Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Office of the Secretary Of Defense	Date: February 2016
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603699D8Z / *Emerging Capabilities Technology Development*

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	97.771	68.640	40.949	49.895	-	49.895	29.903	38.118	38.658	39.437	Continuing	Continuing
P795: *Emerging Capabilities Technology Development*	97.771	68.640	40.949	49.895	-	49.895	29.903	38.118	38.658	39.437	Continuing	Continuing

Note

The Emerging Capabilities Technology Development (ECTD) Program Element (PE) supports a focus throughout the Office of the Deputy Assistant Secretary of Defense for Emerging Capability & Prototyping (DASD(EC&P)) on producing risk-reducing proof-of-principle prototypes and demonstrations of emerging technologies coordinated through interagency and joint partnerships. ECTD will support the Assistant Secretary of Defense for Research & Engineering (ASD(R&E)) under the mitigating new and emerging threats priority area with longer-term, mission-focused capability development that crosses functional domains to enhance Warfighter adaptability and resilience. The office, in collaboration with government labs, academia and industry will execute projects that target specific mission capability gaps identified by the Combatant Commands (COCOMs), the Joint Staff and senior leadership in the Office of the Secretary of Defense.

A. Mission Description and Budget Item Justification

The ECTD funding supports projects that reduce the technology risk of emerging capabilities by advancing proof-of-principle prototypes in support of near and mid-term operational engagements and stability operations. The framework is guided by the ASD(R&E), DASD(EC&P) and the Rapid Reaction Technology Office's science and technology objectives and focus areas. With an emphasis on interagency and joint partnerships, ECTD develops initiatives to produce capability options that anticipate and inform formal joint and interagency requirements and acquisition processes. Individual projects generally span one to three years, typically at a cost of less than $4.000 million, and are demonstrated and released in spirals within the project timeline. The ECTD program focuses on rapid prototyping of emerging technologies, including electromagnetic spectrum-agile capability options, multi-domain, autonomous systems, counter-weapons of mass destruction and dismounted soldier systems.

B. Program Change Summary ($ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Previous President's Budget	33.658	33.515	32.079	-	32.079
Current President's Budget	68.640	40.949	49.895	-	49.895
Total Adjustments	34.982	7.434	17.816	-	17.816
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	7.500			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.945	-			
• Other Internal Baseline Adjustment	-	-	18.095	-	18.095
• FY15 Reprog. for Cancelled Account	-0.013	-	-	-	-

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• Other Reprogrammings	35.940	-	-	-	-
• FFRDC Reduction	-	-0.066	-	-	-
• Economic Assumptions	-	-	-0.279	-	-0.279

Change Summary Explanation

The FY 2017 funding increase of $18.095 million is being applied to proof-of-principle demonstrations and prototypes of emerging technologies as well as prototypes designed to counter threats from international information and strategic communications operations.

The FY 2015 funding increase involves funding for higher Department priorities that support the Advanced Capabilities Deterrence Panel / Third Offset strategy. The Long Endurance Airborne Platform (LEAP) project reprogrammed $24.000 million to improve battlespace awareness in the U.S. Central Command (USCENTCOM) Area of Responsibility (AOR). The Missile Defeat Project increase of $11.250 million addressed an operational need in the U.S. Strategic Command (USSTRATCOM) and U.S. Pacific Command (USPACOM) Areas of Responsibility.

Exhibit R-2A, RDT&E Project Justification: PB 2017 Office of the Secretary Of Defense			Date: February 2016
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603699D8Z / *Emerging Capabilities Technology Development*	Project (Number/Name) P795 / *Emerging Capabilities Technology Development*	

