technicians to select disruption tools based on automated X-ray diagnostics. Complete development of a detailed analysis of the use of additive manufacturing to build and conceal explosive devices. Complete exploitation of improvised electric detonators and igniter components. Initiate development of an EOD robot-mounted X-ray backscatter imaging system. Initiate development of enhanced capabilities for a submersible remotely operated vehicle to counter water borne IEDs based on operational capability assessment. Initiate an East Coast-based capability exercise to develop and test advanced skills to maneuver hazardous duty robots in challenging, real-world scenarios.</p> <p><b>Title:</b> INVESTIGATIVE AND FORENSICS SCIENCE</p> <p><b>Description:</b> The IFS subgroup’s objective is to advance combating terrorism capabilities in investigative and forensic science. IFS supports joint, interagency, and other partners who apply investigative and forensic science methods, means, or practices to forensic intelligence or practices to forensic intelligence or investigations. To meet this objective, the subgroup focuses on rapid research, development, test and evaluation of new and advanced technology, equipment, forensic techniques, and tools, as well as development of information resources and decision support tools for risk-based decision making and rapid exploitation of evidence. Projects emphasize rapid and field DNA analysis, identification of insider threat within agencies, pre- and post-blast forensic examination, electronic evidence data acquisition and analysis, sensitive site exploitation, forensic intelligence, and criminalistics.</p> <p><b>FY 2015 Accomplishments:</b>                      Completed the secondary phase of the interagency research, development, test, and evaluation strategy and roadmap for the federal investigative and forensic science community. Completed development of the best practices for expeditionary forensic operations.                      Completed testing and evaluation of commercially available rapid DNA instruments for use in combating terrorism operations. Completed development of an effective forensic microbial proteomic methodology for biological samples to aid in source attribution. Completed development of a field-deployable prototype system for automated rapid processing of human DNA profiles using short tandem repeat loci. Completed development of advanced methods to analyze visual, verbal, and behavioral cues of persons to determine their likelihood of being an insider threat to commit physical violence, espionage, and sabotage and build a network of researchers to further advancements in this field. Completed development of a more productive and effective method of interrogating and interviewing persons for human intelligence collection in law enforcement and tactical environments. Completed development of a forensic opium poppy DNA methodology to determine the geographic origin of heroin. Completed development of an advanced facial thermal imaging technology to determine credibility and intent. Completed development of an automated system that creates identifications, intelligence, and analysis of forensic and criminal information from multiple, diverse, and proprietary databases. Completed development of protein polymorphism methodology and database, isolating protein markers from hair follicles. Continue development of a comprehensive forensic procedure to separate mixed samples DNA</p>	4.840	4.840	4.472

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2015	FY 2016	FY 2017
<p>by using nuclear DNA. Initiated the development of an automatic tool that recognizes and identifies faces in uncontrolled files and images. Initiated the development of a remote identification card image system for the detection of suspected fraudulent ID cards at checkpoints. Initiated development of a tool that automatically ingests and analyzes data from mobile device extraction tools and produces intelligence reports. Initiated development of mobile device corpus to track, exploit, and store electronic evidence. Initiated development of a methodology to identify and exploit organic and inorganic compounds found in AN/CAN samples for geographical sourcing. Initiated development of a methodology to identify and exploit organic and inorganic compounds found in AN/CAN samples for geographical sourcing.</p> <p><b>FY 2016 Plans:</b> Complete development of a comprehensive forensic procedure to separate mixed samples DNA by using nuclear DNA. Complete the development of an automatic tool that recognizes and identifies faces in uncontrolled files and images. Complete the development of a remote identification card image system for the detection of suspected fraudulent ID cards at checkpoints. Complete development of a tool that automatically ingests and analyzes data from mobile device extraction tools and produces intelligence reports. Complete development of mobile device corpus to track, exploit, and store electronic evidence. Complete development of a methodology to identify and exploit organic and inorganic compounds found in AN/CAN samples for geographical sourcing. Complete development of a methodology to identify and exploit organic and inorganic compounds found in AN/CAN samples for geographical sourcing. Initiate development of an advanced and improved system that analyzes, stores, and links data and traits from fraudulent identification and travel documents. Initiate development of forensically validated procedures using high resolution mass spectrometry to determine the geographic source of cultivation and processing of heroin and related opium substances. Initiate development of the forensic analysis methodologies that will have to be used on 3-D printed firearms made with non-metallic materials.</p> <p>Initiate development of a forensic software application that performs searches, matches, and exclusions of vehicle images in still image or video databases. Initiate development of a test bed for standard forensic laboratory equipment in a maritime environment. Initiate development of an advanced non-traditional latent fingerprint detection and visualization method based on novel antibodies and nano-technology approaches.</p> <p><b>FY 2017 Plans:</b> Complete development of an advanced and improved system that analyzes, stores, and links data and traits from fraudulent identification and travel documents. Complete development of forensically validated procedures using high resolution mass spectrometry to determine the geographic source of cultivation and processing of heroin and related opium substances. Complete development of the forensic analysis methodologies that will have to be used on 3-D printed firearms made with non-metallic materials. Complete development of a forensic software application that performs searches, matches, and exclusions of vehicle images in still image or video databases. Complete development of a test bed for standard forensic laboratory equipment in a</p>			

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
---	----------------	----------------	----------------

maritime environment. Complete development of an advanced non-traditional latent fingerprint detection and visualization method based on novel antibodies and nano-technology approaches.			
---	--	--	--

<b>Title:</b> Irregular Warfare and Evolving Threats (IW/ET)	3.500	9.615	5.168
--	-------	-------	-------

**Description:** U.S. Forces face a threat environment where irregular, state-sponsored and non-state hybrid and conventional adversaries armed with easy to employ precision weapons, global surveillance and networking will have the capability to undercut the operational and technical superiority of U.S. Conventional and Special Operations Forces. These evolving threats will progressively blur the boundaries between conventional and irregular warfare. Offering foresight about disruptions of this nature through rapid, adaptive demonstration of novel operational concepts so that concept developers can explore new models and capabilities before a conflict begins must be a primary goal.

The IW/ET subgroup develops new concepts and capabilities for warfighters and inter-agency partners who are confronting the complexity of the current operational environment, while simultaneously looking outward rather than inward to appropriately size, shape and develop their forces. In accordance with the QDR’s emphasis on preparation to defeat adversaries and succeed in a wide range of contingencies, IW/ET will engage in operational assessment, concept development, and independent validation of unique prototype capabilities to identify, confront and defeat evolving threats.

**FY 2015 Accomplishments:**

Completed the development of a non-material effort intended to better understand indirect and irregular threats currently facing the US, and how to implement effective measures against them. This effort will support the Army Special Operations Command and will include wargaming and experimentation, strategy assessment and recommendations for future operations planning. Continued development of the Nightingale effort, which fielded a prototype digital workflow management and content approval capability for members of the Counter Terrorism Strategic Communication community of practice who actively engage on social media platforms. This effort is entirely novel to the United States Government and will provide critical test and evaluation for operational deployment, enabling US operators to more effectively contest the informational domain. Continued research and analysis providing support for: planning and organizing integration of influence capabilities into cyber planning and execution, understanding and planning for the impact and implications of “now media,” and planning and organizing to conduct military deception, as well as the distillation and dissemination of best practices in the planning, execution, and assessment of information operations (IO). Continued research and development of a low-cost, effective and efficient method of extending or creating local security, sustainable governance, and protection from terrorism in small and large urban environments through relevant doctrine, training, technology and innovative partnerships. Utilizing Secure Unclassified Network (SUNet) architecture, this effort facilitates dialogue and information sharing among entities involved in developing community resilience/resistance in the face of armed violence and creates a platform to test and evaluate tools and TTPs for use in the "ungoverned" or "under-governed" urban environment. Continued the development and initial testing of a government off the shelf application that integrates and