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
P795: *Emerging Capabilities Technology Development*	97.771	68.640	40.949	49.895	-	49.895	29.903	38.118	38.658	39.437	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Emerging Capabilities Technology Development (ECTD) funding supports projects that reduce the technology risk of emerging capabilities by advancing proof-of-principle prototypes in support of near and mid-term operational engagements and stability operations. The framework is guided by the Office of the Assistant Secretary of Defense, Research and Engineering (ASD(R&E)), the Deputy Assistant Secretary of Defense, Emerging Capability & Prototyping (DASD(EC&P)) and the Rapid Reaction Technology Office science and technology objectives and focus areas. With an emphasis on interagency and joint partnerships, ECTD develops initiatives to produce capability options that anticipate and inform formal joint and interagency requirements and acquisition processes. Individual projects generally span one to three years, typically at a cost of less than $4.000 million, and are demonstrated and released in spirals within the project timeline. The ECTD Program focuses on rapid prototyping of emerging technologies including electromagnetic spectrum-agile capability options, multi-domain, autonomous systems, counter-weapons of mass destruction and dismounted soldier systems.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Title: Product Architectures, Design and Manufacturing for Operational Responsiveness	1.250	0.000	-
Description: This project demonstrated the gains to be realized by tightly coupling product architectures with manufacturing and design tools, using a prototype unmanned aerial system (UAS) architecture for demonstration purposes. The UAS architecture serves as a test bed for research in system physical and autonomy architectures and their complementary design tools in applying additive manufacturing to accelerate development by orders of magnitude. The demonstration platform for this effort is a modular, rapidly designed and reconfigurable UAS with modules built using additive manufacturing, to enable: construction at any location; structural design tools and methods that guide and constrain designers to provide guarantees on performance and manufacturability; a layered control system architecture that reuses the supervisory and actuator levels of control; and, a system level design tool that allows the user to configure a new vehicle, predict its performance, and automatically generate the flight control laws for the new configuration.			
FY 2015 Accomplishments: The project produced a final prototype system and training materials for a structures design module. Final measures of operational responsiveness and training metrics were provided. The UAS architecture is readily transferrable to operators and the training material is available for use. The products transitioned to Naval Air Systems Command for further toolset development. Additionally, the adaptive design approach has been adopted by elements of the Joint Improvised-threat Defeat Agency (JIDA).			
FY 2016 Plans:			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Using prior year funds, a demonstration of the design and fabrication of the UAS will be conducted in support of emergent requirements by operational personnel.			
Title: Low Cost Missile Defeat (LCMD) Prototype ***Description:*** Low Cost Missile Defeat (LCMD) is a ballistic missile defense system designed to counter current and emerging weapons of mass destruction (WMD) and anti-access/area denial (A2/AD) threats using primarily existing commercial off-the-shelf (COTS) technology. LCMD program execution has been structured using a building block approach. The first phase successfully produced an in-depth system design to provide the mission performance baseline leading to a validated concept of operations (CONOPS). The CONOPS for the system has been formulated to integrate LCMD into the existing National Ballistic Missile Defense (BMD) architecture and will prioritize the use of existing components and systems already fielded. LCMD is a lower cost complementary/augmentative component to forward-deployed BMD assets. The LCMD capability will augment current BMD systems and mitigate threat vulnerabilities to U.S. personnel and strategic assets. ***FY 2015 Accomplishments:*** Efforts focused on accelerating technology maturation and risk reduction. System design, performance and cost/value trade studies were conducted according to the LCMD analysis plan to refine and validate the system concept and assess the maturity of the required technology. High fidelity simulations and engineering analyses were developed to characterize detailed mission performance, integration interfaces with existing ballistic missile defense infrastructure, and the system's ability to address validated capability gaps. In addition, the maturity of three critical technology areas was advanced through additional detailed design work and component level testing. Technical coordination with the Missile Defense Agency and Ballistic Missile Defense program was initiated. The studies concluded the LCMD concept presents a promising approach to lowering threat ballistic missile engagement costs and is suitable for transition to a Critical Design Review phase. The analysis conducted in ECTD complements developmental research being conducted in Program Element 0603648D8Z. This effort will transition to Program Element 0603648D8Z in FY 2016.	3.500	-	-
Title: Long Endurance Airborne Platform (LEAP) ***Description:*** Long Endurance Airborne Platform (LEAP) provides a revolutionary, low-cost, low acoustic signature, persistent aerial Intelligence, Surveillance and Reconnaissance (ISR) capability by converting a proven, fuel-efficient Light Sport Aircraft into an Unmanned Aerial System (UAS). LEAP addresses the operational need for improved battlespace awareness in the USCENTCOM Area of Responsibility (AOR). ***FY 2015 Accomplishments:***	24.000	-	-

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
The team completed flight testing for the LEAP design which has a takeoff weight of 1650 pounds, 30+ hours endurance, and carries a beyond-line-of-sight (BLOS) satellite communication (SATCOM) command and control/data relay capability along with full motion video, day/night imaging and radio direction finding payloads.			
Title: Multimodal Hostile Fire Detection System ***Description:*** The Multimodal Hostile Fire Detection System (MHFDS) integrated multiple hostile shot detection technologies through data fusion algorithms and ballistic models. The system conducted point-of-origin shot detection and classified threats in multi-shooter scenarios. This effort is a critical subsystem for the Rapid Reaction Technology Office's (RRTO) Remote Weapon Station (RWS) Auto Prioritization, Targeting, and Operator Cueing (RAPTOR) project. This effort will also transition proof of principle technologies, fulfilling a requirement for the Army Ground Based Operational Surveillance System (Expeditionary) (GBOSS(E)). ***FY 2015 Accomplishments:*** Demonstrated small arms multi-shooter detection, providing point-of-origin and weapon identification information. The MHFDS system was integrated with the RAPTOR system. ***FY 2016 Plans:*** Using prior year funding, development will focus on fusing detection signatures for small arms and large arms. A prototype ground demonstration is planned to evaluate the system's capability to detect and classify hostile fire in complex fire fights with multiple hostile engagements and support a transition decision for the U.S. Army.	2.500	0.000	-
Title: X-Lab ***Description:*** X-Lab will develop a robust architecture that will query numerous extremely large data sets to provide solutions to challenging problems. Initial work focused on leveraging data sets to provide early indications of activities leading to a terrorist or state-sponsored attack using weapons of mass destruction (WMD). X-Lab will develop and assess analytic methods and tools for finding and correlating multiple subtle signatures associated with biological WMD development and employment. Early detection and warning of precursor activities can enable intervention, earlier localization of response, and earlier deployment of countermeasures. ***FY 2015 Accomplishments:*** In FY 2015, X-Lab developed systems that automatically integrated and analyzed available image, signals and open source intelligence feeds. X-Lab implemented an infrastructure, process and analytic tools for detection of precursor activity related to the execution of a biological WMD attack. The capability was assessed with analysts operating in a Red-Blue game format. ***FY 2016 Plans:***	1.900	2.000	-

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
The X-Lab architecture will expand to include access to additional live and archived classified and unclassified data sets to address other challenging problems. The X-Lab system will provide the first ever automated analysis of archived imagery and text data, and will provide advance indications and warnings of a simulated WMD attack in a demonstration for the Joint Staff and Joint Warfare Analysis Center as part of the Special Program for Missile Defeat.			
Title: Missile Defeat ***Description:*** The Missile Defeat effort will support the assessment and development of a suite of capabilities to address emergent strategic and tactical threats. The effort meets strategic goals as directed by the Office of the Under Secretary of Defense for Acquisition, Technology & Logistics (OUSD(AT&L)). The Missile Defeat addresses an operational need in the U.S. Strategic Command (USSTRATCOM) and U.S. Pacific Command (USPACOM) Areas of Responsibility. Details are classified. ***FY 2015 Accomplishments:*** The Missile Defeat effort started multiple projects in support of STRATCOM, PACOM, and the Joint Staff. These projects included beginning the development of initial, system engineering, and test/demonstration plans. Initial assessments were conducted and detailed modeling and simulation tools developed. Additionally, several technology development projects were supported or begun. Further details are classified. ***FY 2016 Plans:*** Using prior year funds, the Missile Defeat effort will develop an updated system architecture and demonstrate and assess new technologies for insertion into the updated architecture that addresses the operational needs of the U.S. Strategic Command (USSTRATCOM) and U.S. Pacific Command (USPACOM). Further details are classified.	11.250	0.000	-
Title: Remote Weapon Station (RWS) Auto Prioritization, Targeting, and Operator Cueing (RAPTOR) ***Description:*** The Remote Weapon Station (RWS) Auto Prioritization, Targeting, and Operator Cueing (RAPTOR) project will develop a prototype for a crew-served weapon system that will semi-autonomously detect, track, prioritize and engage multiple targets with operator determination. This is a joint effort in conjunction with representatives of the U.S. Army Armament Research, Development and Engineering Center (ARDEC), the Joint Non-Lethal Weapons Directorate (JNLWD) and the Office of Naval Research (ONR). These partner organizations will provide subsystems critical for RAPTOR functionality. The combined demonstration of multi-agency science and technology developments will serve to inform the Common Remotely Operated Weapon Station (CROWS) Program of Record. RAPTOR will also inform the development of a Joint Advanced Weapon Sensor System (JAWSS) Capability Development Document (CDD). ***FY 2015 Accomplishments:***	1.300	1.400	-

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
All RAPTOR systems engineering was completed. Integration with the Multimodal Hostile Fire Detection System (MHFDS) and hardware components from partner organizations was initiated. ***FY 2016 Plans:*** The project will complete development of a man-in-the-loop, semi-autonomous Remote Weapon Station (RWS) capable of detecting, tracking, prioritizing and engaging multiple targets. The project will also coordinate partner organizations' technology development efforts to allow the execution of a combined demonstration in a hasty defense scenario. In addition to the planned final demonstration in FY 2016, RAPTOR will participate in additional exercises with the U.S. Army Tank Automotive Research, Development and Engineering Center (TARDEC). The results of the FY 2016 demonstrations and exercises will inform a transition decision to the U.S. Army.			
Title: Battlespace Environmental Monitoring System (BEMS) ***Description:*** This project developed a system to detect radio frequency (RF) emissions in certain portions of the RF spectrum. Detection will inform the radiometer community in remote sensing programs on RF Interference sources, inform Department of Defense of emergent RF emitters and report unusual RF emission patterns that are detected in the environment. The project included the production and fielding of a distributed set of six units to three operational naval vessels that operate in high risk environments. Details of the project are classified. ***FY 2015 Accomplishments:*** BEMS completed design, fabricated systems and deployed on operational Navy ships. The system collected data that will inform the DoD and development community of emergent RF environment issues. No future Emerging Capabilities Technology Development funding has been planned; however, the Navy plans to expand capabilities to include direction finding and deploy additional systems to collect more detailed and comprehensive information on particular environments.	0.520	-	-
Title: Software Defined Radio Frequency Test System (Seeker) ***Description:*** The Software Defined Radio Frequency (RF) Test System, known as Seeker, will develop a rapidly reconfigurable test infrastructure and capabilities to address RF spectrum sharing, spectrum relocation and emergent RF spectrum denial and electronic attack capabilities. The Seeker project is part of ECTD's focus on missile defeat, aimed at addressing emergent strategic and tactical threats to ballistic missile defense and counter emerging weapons of mass destruction (WMD). Details of this project are classified. ***FY 2015 Accomplishments:*** System level design of RF Test Systems was completed for laboratory deployment. ***FY 2016 Plans:***	3.000	2.000	-

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Plans for FY 2016 are to develop prototype systems for assessment of U.S. capabilities in laboratory environments.			
Title: Stiletto Maritime Demonstration Program	2.500	2.500	2.500

Description: Stiletto is a technology demonstration and assessment asset developed to examine and explore emerging technologies and prototypes via a series of maritime technology demonstrations and other activities conducted by the Rapid Reaction Technology Office (RRTO) within the office of the Deputy Assistant Secretary of Defense for Emerging Capability & Prototyping (DASD(EC&P)). Stiletto is an 88-foot boat that serves as a maritime demonstration platform to assist in the assessment and development of prototypes and the rapid transition of emerging technologies across the range of military operations to higher technology readiness levels. Stiletto is an experimental, all carbon fiber craft. It was purposefully designed to rapidly acquire, integrate and employ new capabilities to explore the military utility and reduce the risk of emerging technologies and concepts of operation for special and expeditionary forces, interagency users and international partners. The Stiletto Maritime Demonstration Program offers a streamlined experimentation and demonstration process that encourages system developers to engage directly with the warfighter in the maritime environment to rapidly adapt technologies around operational needs. The Stiletto vessel is home-ported in Norfolk, Virginia.

FY 2015 Accomplishments:
The Stiletto Maritime Demonstration Program focused on autonomous capabilities, situational awareness, net-centric operations and electronic warfare/electronic protection technologies, demonstrating more than 60 technology prototypes. Stiletto conducted three capability demonstrations with operational commands and interagency partners, including Trident Spectre 2015, an interagency exercise focused on operations, intelligence, and technology fusion. Capability demonstrations included an assessment of maritime unmanned aerial vehicle (UAV) capabilities to support Naval Special Warfare and the United Kingdom Ministry of Defense stakeholders; a littoral operations center concept; and communications capabilities while on-the-move at sea. Demonstrations were conducted in partnership with the U.S. Navy, U.S. Coast Guard, U.S. Army, United States Special Operations Command (USSOCOM), United States Southern Command (USSOUTHCOM), the Intelligence Community and other operational users. Technology demonstration opportunities were offered to non-traditional businesses to help mature their systems and increase engagement with the warfighter in the development process. In FY 2015, Stiletto demonstrated 61 technologies, worked with nine small businesses, and achieved $2.5 million in cost avoidance to other government programs.