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<p>fuses heterogeneous social media data for use in strategic and tactical operational planning and preparation of the battlefield. This effort provides a real time data and analysis capability along with mentorship and the analytical tradecraft to understand and monitor critical events and sentiments in open source social media and will be deployed to support USMC operators. Initiated an effort to research and develop a classified report that makes use of the Open Source Center's open source analytical expertise in order to support mission-enabling research and analysis capabilities for a CTTSO end user. Initiated an operational test of the Network Enablement Capability (NEC) with Special Operations Command Africa called Clever Enabler. This effort will test the ability of Special Operations personnel to deliver the Legacy model with the contractor in select African countries. In addition, the focus of Clever Enabler will expand the Legacy model into an exportable all source intelligence partner nation capacity building effort. Upon completion of the curriculum and a brief test, the contract will transition to US SOCOM in FY16. Initiated an effort to determine how the Department of Defense (DoD), Interagency and Allied Nations conduct partner capacity building operations. The end state is to design a holistic common interagency analytical and planning approach that better identifies capabilities authorities and funding, links US, Allied and partner nation objectives and builds synergy when conducting partner nation capacity building missions. Initiated an effort that developed an analytical framework to provide analysts and planners tools and techniques for understanding the urban operational environment that can be used to support operational design, intelligence preparation of the operational environment, course of action (COA) development, COA analysis, and ultimately COA selection and plan/order production. These techniques use systems thinking to address urban environments' dynamism and interconnectedness. Initiated the development of new concepts and constructs for understanding the role of virtual currencies in threat finance. This effort will develop statistical models using near real time Blockchain data to determine the probability that a Bitcoin transaction is associated with illicit activities. Initiated and completed a crowd sourced effort to gain innovative insights into virtual currency and new payment technologies to support ongoing interagency and international discussions on the risks and opportunities of this burgeoning technology. Initiated support for the SPOTLIGHT platform which is currently providing field data and an open source information platform to Special Operations Command Central (SOCCENT) for conducting analysis of open source big data (traditional and social media) to support operational planning and sustained situational understanding of the information and media environment. This new initiative expands and standardizes requirements for an automated and integrated open source secure analytical platform. The targeted objective is to allow the command to remotely perform mission critical tasks that result in lower cost over time and improved system performance with lower latency in terms of augmented exploitation of the data for multiple operational requirements. Initiated the development and test of an exportable information operations capability that legitimate governments' can use to counter violent extremist messaging. Conducted testing and evaluation by delivering training and periodic evaluation through the use of mobile advise and assist training teams. Initiated an effort in partnership with UK Dstl to enable analysts to assess higher-order cascading influences and reactions to events, as well as determine the uncertainty that the event will produce the desired results over time. The effort will pull together subject matter experts and existing technology to produce a report documenting findings and data sets in order to help inform current and future operations in a country of strategic interest. This is of significant importance in order to better understand and anticipate the interplay between specific individuals, political/social military organizations, and general society in response to potential courses of actions or events, specifically when</p>			

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

**C. Accomplishments/Planned Programs (\$ in Millions)**

	FY 2015	FY 2016	FY 2017
<p>it comes to planning and conducting operations in support of or with foreign partners and nations. Initiated an effort to challenge university students from the United States and abroad to create an online community to counter a common enemy of violent extremists wherever they might exist. The teams researched, designed, implemented, and measured the success of a social or digital initiative that: Motivated or empowered people to become involved in countering violent extremism; Catalyzed others to create their own initiatives, products, or tools to counter violent extremism; and Build a community of interest focused on living shared values that counter violent extremism. Initiated the development of an ability to monitor social media, identify and archive communications trends, and disseminate and respond to real-time threats broadcasted through social media in permissive and non-permissive environments using a mobile application that provides real-time open-source and social media situational awareness around a mobile military unit. This capability operationally impacts soldiers on the ground by providing relevant alerts of emerging threats in the immediate area or along a planned route. An essential aspect of the end solution is the ability to persistently monitor around the team or even an individual soldier during movement along both planned and unplanned routes. This solution is highly configurable and extendible, allowing for multiple local and regional data sources to be quickly integrated into the platform. Initiated the development of a mobile and web browser-based platform to collect photographs, videos, audio recordings, and general text-based information via precise crowd sourcing techniques. The objective is to provide an Android-based application that is highly customized for a specific region, language, and purpose to use for crowd source media collection and to establish a secure, controlled-access internet hosting platform of searchable, retrievable, and viewable media for USG and partner nation communicator use, in order to provide timely access to vetted visual media and improve cross-government(s) coordination of relevant content. Additionally, the collected data is automatically geo-tagged and uploaded to a dedicated assigned server. The immediate operational impact is the enhanced ability of users to rapidly collect and share photos, audio, and video in a non-obvious manner from the tactical edge, making compelling visual media content available through improved cross-government cooperation. Initiated development of the Conflict Zone Tool Kit (CZTK) which resides on a secure, unclassified network and empowers non-analytic personnel with leading edge tools and expert instruction to enable near-real time situational awareness from host-nation perspective ('green lens') related to activities and actors of concern. This platform is designed for non-intelligence functions in conflict zones outside of the continental U.S. (OCONUS) and focuses exclusively on publicly available information accessible on the internet to enhance the ability of operational personnel to develop and maintain a real time pulse of how terrorist groups make use of open source messaging to recruit, train, and fundraise. Accessible from a standard Internet browser, CZTK offers an accredited plug-and-play platform enabling users to apply the best data and applications needed to characterize and geospatially visualize the information environment for operational level planning and a range of tactical missions.</p> <p><b>FY 2016 Plans:</b> Complete development and operational deployment of the Nightingale effort, a prototype digital workflow management and content approval capability for members of the Counter Terrorism Strategic Communication community of practice who actively engage on social media platforms. This effort is entirely novel to the United States Government and will enable US operators</p>			

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<p>to more effectively contest the informational domain. Complete research and development for providing support: planning and organizing integration of influence capabilities into cyber planning and execution, understanding and planning for the impact and implications of “now media,” and planning and organizing to conduct military deception, as well as the distillation and dissemination of best practices in the planning, execution, and assessment of information operations (IO). Complete research and development of a low-cost, effective and efficient method of extending or creating local security, sustainable governance, and protection from terrorism in small and large urban environments through relevant doctrine, training, technology and innovative partnerships. Utilizing Secure Unclassified Network (SUNet) architecture, this effort facilitates dialogue and information sharing among entities involved in developing community resilience/resistance in the face of armed violence and creates a platform to test and evaluate tools and TTPs for use in the "ungoverned" or "under-governed" urban environment. Complete deployment and transition of a government off the shelf application that integrates and fuses heterogeneous social medial data for use in strategic and tactical operational planning and preparation of the battlefield. This effort provides a real time data and analysis capability along with mentorship and the analytical tradecraft to understand and monitor critical events and sentiments in open source social media and will be deployed to support USMC operators. Complete the expansion and standardization of requirements for an automated and integrated open source secure analytical platform. Upon completion, the SOCCENT command will be able to remotely perform mission critical tasks that result in lower cost over time and improved system performance with lower latency in terms of augmented exploitation of the data for multiple operational requirements. Continue the development and test of an exportable information operations capability that legitimate governments’ can use to counter violent extremist messaging. Conduct testing and evaluation by delivering training and periodic evaluation through the use of mobile advice and assist training teams. Continue an effort in partnership with UK Dstl to enable analysts to assess higher-order cascading influences and reactions to events, as well as determine the uncertainty that the event will produce the desired results over time. The effort will pull together subject matter experts and existing technology to produce a report documenting findings and data sets in order to help inform current and future operations in a country of strategic interest. This is of significant importance in order to better understand and anticipate the interplay between specific individuals, political/social military organizations, and general society in response to potential courses of actions or events, specifically when it comes to planning and conducting operations in support of or with foreign partners and nations. Complete an effort to challenge university students from the United States and abroad to create an online community to counter a common enemy of violent extremists wherever they might exist. The teams research, design, implement, and measure the success of a social or digital initiative that: Motivates or empowers people to become involved in countering violent extremism; Catalyzes others to create their own initiatives, products, or tools to counter violent extremism; and Builds a community of interest focused on living shared values that counter violent extremism. Complete the development of an ability to monitor social media, identify and archive communications trends, and disseminate and respond to real-time threats broadcasted through social media in permissive and non-permissive environments using a mobile application that provides real-time open-source and social media situational awareness around a mobile military unit. This capability operationally impacts soldiers on the ground by providing relevant alerts of emerging threats in the immediate area or along a planned route. An essential aspect of the end solution is the ability to persistently monitor around the team or even an</p>			