FY 2016 Plans:
The Stiletto Maritime Demonstration Program will continue to focus on emerging capabilities and threats and will execute capability demonstrations based on needs and priorities identified through engagement with stakeholders in the U.S. Navy, U.S. Coast Guard, U.S. Army, U.S. Marine Corps, USSOCOM, USSOUTHCOM, the Intelligence Community and other operational users. Focus areas for FY 2016 will include biometrics; electronic warfare; asymmetrical force application; autonomous systems; integration with undersea technologies; and, intelligence, surveillance and reconnaissance technologies. Three capability

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
demonstrations are planned for FY 2016, including Trident Spectre 2016 and a joint demonstration with the Thunderstorm Demonstration Program. ***FY 2017 Plans:*** Stiletto will continue to focus on emerging capabilities and threats and will execute capability demonstrations based on needs and priorities identified through engagement with stakeholders in the U.S. Navy, U.S. Coast Guard, U.S. Army, U.S. Marine Corps, Geographic Combatant Commands, the Intelligence Community and other operational users.			
Title: Thunderstorm ***Description:*** This portfolio examines and explores emerging technologies and prototypes via a series of technology demonstrations and other activities conducted by the Rapid Reaction Technology Office within the office of the Deputy Assistant Secretary of Defense for Emerging Capability & Prototyping. Thunderstorm enhances interagency and international collaboration and provides the Department of Defense (DoD) and participating partners with an opportunity to evaluate and assess the capabilities of new and emerging technologies, primarily in the fields of air, space and intelligence, surveillance and reconnaissance (ISR). In addition, Thunderstorm provides an opportunity for technology developers to interact with a specific operational command and/or other government personnel to determine how specific efforts and systems may support or enhance warfighter capability needs. Technology developers are given the opportunity to demonstrate selected technologies in geographically and operationally relevant scenarios. Thunderstorm demonstration objectives, performance measures, lessons learned, post-demonstration assessments and data evaluation serve to inform future DoD technology investments and identify new capabilities and/or new ways to employ existing capabilities. ***FY 2015 Accomplishments:*** Thunderstorm Demonstration Program completed two table top exercises and two live technology demonstrations. The demonstrations included countering small unmanned aerial systems (UAS), Arctic challenges, detection of weapons of mass destruction (WMD) using UAS and anti-personnel landmine alternative technologies. Demonstrations were conducted in partnership with United States Northern Command (USNORTHCOM), United States Pacific Command (USPACOM), United States Special Operations Command (USSOCOM), Defense Threat Reduction Agency (DTRA), Army's Asymmetrical Warfare Group (AWG), Edgewood Chemical Biological Center (ECBC), Navy Expeditionary Combat Command (NECC), Naval Special Warfare Command, Naval Research Laboratory (NRL), U.S. Coast Guard, Department of Homeland Security (DHS), Federal Bureau of Investigation (FBI) and the Intelligence Community (IC). In FY 2015, Thunderstorm demonstrated a total of 28 technologies and worked with operational end users to pursue further research and development and transition opportunities for 11 technologies. ***FY 2016 Plans:***	2.500	2.500	2.500