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<p>individual soldier during movement along both planned and unplanned routes. This solution is highly configurable and extendible, allowing for multiple local and regional data sources to be quickly integrated into the platform. Complete the development of a mobile and web browser-based platform to collect photographs, videos, audio recordings, and general text-based information via precise crowd sourcing techniques. The objective is to provide an Android-based application that is highly customized for a specific region, language, and purpose to use for crowd source media collection and to establish a secure, controlled-access internet hosting platform of searchable, retrievable, and viewable media for USG and partner nation communicator use, in order to provide timely access to vetted visual media and improve cross-government(s) coordination of relevant content. Additionally, the collected data is automatically geo-tagged and uploaded to a dedicated assigned server. The immediate operational impact is the enhanced ability of users to rapidly collect and share photos, audio, and video in a non-obvious manner from the tactical edge, making compelling visual media content available through improved cross-government cooperation. Continue development of the Conflict Zone Tool Kit (CZTK) which resides on a secure, unclassified network and empowers non-analytic personnel with leading edge tools and expert instruction to enable near-real time situational awareness from host-nation perspective ('green lens') related to activities and actors of concern. This platform is designed for non-intelligence functions in conflict zones outside of the continental U.S. (OCONUS) and focuses exclusively on publicly available information accessible on the internet to enhance the ability of operational personnel to develop and maintain a real time pulse of how terrorist groups make use of open source messaging to recruit, train, and fundraise. Accessible from a standard Internet browser, CZTK offers an accredited plug-and-play platform enabling users to apply the best data and applications needed to characterize and geospatially visualize the information environment for operational level planning and a range of tactical missions. Continue to develop and deliver Secure Unclassified Network (SUNet) which provides a unique virtualization of a single hardware suite of servers and software that will provide protected dynamic enclaves of capability for multi-agency users (Law Enforcement, Interagency, Coalition, and Foreign Nationals). This effort enables an inter-organizational collaborative area and enhanced capabilities of data upload, searching and sharing from headquarters down to smartphones, tablets or laptops. Initiate an effort to develop an assessment methodology that will assist counterterrorism strategic messaging by enhancing the ability to use publicly available information to identify key influencers, derive linguistically and culturally accurate insights for message development, and then measure the impact and resonance of such messages. As terrorist groups continue to propagate their narratives through internet-enabled social media, the US and her allies need new tools and methodologies to fully understand the scope of terrorist groups' online messaging campaigns, successfully counter violent and extremist messages, and to create, enrich, and sustain a persuasive, relevant, and positive narrative in this virtual battlefield. This effort will enable users to capture and share resonance data with other users, enabling them to create and sustain more effective messaging while allowing for faster adjustment and tailored response to adversary communications. Initiate an effort that will bolster rewards programs by better understanding how to address the "street-level" community information that may provide—for cents rather than thousands of dollars—indicators of instability and violence of interest to the USG and its foreign partners. Phone and walk-in based reporting fail to incorporate the potential to dramatically increase the volume, information security, and quality of reporting possible through crowdsourcing applications, particularly when combined with the micro-payment processing breakthrough afforded by Blockchain technology. To explore the potential</p>			

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
---	----------------	----------------	----------------

of this new reporting paradigm, initiate a project to develop and test a prototype methodology and application that would enable automated and incentivized reporting by civilians of images, text and/or video in zones of conflict in exchange for micro-payments or tip-sized rewards. Initiate an effort to develop a web-based software application framework that can visualize and monitor the online social network terrain using publicly available information. The importance of this domain is increasing at an all-time high as violent extremist organizations (VEO) successfully use social media to recruit, train, fundraise, and command and control on-the-ground military operations. Anecdotal success stories gleaned from Twitter or other media is insufficient, especially when repeatable, systematic approaches for exploiting this environment are absent. This tool will be integrated into CTTSO's Conflict Zone Tool Kit (CZTK) and will set the foundation for military planners and senior leaders to visualize and understand key terrain in online social networks. Initiate an effort that will address a gap in understanding the strategy and concepts of how to foster effective Counter Unconventional Warfare (UW) in the modern age. This effort will explore and inform strategy and concepts focused on how a country prepares itself to conduct resistance against an occupying aggressor and what measures and actions a country can take prior to occupation. This effort will provide an opportunity to gain insight into the phenomenon of resistance and modern counter UW by looking through the lens of current events in Ukraine. It will draw lessons from the historical cases and, where appropriate, will derive comparisons with current events in the Ukraine. A key element will be to understand variables that lead to failure in the former Soviet Republics or other select regions. Complete the Lawfare initiative, which will provide applicable lessons from literature and expert practitioners on Lawfare and other analogous policy tools. The effort will also provide recommendations for a framework outlining how the US and its allies can effectively defend against and conduct offensive legal warfare.

**FY 2017 Plans:**  
Complete the design of a holistic common interagency analytical and planning approach that better identifies capabilities authorities and funding, links US, Allied and partner nation objectives and builds synergy when conducting partner nation capacity building missions. Upon completion, the analytical and planning approach will be available for use in interagency and allied nation training curriculum. "Complete the development and test of an exportable information operations capability that legitimate governments' can use to counter violent extremist messaging. Conduct testing and evaluation by delivering training and periodic evaluation through the use of mobile advise and assist training teams. Upon completion, the USG will have an exportable information operations model that can be used in select partner nations. Complete an effort in partnership with UK Dstl to enable analysts to assess higher-order cascading influences and reactions to events, as well as determine the uncertainty that the event will produce the desired results over time. The effort pulls together subject matter experts and existing technology to produce a report documenting findings and data sets in order to help inform current and future operations in a country of strategic interest. This is of significant importance in order to better understand and anticipate the interplay between specific individuals, political/social military organizations, and general society in response to potential courses of actions or events, specifically when it comes to planning and conducting operations in support of or with foreign partners and nations. Complete development of the Conflict Zone Tool Kit which resides on a secure, unclassified network and empowers non-analytic personnel with leading edge

--	--	--	--

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<p>analytical tools and expert instruction, to enable near-real time situational awareness from host-nation perspective ('green lens'), related to activities and actors of concern. This platform is designed for non-intelligence functions in conflict zones outside of the continental U.S. (OCONUS) and focuses exclusively on publicly available information accessible on the internet to enhance the ability of operational personnel to develop and maintain a real time pulse of how terrorist groups make use of open source messaging to recruit, train, and fundraise. Complete development and delivery of Secure Unclassified Network (SUNet) which provides a unique virtualization of a single hardware suite of servers and software that will provide protected dynamic enclaves of capability for multi-agency users (Law Enforcement, Interagency, Coalition, and Foreign Nationals). This effort enables an inter-organizational collaborative area and enhanced capabilities of data upload, searching and sharing from headquarters down to smartphones, tablets or laptops. Complete an effort to develop an assessment methodology that will assist counterterrorism strategic messaging by enhancing the ability to use publicly available information to identify key influencers, derive linguistically and culturally accurate insights for message development, and then measure the impact and resonance of such messages. As terrorist groups continue propagate their narratives through internet-enabled social media, the US and her allies need new tools and methodologies to fully understand the scope of terrorist groups' online messaging campaigns, successfully counter violent and extremist messages, and to create, enrich, and sustain a persuasive, relevant, and positive narrative in this virtual battlefield. This effort will enable users to capture and share resonance data with other users, enabling them to create and sustain more effective messaging while allowing for faster adjustment and tailored response to adversary communications. Continue an effort to bolster DOD and Law Enforcement rewards programs through development of a civil reporting application and methodology. This effort will conduct an experiment in realistic field conditions to thoroughly test the feasibility and efficacy of civil reporting incentivized by micropayments in zones of disorder and conflict. Complete an effort to develop a web-based software application framework that can visualize and monitor online social network terrain using publicly available information. The importance of this domain is increasing at an all-time high as violent extremist organizations (VEO) successfully use social media to recruit, train, fundraise, and command and control on-the-ground military operations. Anecdotal success stories gleaned from Twitter or other media is insufficient, especially when repeatable, systematic approaches for exploiting this environment are absent. This tool will be integrated into CTTSO's Conflict Zone Tool Kit (CZTK) and will set the foundation for military planners and senior leaders to visualize and understand key terrain in online social networks. Complete an effort that will address a gap in understanding the strategy and concepts of how to foster effective Counter Unconventional Warfare (UW) in the modern age. This effort will explore and inform strategy and concepts focused on how a country prepares itself to conduct resistance against an occupying aggressor and what measures and actions a country can take prior to occupation. This effort will provide an opportunity to gain insight into the phenomenon of resistance and modern counter UW by looking through the lens of current events in Ukraine. It will draw lessons from the historical cases and, where appropriate, will derive comparisons with current events in the Ukraine. A key element will be to understand variables that lead to failure in the former Soviet Republics or other select regions.</p>			
<b>Title:</b> PERSONNEL PROTECTION	8.986	15.150	8.552