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Thunderstorm spirals will build on the experience garnered from previous spirals. Focus areas will include physical security of critical port facilities, Counter Unmanned Underwater Vehicles (C-UUV), megacities/subterranean warfare, Arctic challenges and other priorities identified through engagement with stakeholders. A Thunderstorm spiral will be conducted in coordination with the Stiletto maritime demonstration platform. ***FY 2017 Plans:*** Thunderstorm will continue to reflect the most exigent challenges to DoD and provide a venue to explore new and innovative technological solutions. Focus areas will include Counter Unmanned Aerial Systems (C-UAS), Anti-Personal Landmine Alternatives (APL-A) and megacities/subterranean challenges.			
Title: Multi-Domain Demonstrations	1.500	1.500	1.500
Description: Multi-Domain Demonstrations will leverage existing demonstration venues and sites across the military Services to evaluate emerging technologies and prototypes at the system and individual component levels. Multi-domain demonstrations will focus on the integration of emerging capabilities across space, air, sea and ground domains, with specific attention to the recommendations of the Department's Long Range Research and Development Program Plan (LRRDPP). The sponsored demonstrations give non-traditional and other businesses easy access to realistic environments for informal evaluation of emerging technologies. The results of these evaluations enable improvements to prototype systems, inform the procurement process for future enhanced capabilities and alert operational users of capabilities in development. ***FY 2015 Accomplishments:*** Demonstrations were conducted with the Joint Experimental Range Complex at Yuma Proving Grounds, Arizona, to evaluate low-cost, small business-oriented technologies in the areas of autonomy, wearable electronics and tunnel detection capabilities. Documentation of more than 300 systems demonstrated since 2003 were consolidated in the Defense Technical Information Center (DTIC) database. ***FY 2016 Plans:*** Multi-domain demonstrations in FY 2016 will continue to support the Rapid Reaction Technology Office (RRTO) programs and DoD guidance resulting from the LRRDPP, such as emerging cross-domain technology, Arctic challenges, strategic security, electronic warfare, megacities challenges, and convergence assessments. Demonstrations will leverage existing venues within RRTO and across the military Services and DoD component organizations. Other priorities will be identified through engagement with stakeholders. ***FY 2017 Plans:***			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Multi-domain demonstrations in FY 2017 will continue to support RRTO programs and DoD guidance resulting from the LRRDPP. Demonstrations will leverage existing venues within RRTO and across the military Services and DoD component organizations. Other priorities will be identified through engagement with stakeholders.			
Title: Low Cost Innovative Projects	8.420	4.560	4.700
Description: Emerging Capabilities Technology Development (ECTD) funds supported several projects requiring less than one million dollars for execution. ECTD selected, executed and transitioned low cost projects in the areas of autonomous vehicles, maritime irregular warfare capabilities, countering violent extremism, persistent surveillance, low-cost, small footprint operations and other emerging technology areas. These projects delivered developmental prototypes for evaluation or assessment by warfighters and other interagency users. ***FY 2015 Accomplishments:*** •Spectral Management: Developed and tested camouflage materials in applicable global environments with currently fielded camouflage spectrum as a baseline. Finalized the spectral management camouflage specification in support of transition to Marine Corps Systems Command and the Army Program Executive Officer (PEO) Soldier. •Spatial Iris: Developed and fielded software for manual and digital mobile data collection of geospatial intelligence in austere environments by Department of Defense (DoD), interagency organizations and host nation partners. The software enables persistent domain awareness for transnational criminal identification, counterinsurgency work, humanitarian assistance/disaster relief, civil affairs and tracking trends and perceptions in high-threat countries with minimal cost and risk. The software will be transitioned to the Defense Threat Reduction Agency's (DTRA) Secure Unclassified Network (SUNet). •Humanitarian Assistance/Disaster Relief (HA/DR) Science & Technology Test Center: Completed development of a center for evaluating expeditionary and HA/DR technologies in a Southeast Asian tropical environment. The center supports U.S. Pacific Command (USPACOM) HA/DR Science & Technology (S&T) exercises and demonstrations. •Spar Tactical Sensor Mast: Delivered the prototype Spar ocean sensor buoy. Rapidly deployed the buoy and integrated the buoy with sensor systems from Naval Surface Warfare Center Dahlgren and commercial partners, and assessed performance during the Trident Spectre 2015 exercise at Fort Story, Virginia. Data from these demonstrations will be used by the Navy to support a transition decision. •Persistics Software Enhancement and Infrasonic Signal Association: These two projects developed and delivered systems in FY 2015 that automatically integrate and analyze available image, signals, and open source intelligence feeds to predict adversary behavior and track weapons of mass destruction in denied areas. Details are classified. •Two classified Maritime Disablement Operations prototypes were delivered and demonstrated. Both prototypes have transitioned to operational users.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
•Warrior Resiliency Course: Initiated a program of psychology-based educational instruction that empowers Warfighters to take control of their stress reaction and increase unit readiness. Developed plans to provide instructor training to selected unit members, first responders and medical professionals; and develop mentored resiliency training to military members. •Electric-Vertical BAT (E-VBAT): E-VBAT unmanned aerial system (UAS) was delivered to Naval Sea Systems Command (NAVSEA) and transferred to Naval Air Systems Command (NAVAIR) for flight airworthiness certification in support of planned maritime launch and recovery demonstrations from Stiletto to support identified needs from stakeholders in the U.S. Navy, U.S. Marine Corps, U.S. Coast Guard and other government agencies in the areas of intelligence, surveillance and reconnaissance (ISR); data communications; and maritime disablement operations. The E-VBAT is a hybrid platform possessing the launch and recovery capabilities of a rotary wing aircraft and the endurance, range and payload capacity of a fixed wing ISR UAS. •Augmented Reality Clip-On (ARCO): Completed development, integration and testing of a heads-up display (HUD) that delivers day/night-time vision, thermal imaging, navigation and route planning capabilities. Prototypes were demonstrated during a limited user assessment with special operations forces (SOF) participation. The ARCO prototypes will directly transition to United States Special Operations Command (USSOCOM) Program Executive Office (PEO) SOF Warrior's Joint and Special Operations Program (JSOP) Program of Record and the U.S. Army PEO Soldier's Soldier Enhancement Program (SEP). In addition, ARCO informed follow-on Joint Special Operations Command (JSOC) science & technology development and acquisition. •Communications Modeling for Unattended Ground Sensors (UGS) Radio: Developed new capabilities for radio frequency mesh networking for intelligence collection in contested environments. During FY 2016, the mesh networking capability will be integrated into field ready UGS systems. •United Nations (U.N.) Peacekeeping Operations (PKO) Technology: Conducted two table top discussions regarding technologies that could be transitioned to support U.N. troop contributing countries and police contributing countries in changing peacekeeping operations. The table top exercises helped the team assess the needs and gaps in U.N. PKO missions. Based on the results of the table top exercises, the U.S. developed a prototype “book” of technologies for use by partner nations.			
FY 2016 Plans: Ongoing projects started in FY 2015 will be completed in FY 2016. FY 2016 Low Cost Innovative Projects will be selected in the year of execution in support of DoD Strategic Priorities and S&T objectives identified by the Assistant Secretary of Defense (Research and Engineering) (ASD(R&E)) and the Deputy Assistant Secretary of Defense (Emerging Capability & Prototyping) (DASD(EC&P)). • United Nations (U.N.) Peacekeeping Operations (PKO) Technology: In FY 2016, United States Southern Command (USSOUTHCOM) will provide guidance for the types of technologies that could be utilized in multi-national stabilization missions and will develop a test-bed for technologies recommended through this effort. A pilot project will demonstrate the utility of integrating proven DoD technologies to enhance planning capabilities for Multilateral Peacekeeping Operations, and improve DoD collaboration with the U.N. and other peacekeeping stakeholders.			