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
---	----------------	----------------	----------------

<p><b>Description:</b> The Personnel Protection Subgroup’s objective is to develop new equipment, reference tools, and standards to improve the protection of personnel. Projects focus on putting innovative tools such as automated information management systems, communication devices, tagging, tracking and locating devices, mobile surveillance systems, as well as personal and vehicle protection equipment in the hands of personnel.</p> <p><b>FY 2015 Accomplishments:</b> Completed development and deployed a capability that activates vehicle tracking, tagging, and locating device upon detection of a blast. Completed development and delivered a whole body deformation tool and analysis for the development of protective solutions for vehicles, ships, and buildings. Completed development of a three dimensional personnel tracking and locating system for use within structures. Completed development of a capability for local data storage of maps for operational use in austere environments. Completed development of a mobile blast mitigation barrier that mitigates fragmentation effects of a behind the wall improvised explosive device. Continued development of a tethered aerial platform for enhanced situational awareness and communication capabilities. Continued development of a concealable armor system that provides rifle threat protection. Continued development of a novel lightweight armor material that provides rifle protection. Continued development of automated exploitation algorithms for light detection and ranging data. Continued development of biomarker identification for brain injury using magnetic resonance imaging (MRI) and magnetic resonance spectroscopy (MRS) to monitor neurochemical biomarkers for post-traumatic stress disorder and mild traumatic brain injury. Initiated development of counter unmanned aerial vehicle capabilities. Initiated development of a multi radio device that combines multiple radios, GSM and Iridium communication capabilities into one device. Initiated development of a wireless tactical communications headset. Initiated development of a miniaturized transmitter device that can accommodate a Tier 1 unmanned aerial vehicle (UAV) to transmit the UAV video feed over the cellular network for enhanced situational awareness. Initiated development of a novel material for ballistic and blast protection that utilizes fiber optics to enable visibility with opaque armor. Initiated development of a statistical correlation of environmental, storage, duty, and geographic region parameters on the degradation and life cycle of body armor. Initiated characterization of ballistic clay to understand unconstrained boundary effects of built up regions of ballistic clay backing in armor testing.</p> <p><b>FY 2016 Plans:</b> Complete development of a tethered aerial platform for enhanced situational awareness and communication capabilities. Complete development of a concealable armor system that provides rifle threat protection. Complete development of a novel lightweight armor material that provides rifle protection. Complete development of automated exploitation algorithms for light detection and ranging data. Complete development of biomarker identification for brain injury using magnetic resonance imaging (MRI) and magnetic resonance spectroscopy (MRS) to monitor neurochemical biomarkers for post-traumatic stress disorder and mild traumatic brain injury. Complete development of counter unmanned aerial vehicle capabilities. Complete development of a multi radio device that combines multiple radios, GSM and Iridium communication capabilities into one device. Complete</p>			
---	--	--	--

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<p>development of a wireless tactical communications headset. Complete development of a miniaturized transmitter device that can accommodate a Tier 1 unmanned aerial vehicle (UAV) to transmit the UAV video feed over the cellular network for enhanced situational awareness. Complete development of a novel material for ballistic and blast protection that utilizes fiber optics to enable visibility with opaque armor. Complete development of a statistical correlation of environmental, storage, duty, and geographic region parameters on the degradation and life cycle of body armor. Complete characterization of ballistic clay to understand unconstrained boundary effects of built up regions of ballistic clay backing in armor testing. Initiate development of a mechanism to wirelessly charge onboard power supplies for in-flight sUASs. Initiate development of an event pin detection system to mitigate the risk of adversaries, including insider threats, gaining unauthorized access to event sites. Initiate development of an enhanced vehicle tracking system to operate in urban and GPS denied areas. Initiate development of a multifunctional head protection system that provides ballistic protection, and incorporates communication and data display capabilities. Initiate development of an imminent danger notification system that immediately alerts building occupants to a perceived or actual threat. Initiate development of a system that will augment the strength and endurance of the warfighter without degrading speed or mobility. Initiate development of a system to detect and detach magnetically attached explosive devices placed on vehicles. Initiate development of a man packable system that reduces or eliminates the radar, electronic, thermal, infrared, visual or acoustic signatures of a dismounted soldier.</p> <p><b>FY 2017 Plans:</b> Complete development of a mechanism to wirelessly charge onboard power supplies for in-flight sUASs. Complete development of an event pin detection system to mitigate the risk of adversaries, including insider threats, gaining unauthorized access to event sites. Complete development of an enhanced vehicle tracking system to operate in urban and GPS denied areas. Continue development of a multifunctional head protection system that provides ballistic protection, and incorporates communication and data display capabilities. Continue development of an imminent danger notification system that immediately alerts building occupants to a perceived or actual threat. Continue development of a system that will augment the strength and endurance of the warfighter without degrading speed or mobility. Continue development of a system to detect and detach magnetically attached explosive devices placed on vehicles. Continue development of a man packable system that reduces or eliminates the radar, electronic, thermal, infrared, visual or acoustic signatures of a dismounted soldier.</p>			
<p><b>Title:</b> PHYSICAL SECURITY</p> <p><b>Description:</b> Rapidly develop and transition physical security/force protection capabilities and technologies to support forward deployed and domestic first responders, military, interagency, and international partners in the focus areas of Blast Effects and Mitigation; Emerging Explosive Threats; Vulnerability Identification; Integrated Solutions; and, Screening, Surveillance; and Detection. Emphasize these technology development efforts primarily at U.S. embassies and consulates, forward operating bases, along the U.S. borders, at mass transportation and commerce nodes, in maritime port and littoral environments, and in support of large scale public venues.</p>	12.850	48.320	7.155

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z I <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
---	----------------	----------------	----------------