Exhibit R-2A, RDT&E Project Justification: PB 2017 Office of the Secretary Of Defense		Date: February 2016
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603699D8Z / *Emerging Capabilities Technology Development*	**Project (Number/Name)** P795 / *Emerging Capabilities Technology Development*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
•Warrior Resiliency Course: In FY 2016, this project will deliver a program of psychology-based educational instruction that empowers Warfighters to take control of their stress reaction and increase unit readiness. Instructor training to selected unit members, first responders and medical professionals will be completed; mentored resiliency training will be provided to military members as part of the pilot; and a web portal for the DoD focused on mitigating post-traumatic stress disorder (PTSD) will be completed. ***FY 2017 Plans:*** FY 2017 Low Cost Innovative Projects will be selected in the year of execution in support of DoD Strategic Priorities and S&T objectives identified by the ASD(R&E) and DASD(EC&P).			
Title: High Energy and Power Density Composites Focus Area ***Description:*** This focus area will develop scalable composite systems which are capable of high energy and power densities. Additional objectives will be to support the development of low-weight composite munitions that could increase the range and mission duration of unmanned aerial systems (UAS). ***FY 2016 Plans:*** Funding will be used to develop prototype scalable composite systems that could offer leap-ahead energy storage capabilities to advance deployable power and energy charging applications. Development of composite energy storage systems will drive advancements in high energy and power densities for multiple applications, including deployable pulse power devices and Unmanned Undersea Vehicle (UUV) charging stations. Other new projects in this focus area will develop prototype composite munitions systems for small UAS applications, enabling enhanced lethality from small modular weapon systems.	-	7.500	-
Title: Proof-of-Principle Prototyping ***Description:*** This project focuses on cost-effective, limited duration efforts to design, develop and deliver prototypes of cutting-edge land, sea, undersea, air and space systems to meet the Department's goal to drive innovation in aviation, space, maritime and ground combat systems in a fiscally constrained environment through advanced rapid prototyping. These prototypes will be delivered to joint and Service users to evaluate operational capabilities under realistic conditions and against current adversaries or anticipated threats. Potential venues for prototype assessment include assets such as the Stiletto Maritime Demonstration Program, Thunderstorm integration exercises and multi-domain demonstration venues across the Department of Defense (DoD). Knowledge and experience gained through those demonstrations will help develop new warfighting concepts and inform requirements and technical feasibility of future acquisition programs. These initial prototype efforts will help reduce the cost of future acquisition programs and stimulate efforts beyond traditional defense industrial base activities. Development of advanced prototypes will involve partnerships with industry and academia and permit operational users to gain insight into future technology-enabled strategies and tactics. Advanced rapid prototyping provides a mechanism to guard against technological	-	3.400	7.160

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
surprise, preserve industrial base capabilities, impose asymmetric strategic costs on potential adversaries and explore innovative, technology-enabled military capabilities. ***FY 2016 Plans:*** Will test and model capabilities that will inform critical U.S. policy decisions on area denial and area effect munitions, develop the test infrastructure and capabilities to address radio frequency (RF) spectrum sharing, spectrum relocation and emergent RF spectrum denial and electronic attack capabilities. Develop the technical data package and design for a software reconfigurable radar that would provide a single very low cost, very low size, weight and power capability that is effective on multiple platforms against a wide range of targets. Conduct a realistic cyber and electronic warfare experiment to enable developers from industry and the labs to assess capabilities against reproductions of emergent threats in relevant environments. ***FY 2017 Plans:*** Projects will be selected in the year of execution. Projects to be considered will support DoD Research and Engineering Enterprise Strategic Priorities and will focus on cost-effective, mission-focused projects to design, develop and deliver new concepts and technology prototypes aimed at supporting the Joint Force with critical enablers in force protection, lethality, robotics, human performance optimization, warfighter resilience, command & control, mobility and sustainment.			
Title: Electromagnetic Spectrum Agile Capability Focus Area ***Description:*** This portfolio will focus on cost-effective, mission-focused projects to design, develop and deliver new concepts and technology prototypes aimed at protecting DoD systems and extending capabilities across the electromagnetic spectrum. In the U.S. and allied nations, Department of Defense (DoD) communication and sensing capabilities are increasingly compromised by spectrum congestion and loss, as is evidenced by the recent radio frequency (RF) spectrum auction and the spectrum relocation fund. In other operational environments, emergent threats, technologies and tactics contest the use of RF spectrum and erode U.S. capabilities in ways that are difficult to predict and counteract. Prototypes from this focus area will address spectrum sharing, spectrum relocation and spectrum competition requirements, and will be evaluated under the electromagnetic (EM) conditions expected at home and abroad. Potential venues for prototype assessment include assets such as the Stiletto maritime demonstration program, Thunderstorm integration exercises and multi-domain demonstration venues across the DoD. Knowledge and experience gained through those demonstrations will help develop new warfighting concepts and inform requirements for future acquisition programs. These initial prototype efforts will help reduce the cost of future acquisition programs and stimulate efforts beyond traditional defense industrial base activities. Development of advanced prototypes will involve partnerships with industry and academia and permit operational users to gain insight into future technology-enabled strategies and tactics. ***FY 2015 Accomplishments:***	4.500	3.200	3.600

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Established EM Spectrum Consortium to explore technical solutions for the spectrum relocation and sharing required to accommodate the Advanced Wireless Services – 3 (AWS-3) RF spectrum auction. The consortium includes industry leaders from both the Defense and Telecommunications communities. This effort established an Other Transaction Authority (OTA) contracting mechanism with the EM Spectrum Consortium that will enable cooperative development of agile communications and sensing capabilities through the Office of Management and Budget/DoD Chief Information Officer's (OMB/DOD CIO) Spectrum Access Research and Development Program. This effort developed and assessed multiple RF collection and reproduction capabilities that permit the DoD to discover, analyze, quantify, prioritize and test against emergent RF threats and poorly understood EM environments. ***FY 2016 Plans:*** This focus area will be used to develop wideband free space optics (FSO) communication network to augment United States Marine Corps (USMC) tactical RF communications capabilities. The program will develop and advise laboratories that can simulate competitive EM environments and emergent EM threats for industrial and laboratory technology assessments. Funding will be used to develop concepts and designs that will result in prototype next generation electronic warfare, communications and RF sensing capabilities in one to three years. While project determinations are generally made in the year of execution, projects to be considered will identify and analyze EM threats and provide capabilities that will enable DoD systems to operate effectively in the congested EM environments at home and the contested EM environments expected in future contingency operations. Three to four prototype efforts are anticipated in FY 2016 leveraging joint, Service and interagency partnerships. ***FY 2017 Plans:*** Projects will be selected in the year of execution. Projects to be considered will support DoD Research and Engineering Enterprise Strategic Priorities and will focus on cost-effective, mission-focused projects to design, develop and deliver new concepts and technology prototypes aimed at protecting DoD systems and extending capabilities across the electromagnetic spectrum. Three to four prototype efforts are anticipated in FY 2017 leveraging joint, Service and interagency partnerships.			
Title: Counter-Weapons of Mass Destruction Focus Area ***Description:*** This focus area for FY 2016 and FY 2017, in anticipation of emerging needs, will include the development and advancement of prototype technologies that focus on the detection and interdiction of chemical, biological, radiological, nuclear and high yield explosives threats. Projects may include techniques and methodologies that improve detection sensitivities, persistent intelligence, surveillance and reconnaissance (ISR), tagging and tracking technologies, data analysis tools and global situational awareness. Efforts will support the Department of Defense (DoD) strategy for countering weapons of mass destruction (WMD) by developing and demonstrating active and passive defenses that address both known threats and potential surprises in adversaries' WMD technology and employment methods, particularly those that could present challenges to existing countermeasures. The constant evolution of WMD materials, tactics and technologies calls for the development of flexible and innovative solutions that leverage the full range of DoD and interagency tools and capabilities. Capabilities that support these	-	3.020	8.145

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
tasks include detection; modeling; detailed operational planning; and analysis of materials, precursors and agents that may be related to a proliferation activity, an adversary's developmental or fielded capability or the actual use of WMD. Prototypes developed in this focus area will be delivered to joint and Service users to evaluate operational capabilities under realistic conditions and against current adversaries or anticipated threats. Potential venues for prototype assessment include assets such as Thunderstorm integration exercises and multi-domain demonstration venues across DoD. Development of advanced prototypes will involve partnerships with industry and academia and permit operational users to gain insight into future technology-enabled strategies and tactics. ***FY 2016 Plans:*** Plans for FY 2016 include pursuing development of concepts and designs that will result in innovative concept of operations (CONOPS) and prototype systems in one to three years. FY 2016 projects include data mining for indications and warnings of a WMD attack and unattended Measurement and Signature Intelligence (MASINT) sensors to provide situational awareness of WMD activities in denied areas. While project determinations are generally made in the year of execution, projects to be considered include prototypes and demonstrations of capabilities to detect early indications of activities leading to a terrorist or state-sponsored attack using WMD. Other potential projects will focus on advances in the DoD's ability to locate, secure, monitor, tag, track, interdict, eliminate and attribute WMD weapons and materials. Two to three prototype efforts are anticipated in FY 2016 leveraging joint, Service and interagency partnerships. Three to four prototype efforts are anticipated in FY 2016 leveraging joint, Service and interagency partnerships. ***FY 2017 Plans:*** Projects will be selected in the year of execution. Projects to be considered will support DoD Research and Engineering Enterprise Strategic Priorities and will focus on cost-effective, mission-focused projects to design, develop, and deliver new concepts and technology prototypes aimed at supporting the Joint Force with critical enablers in force protection, lethality, robotics, human performance optimization, warfighter resilience, command & control, mobility and sustainment. Five to six prototype efforts are anticipated in FY 2017 leveraging joint, Service and interagency partnerships.			
Title: Missile Defeat Focus Area ***Description:*** Building on the lessons learned from the Low Cost Missile Defeat Prototype project, this focus area will pursue low cost, innovative counters to ballistic and cruise missile threats. The missile defeat focus area will aim to improve and expand homeland and regional missile defenses and invest in advanced technology development and future capabilities to counter the increasingly complex threat. The missile defeat focus area will address emergent strategic and tactical threats from cruise and ballistic missiles. This focus area is aimed at developing prototype technologies and demonstrations of advanced sensors and capabilities to support persistent discrimination, common kill vehicle technology, autonomous and integrated interceptors, and Command, Control, Battle Management and Communications (C2BMC).	-	2.172	5.833