<p><b><i>FY 2015 Accomplishments:</i></b>                  Completed development of a fast-running, CHINOOK-based computational tool to assist Federal and municipal planners and first responder personnel in predictive blast analysis in an urban environment. Completed development of explosive testing methodology to reinforce critical infrastructure design for mitigated and unmitigated brick tunnels. Completed development of an IR-based detection system with automatic focus to allow for enhanced detection of explosive and weapon threats in operational environments. Completed the development and assessment of the Military Blast Expert Evaluation Software to aid commanders in protecting US military expeditionary bases globally. Continued development of a modular air-droppable force protection kit that includes mini-radar, trip wire sensor and electro-optical/IR camera sensor. Continued development of a tool for an understanding of TNT equivalency that will provide operational forces necessary information for protecting personnel and infrastructure. Continued development of forced-entry, ballistic and blast resistant doors to support US facilities abroad. Continued development of an automatic target recognition and improved gimbal control, to maneuver in rough terrain, for on-the-move, standoff IED detection. Continued development of a rapidly deployable, temporary antipersonnel barrier system to protect fixed and expeditionary facilities in response to increased threat levels. Continued development of tactical arresting systems designed to stop vehicles over a short distance. Continued development of an Advanced Diver Data Display System final prototype for combat swimmers. Continued development of an advanced active diver thermal protection system for long exposure dives, including SEAL Delivery Vehicle (SDV) operations. Continued development and upgrade of a tactical compact aerostat surveillance system for intelligence, surveillance and reconnaissance, as well as communication between non-line-of-sight (NLOS) forces. Initiated development of a system that can determine the path of a long underground conductor, given a known end of the conductor. Initiated development of decision aids for first responders and military engineers by testing explosives effects in an urban environment, to include Historic Masonry and frangible front structures. Initiated development of an in-tunnel unmanned aerial vehicle (UAV) that will provide the ability to safely conduct reconnaissance of discovered illicit tunnels and/or scheduled inspections of underground municipal infrastructures (UMIs) for evidence of interconnecting tunnel activity. Initiated development of a high performance towed sled to provide increased payload and deployment options for existing combatant craft used by Naval Special Warfare (NSW). Initiated development of computer modeling and simulation program to determine the smallest booster size needed to initiate detonation of Ammonium Nitrate Prill in shipping configuration to determine screening and detection capability needed to prevent the weaponization of fertilizer being transported in public areas. Initiated development of materials and mechanisms for tactical delivery of novel non-lethal solutions for maritime vessel disablement. Initiated development of U.S. Navy life cycle cost benefit analysis by conducting intermediate system integration and environmental testing of the HALO Maritime Barrier System. Initiated development of a mobile application to enhance and host the Vehicle Explosion Analysis Software. Initiated and Completed tests to explore the feasibility of use and characteristics of the emerging explosive threat of cast Erythritol Tetranitrate (ETN). Initiated Joint work between U.S. and Australia to test, characterize and model a novel propane tank Vehicle Borne Improvised Explosive Device (VBIED) threat. Initiated development of a portable and ruggedized body scanner for personnel protection missions based on the existing AIT stationary body scanner system</p>			
---	--	--	--

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<p>developed by Tek84. Initiated development of two distinct versions of preliminary tunnel mapping system demonstrators that leverage research and technology developed under a previous task. Initiated development of a subterranean communications system that is man portable and will give operators the ability to effectively communicate within a tunnel. Initiated development of a small, lightweight, parachute-balloon based, tethered tunnel scanning system which will be able to maneuver inside tunnels and provide ISR to operators on surface via real time video transmission. Initiated joint test and evaluation of the IDAN kit, a portable system that can be used to quickly block tunnel entrances/exits as well as doorways in underground tunnels. Initiated development of a bi-static electromagnetic cavity countermeasure prototype for detection of existing tunnels (voids) and existing tunnels containing conductive infrastructure. Initiated development of a joint multi-disciplinary geophysical survey kit, comprised of two distinct classified tools. Initiated preliminary development of a test site to evaluate and optimize advanced geophysical survey capabilities for use in terrains and geologies of particular interest to the US and Israel. Initiated development of an airborne variant of the T-track system, to determine the path of a long underground conductor, given a known end of the conductor, at low altitudes.</p> <p><b>FY 2016 Plans:</b>            Complete development of a modular air-droppable force protection kit that includes mini-radar, trip wire sensor and electro-optical/IR camera sensor. Complete development of a software tool for an understanding of TNT equivalency that will provide operational forces necessary information for protecting personnel and infrastructure. Complete development of forced-entry, ballistic and blast resistant doors to support US facilities abroad. Complete development of an automatic target recognition and improved gimbal control, to maneuver in rough terrain, for on-the-move, standoff IED detection. Complete development of a rapidly deployable, temporary barrier system to protect fixed and expeditionary facilities in response to increased threat levels. Complete development of tactical arresting systems designed to stop vehicles over a short distance. Complete development of an Advanced Diver Data Display System final prototype for combat swimmers. Complete development of an advanced active diver thermal protection system for long exposure dives, including SEAL Delivery Vehicle (SDV) operations. Complete development and upgrade of a tactical compact aerostat surveillance system for intelligence, surveillance and reconnaissance, as well as communication between non-line-of-sight (NLOS) forces. Continue development of decision aids for first responders and military engineers by testing explosives effects in an urban environment, to include Historic Masonry and frangible front structures. Continue development of an in-tunnel unmanned aerial vehicle (UAV) that will provide the ability to safely conduct reconnaissance of discovered illicit tunnels and/or scheduled inspections of underground municipal infrastructures (UMIs) for evidence of interconnecting tunnel activity. Initiate development of a fast-running ultra-high performance concrete slab model, WAC-U, and improve tools for design, protective use, and vulnerability assessments. Complete development of a high performance towed sled to provide increased payload and deployment options for existing combatant craft used by Naval Special Warfare (NSW). Initiate development of a surveillance system with automated 360-degree long range scanning capability (optical radar) to protect the Force in Tactical Combat Outposts. Continue development of computer modeling and simulation program to determine the smallest booster size needed to initiate detonation of Ammonium Nitrate Prill in shipping configuration to determine</p>			

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<p>screening and detection capability needed to prevent the weaponization of fertilizer being transported in public areas. Continue development of materials and mechanisms for tactical delivery of novel non-lethal solutions for maritime vessel disablement. Complete development of US Navy life cycle cost benefit analysis in support of POM decision by conducting intermediate system integration and environmental testing of the HALO Maritime Barrier System. Complete development of a mobile application to enhance and host the Vehicle Explosion Analysis Software. Initiate development of a set of guidelines and certifications that can be used by public, private, academic, and government entities to support the qualification of engineers and architects capable of characterizing and mitigating explosive effects. Complete testing on localized responses from facades to quantify the effects of responding components on blast propagation through a new series of controlled explosive tests at the Urban Canyon Test facility. Complete Joint work between U.S. and Australia to test, characterize and model a novel propane tank Vehicle Borne Improvised Explosive Device (VBIED) threat. Continue development of a portable and ruggedized body scanner for personnel protection missions based on the existing AIT stationary body scanner system developed by Tek84. In accordance with Congressional direction to work with Israel to counter tunnel threats, PS will complete development of two distinct versions of preliminary tunnel mapping system demonstrators that leverage research and technology developed under a previous task. Complete development of a system that can determine the path of a long underground conductor, given a known end of the conductor. Continue development of a subterranean communications system that is man portable and will give operators the ability to effectively communicate within a tunnel. Continue development of a small, lightweight, parachute-balloon based, tethered tunnel scanning system which will be able to maneuver inside tunnels and provide ISR to operators on surface via real time video transmission. Complete joint test and evaluation of the IDAN kit, a portable system that can be used to quickly block tunnel entrances/exits as well as doorways in underground tunnels. Continue development of a bi-static electromagnetic cavity countermeasure prototype for detection of existing tunnels (voids) and existing tunnels containing conductive infrastructure. Continue development of a joint multi-disciplinary geophysical survey kit, comprised of two distinct classified tools. Complete preliminary development of a test site to evaluate and optimize advanced geophysical survey capabilities for use in terrains and geologies of particular interest to the US and Israel. Complete development of an airborne variant of the T-track system, to determine the path of a long underground conductor, given a known end of the conductor, at low altitudes. Initiate development of a mobile system for stand-off detection and mapping of specified geophysical phenomena using technology developed under previous bilateral tasks. Initiate development and integration of an extended coverage system for novel border protection applications and test and evaluate the integrated system in different terrain/geophysical conditions. Initiate adaptation of commercial drilling capabilities and techniques for novel military and homeland defense applications. Initiate development of a fast drilling capability for use under combat conditions in various terrains. Initiate adaptation of existing sensors to detect underground geophysical phenomena from the surface. Initiate test and evaluation of borehole antennas for geophysical survey applications to determine capability for subsurface profiling and object detection.</p> <p><b>FY 2017 Plans:</b></p>			

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
---	----------------	----------------	----------------