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
FY 2016 Plans: Plans for FY 2016 are to increase the capability of our ballistic missile defense system by developing and fielding capabilities for protection against attack from ballistic and cruise missiles. Projects like Seeker will address radio frequency (RF) spectrum sharing, spectrum relocation and emergent RF spectrum denial and electronic attack capabilities. Three to four prototype efforts are anticipated in FY 2016 leveraging joint, Service and interagency partnerships. ***FY 2017 Plans:*** FY 2017 projects will be selected in the year of execution. Projects to be considered will support DoD Research and Engineering Enterprise Strategic Priorities and will focus on cost-effective, mission-focused projects to design, develop, and deliver new concepts and technology prototypes aimed at supporting the Joint Force with counters to ballistic and cruise missile threats. The focus will be on low-cost, innovative capabilities. Five to six prototype efforts are anticipated in FY 2017 leveraging joint, Service and interagency partnerships.			
Title: Multi-domain Autonomous Systems Focus Area	-	3.157	8.115
Description: This portfolio will focus on cost-effective, mission-focused projects to design, develop, and deliver technology prototypes of cutting edge multi-domain, autonomous systems to meet the Department's goal to drive innovation in aviation, space, maritime and ground combat systems. Autonomous systems range from software to aid the intelligence analyst in processing, exploitation and dissemination, through very complex autonomous air systems networked in tandem with unmanned ground or undersea vehicles. The technologies associated with autonomy are multiplying: from sensors that can understand the environment, to software algorithms that can make a decision or seek human assistance. Through autonomy, the Department of Defense (DoD) will reduce the manpower required to safely conduct missions. Multi-domain, autonomous systems developed and demonstrated through this focus area will seek to enhance the capabilities of unmanned systems to enable missions across air, sea, land and space environments and advance the state-of-the-art in cooperative behaviors among autonomous systems, such as unmanned Aerial systems, unmanned ground combat vehicles, unmanned underwater vehicles and unmanned surface vehicles. These prototypes will be delivered to joint and Service users to evaluate operational capabilities under realistic conditions and against current adversaries or anticipated threats. Potential venues for prototype assessment include the Stiletto maritime demonstration program, Thunderstorm integration exercises and the Joint Experimental Range Complex (JERC). Knowledge and experience gained through those demonstrations will help develop new warfighting concepts and inform requirements and technical feasibility of future acquisition programs. Development of advanced autonomous systems prototypes will involve partnerships with industry and academia and permit operational users to gain insight into future technology-enabled strategies and tactics. ***FY 2016 Plans:***			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Plans for FY 2016 include pursuing development of concepts and designs that will result in innovative concept of operations and prototype systems in one to three years. While project determinations are generally made in the year of execution, projects to be considered will look at science and technology to achieve autonomous systems that reliably and safely accomplish complex tasks in all environments. Projects under consideration include low-cost, multi-mission prototypes to detect and defeat unmanned aerial system (UAS) threats and prototype systems with autonomous behaviors to accelerate kill chains. Three to four prototype efforts are anticipated in FY 2016 leveraging joint, Service and interagency partnerships. ***FY 2017 Plans:*** FY 2017 projects will be selected in the year of execution. Projects to be considered will support DoD Research and Engineering Enterprise Strategic Priorities and will focus on cost-effective, mission-focused projects to design, develop and deliver new concepts and technology prototypes aimed at achieving autonomous systems that reliably and safely accomplish complex tasks, in all environments, or protect DoD assets from unmanned, autonomous threats. Five to six prototype efforts are anticipated in FY 2017 leveraging joint, Service, and interagency partnerships.			
Title: Dismounted Soldier Systems Focus Area	-	2.040	5.842
Description: This portfolio will focus on cost-effective, mission-focused projects to design, develop and deliver prototypes of cutting-edge dismounted soldier systems. These systems will support the Joint Force with critical enablers in force protection, lethality, robotics, human performance optimization, command & control, mobility and sustainment. Technology development will counter emergent threats to the warfighter both while en-route to and operating within expeditionary environments alongside unified action partners. Force support capabilities that offer the dismounted personnel enhanced situational awareness, communications, data to decisions, and energy and power sources will be explored through this focus area. Prototypes will be delivered to joint and Service users to evaluate operational capabilities under realistic conditions and against current adversaries or anticipated threats. Potential venues for prototype assessment include assets such as the Stiletto Maritime Demonstration Program, Thunderstorm integration exercises and multi-domain demonstration venues across the Department of Defense (DoD). Knowledge and experience gained through those demonstrations will help develop new warfighting concepts and inform requirements and technical feasibility of future acquisition programs. These initial prototype efforts will help reduce the cost of future acquisition programs and stimulate efforts beyond traditional defense industrial base activities. Development of advanced prototypes will involve partnerships with industry and academia and permit operational users to gain insight into future technology-enabled strategies and tactics. ***FY 2016 Plans:*** Plans for FY 2016 include pursuing development of concepts and designs that will result in innovative concept of operations and prototype systems in one to three years. While project determinations are generally made in the year of execution, projects to be considered will look at dismounted soldier systems that support the Joint Force with critical enablers in force protection, lethality, robotics, human performance optimization, warfighter resilience, command & control, mobility and sustainment. Potential projects			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
include the development of a prototype dismount portable, 20 watts solid state combustor that generates electric power from high energy density liquid fuels with no moving parts and development of a prototype unimproved Landing Zone soil assessment system that will cut the time to assess a new landing zone in half, and significantly reduce risk for dismounted advance teams in hostile environments. Two to three prototype efforts are anticipated in FY 2016 leveraging joint, Service and interagency partnerships. ***FY 2017 Plans:*** FY 2017 projects will be selected in the year of execution. Projects to be considered will support DoD Research and Engineering Enterprise Strategic Priorities and will focus on cost-effective, mission-focused projects to design, develop and deliver new concepts and technology prototypes aimed at supporting the Joint Force with critical enablers in force protection, lethality, robotics, human performance optimization, warfighter resilience, command & control, mobility and sustainment. Four to five prototype efforts are anticipated in FY 2017 leveraging joint, Service and interagency partnerships.			
Accomplishments/Planned Programs Subtotals	68.640	40.949	49.895

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

In FY 2017, generic performance metrics applicable to Emerging Capabilities Technology Development include transition of 40 percent of completing demonstrations program per year. In addition, project completions and success are monitored against schedules and deliverables stated in the proposals and statements of work. The metrics include items such as target dates, production measures and demonstration goals. In FY 2015, Emerging Capabilities Technology Development achieved a transition rate of approximately 78 percent.

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