<p>Continue development of decision aids for first responders and military engineers by testing explosives effects in an urban environment, to include Historic Masonry and frangible front structures. Complete development of an in-tunnel unmanned aerial vehicle (UAV) that will provide the ability to safely conduct reconnaissance of discovered illicit tunnels and/or scheduled inspections of underground municipal infrastructures (UMIs) for evidence of interconnecting tunnel activity. Complete development of a fast-running ultra-high performance concrete slab model, WAC-U, and improve tools for design, protective use, and vulnerability assessments. Complete development of a surveillance system with automated 360-degree long range scanning capability (optical radar) to protect the Force in Tactical Combat Outposts. Complete development of computer modeling and simulation program to determine the smallest booster size needed to initiate detonation of Ammonium Nitrate Prill in shipping configuration to determine screening and detection capability needed to prevent the weaponization of fertilizer being transported in public areas. Complete development of materials and mechanisms for tactical delivery of novel non-lethal solutions for maritime vessel disablement. Complete development of a portable and ruggedized body scanner for personnel protection missions based on the existing AIT stationary body scanner system developed by Tek84. Complete development of a subterranean communications system that is man portable and will give operators the ability to effectively communicate within a tunnel. Complete development of a small, lightweight, parachute-balloon based, tethered tunnel scanning system which will be able to maneuver inside tunnels and provide ISR to operators on surface via real time video transmission. Complete development of a bi-static electromagnetic cavity countermeasure prototype for detection of existing tunnels (voids) and existing tunnels containing conductive infrastructure. Complete development of a joint multi-disciplinary geophysical survey kit, comprised of two distinct classified tools. Continue development of a set of guidelines and certifications that can be used by public, private, academic, and government entities to support the qualification of engineers and architects capable of characterizing and mitigating explosive effects. Continue development of a mobile system for stand-off detection and mapping of specified geophysical phenomena using technology developed under previous bilateral tasks. Continue development and integration of an extended coverage system for novel border protection applications and test and evaluate the integrated system in different terrain/geophysical conditions. Continue adaptation of commercial drilling capabilities and techniques for novel military and homeland defense applications. Continue development of a fast drilling capability for use under combat conditions in various terrains. Continue adaptation of existing sensors to detect underground geophysical phenomena from the surface. Continue test and evaluation of borehole antennas for geophysical survey applications to determine capability for subsurface profiling and object detection.</p>			
--	--	--	--

<b>Title:</b> SURVEILLANCE, COLLECTION AND OPERATIONS SUPPORT	19.068	17.034	10.651
<p><b>Description:</b> Identify high-priority user requirements and special technology initiatives focused primarily on countering terrorism through offensive operations. Enhance US intelligence capabilities to conduct retaliatory or preemptive operations and reduce the capabilities and support available to terrorists.</p> <p><b>FY 2015 Accomplishments:</b></p>			

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
---	----------------	----------------	----------------

Completed a capability to manage and protect privacy and personal information from ISIL operatives to include social networks and public databases. Continued development and testing of standardized canine explosive scent training kits to assist personnel that combat ISIL. Continued development of Unmanned Aerial Vehicles to reduce payloads for effective and efficient communication relays to counter ISIL. Continued development of multimedia exploitation human language technology tools for required new languages and for insertion into operational settings to better combat ISIL. Initiated the development of customized force tracking capabilities to combat ISIL into existing fielded technologies. Initiated the integration of public databases into a single user interface application to protect privacy and personal information from ISIL operatives. Initiated development of enhanced technology to assist analysts with biometric intelligence and reporting on ISIL personnel. Initiated deployment of field technical surveillance capabilities against ISIL and enhance custom force tagging, tracking and locating capabilities. Initiated the development of a software application capable of collecting performance and biographical data for selection and assignment of military personnel, complex modeling, and demand forecasting to assign the appropriate personnel to combat ISIL.

**FY 2016 Plans:**

Complete development and testing of standardized canine explosive scent training kits to assist personnel that combat ISIL. Continue development of Unmanned Aerial Vehicles to reduce payloads for effective and efficient communication relays to counter ISIL. Complete development of multimedia, exploitation human language technology tools for required languages and for insertion into operational settings to better combat ISIL. Complete development of customized force tracking capabilities to combat ISIL into existing fielded technologies and transition existing systems and tools. Continue to integrate public databases into a single user interface application to protect privacy and personal information from ISIL operatives. Complete development of enhanced technology to assist analysts with biometric intelligence and reporting on ISIL personnel. Initiate the development of enhanced capabilities to facilitate Computer Network Operations against ISIL. Continue deployment of field technical surveillance capabilities against ISIL and enhance custom force tagging, tracking and locating capabilities. Complete the development of a software application capable of collecting performance and biographical data for selection and assignment of military personnel, complex modeling, and demand forecasting to assign the appropriate personnel to combat ISIL. Initiate the development of convergence solutions to support sustained operations by deployed elements combating ISIL through enhanced layered capabilities.

**FY 2017 Plans:**

Complete development of Unmanned Aerial Vehicles to reduce payloads for effective and efficient communication relays to counter ISIL. Initiate new capabilities focused on Human Language Technology and multimedia exploitation in critical languages for operational use against ISIL at the strategic and tactical levels. Complete the integration of public databases into a single user interface application to protect privacy and personal information from ISIL operatives. Continue development of enhanced capabilities to facilitate Computer Network Operations against ISIL. Continue deployment of field technical surveillance capabilities

<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
---	----------------	----------------	----------------

against ISIL and enhance custom force tagging, tracking and locating capabilities. Continue the development of convergence solutions to support sustained operations by deployed elements combating ISIL through enhanced layered capabilities.			
---	--	--	--

<b>Title:</b> TACTICAL OPERATIONS SUPPORT	16.134	16.350	10.353
---	--------	--------	--------

**Description:** The Tactical Operations Support subgroup’s mission is to execute rapid research and development projects that enhance capabilities of DoD and Interagency special operations tactical teams engaged in finding, fixing, and finishing terrorists. This includes support to state and local law enforcement agencies to combat domestic terrorism. The development focus is enabling small tactical units of dominance by providing state of the art overmatch capabilities in: Offensive Systems; Unconventional Warfare, Counter-Insurgency Support; Tactical Communications; Tactical Reconnaissance, Surveillance, and Target Acquisition Systems (T-RSTA); Specialized Infiltration, Access and Exfiltration Systems; Survivability Systems.

**FY 2015 Accomplishments:**  
 Completed development and delivery of a next generation tactical mesh network system that provides a self-healing, ad hoc mesh network for the transmission of real-time communications (voice and data) utilizing an Android and Windows application. Completed development and delivery of a 20 pound micro tactical ground robot capable of negotiating rugged terrain and climbing obstacles in complex urban and subterranean environments to obtain visual and acoustic surveillance and reconnaissance to defeat improvised explosive devices. Completed development and delivery of a remotely controlled tactical robotics platform capable of casualty evacuation (CASEVAC), emergency resupply, counter – improvised explosive device (C-IED), and chemical, biological, radiological, nuclear, and explosive (CBRNE) tasks. Completed development and delivery of a single man-portable, collapsible-wing tactical small unmanned aerial system with a secure mobile ad-hoc mesh radio network data-link that is capable of being assembled and hand-launched in less than 60 seconds. Completed development and delivery of an enhanced mobile mortar targeting system mounted on a non-standard vehicle with an integrated Fire Control System that provides extremely rapid and highly accurate indirect fire solutions using legacy 81mm mortar ammunition. Completed development and delivery of program of instruction advanced training and kit to Special Operations Forces (SOF) and select interagency tactical operations snipers to increase first round hit capability, decrease time in the kill chain, and improve long range target interdiction of multiple targets at varying ranges, with an increased maximum effective range of 1,800 meters. Completed development and delivery of a small, weapon rail mounted, un-cooled long wave infrared detector system to provide snipers with an advanced high resolution thermal imagery to conduct target interdiction operations effectively and efficiently at distances out to 1,800 meters. Completed development and delivery of a Special Operation Forces (SOF) advanced ballistic engine and rangefinder capability to increase first round hit capability and provide for ease-of-use shot correction information for warfighters. Continued development and delivery of a tactical tethered aerial ISR capability via an indigenous, non-standard mobility platform that provides austere locations with rapid and improved organic situational awareness. Completed development and delivery of an online and social media awareness video for DOD and Interagency family members to educate on current threats and mitigate vulnerabilities. Completed development and delivery of a cyber-advanced support operations course focused on training tactical operators to

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<p>screen social media with mis-attribution for operational preparation of the environment and force protection. Completed feasibility and terminated a candidate tactical platform marking kit capable of discretely tagging stationary and moving targets for tracking with legacy night vision devices. Completed development and delivery of an extremely low volume, low profile, concealable GPS logger. Completed development and delivery of an ultra-light weight, fast deployable, extremely ruggedized hand-carried unmanned ground system. Completed development and delivery of a mobile mesh network repeater system to expand the capabilities of the micro tactical ground robot system in subterranean environments. Completed development and delivery of an export variant capability that integrates a commercial grade encryption, wireless mobile mesh ad-hoc network, Android green and blue force tracking, and video teleconferencing, with integrated devices for situational awareness in real-time. Continued development of a sniper ballistic and downwind sensor system to increase first round hit capability. Continued development of an acoustic tooth communicator system for low-visibility operations. Continued development of a high-definition aerial Intelligence, Surveillance, and Reconnaissance (ISR) gimbal payload for specified air platforms that will significantly upgrade situational awareness and intelligence through higher fidelity imaging capabilities. Continued development of a man-portable aerial radar system that can detect unmanned aerial vehicles and ultralights at the tactical edge. Continued effort on an air mobility vehicle analysis of alternatives initiative to conduct training and an operational feasibility assessment for unconventional warfare. Continued development of a portable tactical micro marker system to enhance personnel recovery operations. Continued a test and evaluation of a new ground mobility vehicle for Special Operations Forces (SOF) that increases survivability and provides signature reduction. Continued development of an underwater vision enhancement device for ship hull inspections in turbid water and for maritime to land operations. Continued development of a multispectral augmented visually enhanced reality imaging capability that provides a significant advantage for long range target acquisition in challenging environments. Continued development of a maritime canister launched small unmanned aerial system for amphibious and maritime operations requiring overhead aerial ISR capabilities. Initiated development of a next generation small arms signature reduction suppressors for the MK18 CQBR and M4. Initiated development of a lightweight intermediate caliber cartridge utilizing polymer material technologies to reduce combat load and enhance terminal ballistics. Initiated development of a 5.56mm polymer round to reduce weight for standard issue rounds, enhancing combat effectiveness and reducing warfighter operational load and cost. Initiated development of an enhanced military free fall navigation board that incorporates Android applications for greater command and control and mission planning/execution. Initiated development of microSD chips that provide state-of-the-art high computing at very low power that can create dual personas, enabling secure communication on a smartphone device. Initiated development of a man-portable optical camera system capable of being deployed in complex urban confined spaces, traversing 90 degree corners and obstacles to provide high fidelity situational awareness to law enforcement and SOF tactical teams. Initiated development of a non-pyrotechnic diversionary device that will mitigate collateral damage in confined spaces. Initiated development of a Multi-Role Thermal Survivability System (MRTSS) to support tactical operators conducting aviation, ground mobility, and first responder combating terrorism (CbT) missions. Initiated development and evaluation of a social media analysis tool for tactical operators. Initiated development of a system that attaches to a smartphone that enables tactical operators to measure areas rapidly to gain a 3D model. Initiated development of a lethal miniature aerial munition system (LMAMS) with substantially improved</p>			

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z I <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<p>maneuverability, attack angle, loiter time, and lethality with a full mission profile flight training variant. Initiated development and delivery of an unclassified, open source digital operations technical course tailored to train tactical operators in a digital dojo environment to understand the cyber domain and to identify and mitigate cyber threats. Initiated development and delivery of a tactical level training course that teaches enhanced operational preparation of the environment and force protection within the digital social media publically accessible information domain to execute 21st Century Special Warfare mission sets. Initiated development of a next-generation small unmanned aircraft system stabilized gimbal that integrates laser target designation technologies.</p> <p><b>FY 2016 Plans:</b>                      Complete development and delivery of a sniper ballistic and downwind sensor system to increase first round hit capability. Complete development and delivery of an acoustic tooth communicator system for low-visibility operations. Complete development and delivery of a high-definition aerial Intelligence, Surveillance, and Reconnaissance (ISR) gimbal payload for specified air platforms that will enhance situational awareness and intelligence through higher fidelity imaging capabilities. Complete development and delivery of a man-portable aerial radar system that can detect unmanned aerial vehicles and ultralights at the tactical edge. Complete development and delivery of a tactical tethered aerial ISR capability via an indigenous, non-standard mobility platform that provides austere locations with rapid and improved organic situational awareness. Complete and deliver an air mobility vehicle analysis of alternatives and demonstration initiative to conduct training and an operational feasibility assessment for unconventional warfare. Complete development and delivery of a portable tactical micro marker system to enhance personnel recovery operations. Complete a test and evaluation of a new ground mobility vehicle for Special Operations Forces (SOF) that increases survivability and provides signature reduction. Complete development and delivery of an underwater vision enhancement device for ship hull inspections in turbid water and for maritime to land operations. Complete development and delivery of a mobile mesh network repeater system to expand the capabilities of the micro tactical ground robot system in subterranean environments. Continue development of a multispectral augmented visually enhanced reality imaging capability that provides a significant advantage for long range target acquisition in challenging environments. Continue development of a maritime canister launched small unmanned aerial system for amphibious and maritime operations requiring overhead aerial ISR capabilities. Complete development and delivery of a next generation small arms signature reduction suppressors for the MK18 CQBR and M4. Complete development and delivery of a lightweight intermediate caliber cartridge utilizing polymer material technologies to reduce combat load and enhance terminal ballistics. Complete development and delivery of a 5.56mm polymer round to reduce weight for standard issue rounds, enhancing combat effectiveness and reducing warfighter operational load and cost. Complete development and delivery of an enhanced military free fall navigation board that incorporates Android applications for greater command and control and mission planning/execution. Complete development and delivery of microSD chips that provide state-of-the-art high computing at very low power that can create dual personas, enabling secure communication on a smartphone device. Complete development and delivery of a man-portable optical camera system capable of being deployed in complex urban confined spaces, traversing 90 degree corners and obstacles to provide</p>			

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<p>high fidelity situational awareness to law enforcement and SOF tactical teams. Complete development and delivery of a non-pyrotechnic diversionary device that will mitigate collateral damage in confined spaces. Complete development and delivery of a Multi-Role Thermal Survivability System (MRTSS) to support tactical operators conducting aviation, ground mobility, and first responder combating terrorism (CbT) missions. Complete development, delivery, and evaluation of a social media analysis tool for tactical operators. Complete development and delivery of a system that attaches to a smartphone that enables tactical operators to measure areas rapidly to gain a 3D model. Continue development of a lethal miniature aerial munition system (LMAMS) with substantially improved maneuverability, attack angle, loiter time, and lethality with a full mission profile flight training variant. Continue development and delivery of an unclassified, open source digital operations technical course tailored to train tactical operators in a digital dojo environment to understand the cyber domain and to identify and mitigate cyber threats. Continue development and delivery of a tactical level training course that teaches enhanced operational preparation of the environment and force protection within the digital social media publically accessible information domain to execute 21st Century Special Warfare mission sets. Continue development of a next-generation small unmanned aircraft system stabilized gimbal that integrates laser target designation technologies. Initiate development of a state-of-the-art amplified speaker unit to work with a number of military and commercial radio devices. Initiate development of a next generation Lightweight Medium Machine Gun (MMG) and ammunition to give operators a distinct advantage in both the extended and close-in fight and can transition rapidly from mounted operations to dismounted operations. Initiate development of a modular multi-ability rapidly reconfigurable hand launched small unmanned aircraft system with a common controller that is capable of being re-configured in the field for mission specific tasks. Initiate development of an increased field of view night vision device for Special Operations Forces (SOF). Initiate development of capabilities for next generation specialized access breaching capabilities involving explosives and hand-held devices. Initiate development of a capability to self-geolocate without causing an RF signature and without relying on GPS capabilities. Initiate development of a night vision device that increases the capability of a tactical operator working in a subterranean environment. Initiate development of a night vision device with Israel that increases the capability of a tactical operator working in a subterranean environment. Initiate development of a night vision device for US operators only that increases the capability of working in a subterranean environment.</p> <p><b>FY 2017 Plans:</b> Complete development and delivery of a multispectral augmented visually enhanced reality imaging capability that provides a significant advantage for long range target acquisition in challenging environments. Complete development and delivery of a maritime canister launched small unmanned aerial system for amphibious and maritime operations requiring overhead aerial ISR capabilities. Complete development and delivery of a lethal miniature aerial munition system (LMAMS) with substantially improved maneuverability, attack angle, loiter time, and lethality with a full mission profile flight training variant. Complete development and delivery of an unclassified, open source digital operations technical course tailored to train tactical operators in a digital dojo environment to understand the cyber domain and to identify and mitigate cyber threats. Complete development and delivery of a tactical level training course that teaches enhanced operational preparation of the environment and force protection within the</p>			

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
---	----------------	----------------	----------------

<p>digital social media publically accessible information domain to execute 21st Century Special Warfare mission sets. Complete development and delivery of a next-generation small unmanned aircraft system stabilized gimbal that integrates laser target designation technologies. Complete development and delivery of a state-of-the-art amplified speaker unit to work with a number of military and commercial radio devices. Continue development of a next generation Lightweight Medium Machine Gun (MMG) and ammunition to give operators a distinct advantage in both the extended and close-in fight and can transition rapidly from mounted operations to dismounted operations. Initiate development of a 7.62mm cartridge that yields a reduced volume case and keeps the propellant load density high to maintain even ignition and consistent flame spread characteristics. Continue development of a modular multi-ability rapidly reconfigurable hand launched small unmanned aircraft system with a common controller that is capable of being re-configured in the field for mission specific tasks. Continue development of an increased field of view night vision device for Special Operations Forces (SOF). Continue development and delivery of capabilities for next generation specialized access breaching capabilities involving explosives and hand-held devices. Continue development of a capability to self-geolocate without causing an RF signature and without relying on GPS capabilities. Continue development of a night vision device that increases the capability of a tactical operator working in a subterranean environment. Continue development of a night vision device with Israel that increases the capability of a tactical operator working in a subterranean environment. Continue development of a night vision device for US operators only that increases the capability of working in a subterranean environment.</p>			
--	--	--	--

<b>Title:</b> TRAINING TECHNOLOGY DEVELOPMENT	10.183	7.900	6.161
---	--------	-------	-------

**Description:** The TTD Subgroup’s objective is to provide SOF, DoD, and the interagency community with agile, rapid response, R&D capabilities for optimizing performance in the operational environment and increasing readiness for tomorrow’s threats. To meet this objective, the subgroup develops human centered technologies that are performance outcome focused in the areas of mobile learning solutions; human performance tools and techniques; immersive and adaptive learning environments; and advanced education and technical skill enhancement methods. TTD’s innovative training capabilities are implemented globally to prepare for critical missions in any operational environment to identify, disrupt, and defeat terrorist threats.

**FY 2015 Accomplishments:**  
 Completed development and implementation of interactive, three-dimensional (3D) animated training scenarios depicting Improvised Explosive Device threats to enhance situational awareness and decision-making for novice and experienced certified public safety responders, federal, and military personnel. Completed two course iterations for training maritime low visibility operations skillsets for personnel to illuminate IED networks. Completed development and evaluation of a system of systems that integrates psychological and behavioral information and technology to predict and optimize human physical performance. Completed development and validation of a performance support system for computer-based training of Regionally Aligned Forces (RAF) Units with customized content based on real-world socio-cultural data from security and/or stability missions. Completed a training needs analysis on the topic of virtual currency and its ties to terrorist activity. Completed design and development of a one-week instructor-led technical surveillance course, and a computer-based prerequisite course and

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
<p>assessment. Continued development and implementation of a training capability for Explosive Ordnance Disposal (EOD) technicians and first responders that identify safe areas/distances to perform duties with minimal risk of injury from overpressure and blast fragmentation caused by Improvised Explosive Devices (IEDs) and breaching charges. Initiated evaluation of a live fire targetry simulation training system to develop and maintain long range shooting skill sets. Initiated development of low-cost robotic targets that move autonomously on a live-fire training range to enhance marksmanship skills and decision making. Initiated design and development of a training and performance support tool for use on mobile devices in operational environments. Initiated design and development of a suite of augmented reality tools for mobile wearable platforms. Initiated development of 3D software models and a mobile application to train features and functions of SOF-Peculiar weapons. Initiated design, development, and implementation of a multi-week special warfare commercial communications course.</p> <p><b>FY 2016 Plans:</b> Complete development of animated computer models for use in a training capability for Explosive Ordnance Disposal (EOD) technicians and first responders on the topic of safe areas/distances to perform duties with minimal risk of injury from overpressure and blast fragmentation. Complete evaluation of a live fire targetry simulation training system to develop and maintain long range shooting skill sets. Complete development of low-cost robotic targets that move autonomously on a live-fire training range to enhance marksmanship skills and decision making. Complete development and evaluation of a training and performance support tool for use on mobile devices in operational environments. Complete development of a suite of augmented reality tools for mobile wearable platforms. Complete development of software models and a mobile application to train features and functions of SOF-Peculiar weapons. Complete development and implementation of a multi-week special warfare commercial communications course. Complete the evaluation of a reactive shooter course incorporating wearable device human performance measures. Complete final course iteration and technology delivery for training maritime low visibility operations skillsets for personnel to illuminate IED networks. Initiate training development on the topic of virtual currency and its ties to terrorist activity. Initiate design and development of task force officer verification and refresher training for delivery on a mobile device. Initiate the development of a virtual reality training capability for pre-mission tasks associated with AC-130 operations.. Initiate the implementation, evaluation, and refinement of a second generation system designed to enhance visual acuity and improve operational visual task performance.</p> <p><b>FY 2017 Plans:</b> Complete training development on the topic of virtual currency and its ties to terrorist activity. Complete the design and development of Task Force Officer verification and refresher training for delivery on a mobile device.. Complete the development of a virtual reality training capability for pre-mission tasks associated with AC-130 operations. Initiate development of an instructor-led training support package for law enforcement personnel tasked with detecting adversarial surveillance in CONUS locations. Complete the implementation, evaluation, and refinement of a second generation system designed to enhance visual acuity and improve operational visual task performance. Initiate the development, implementation and evaluation of an OCONUS low visibility operations course. Initiate the design and development of training software for officers to accomplish immersive use of</p>			

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Office of the Secretary Of Defense	<b>Date:</b> February 2016
---	----------------------------

<b>Appropriation/Budget Activity</b> 0400: <i>Research, Development, Test &amp; Evaluation, Defense-Wide I BA 3: Advanced Technology Development (ATD)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0603122D8Z / <i>Combating Terrorism Technology Support</i>
---	---

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2015</b>	<b>FY 2016</b>	<b>FY 2017</b>
force decision-making training from a desktop computer or tablet. Initiate the development of a training capability that models critical variables relevant to sniper performance allowing the sniper to make decisions and see the result of those decisions in a simulated environment. Initiate the design and development of Remotely Operated Vehicle (ROV) training simulator incorporating the use of the ROV's cameras sonar and navigation software. Initiate the analysis for and design of a system for snipers to practice sniper skills and receive ballistically accurate feedback in an environment where live fire is not available or feasible. Initiate the analysis for and design of a virtual environment accessible via a PC which provides a 15 city block by 15 city block environment with pervasive, non-player characters to immerse students and instructors into realistic, city-based training scenarios.			
<b>Accomplishments/Planned Programs Subtotals</b>	99.121	148.030	73.002

**D. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**E. Acquisition Strategy**

N/A

**F. Performance Metrics**

N/A