Department of Defense
Fiscal Year (FY) 2016 President's Budget Submission

February 2015

Defense Threat Reduction Agency

Defense Wide Justification Book Volume 5 of 5

Research, Development, Test & Evaluation, Defense-Wide

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Table of Volumes

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Exhibit R-1, RDT&E Programs
Defense Threat Reduction Agency
Fiscal Year 2016-2020 Budget Estimates

Appropriation: RDT&E, Defense-Wide   **Date: February 2015**

OVERVIEW

The Defense Threat Reduction Agency (DTRA) is the Department of Defense's (DoD) Combat Support Agency and Defense Agency for countering weapons of mass destruction (CWMD).

DTRA safeguards the United States and its allies from global Weapons of Mass Destruction (WMD) threats by integrating, synchronizing, and providing responsive expertise, technologies, and capabilities. This mission directly reflects several national and Department of Defense guidance/vision documents. For Research, Development, Test and Evaluation (RDT&E), these documents include the National Security Strategy, 2012 Defense Strategic Guidance (*Sustaining U.S. Global Leadership: Priorities for 21st Century Defense*), 2014 Quadrennial Defense Review, National Strategy for Combating Terrorism, National Strategy for Countering Biological Threats, National Strategy for Biosurveillance, 2014 DoD Strategy for Countering WMD, and the 2010 Nuclear Posture Review.

DTRA's RDT&E budget request responds to warfighter needs and supports DTRA's chartered responsibilities and national commitments across the chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) spectrum. DTRA identifies and conducts innovative CWMD-related RDT&E to deliver products and services to the Combatant Commanders (CCDRs) and the Armed Services . The Agency's RDT&E portfolio includes a range of activities from basic research through system development and demonstration to deliver new CWMD technologies and capabilities to the warfighter. DTRA investigates, develops, and demonstrates innovative technologies and capabilities to actively counter or mitigate the full spectrum of CBRNE threats and/or effects; enhances the safety, security, survivability, and performance of U.S. nuclear assets and facilities; protects the warfighter from conventional or genetically engineered biological threats; preserves the warfighter's mission capability through physical and medical protection against chemical and biological agents; and executes quick reaction R&D projects that support combating and countering WMD initiatives. DTRA fosters and enables farsighted, high-payoff research focused on the unique challenges related to reducing, eliminating, countering, and mitigating the effects of WMD, and provides a robust fundamental knowledge base and understanding in the CWMD-related sciences.

The DTRA RDT&E portfolio is directly aligned to the Office of Management and Budget (OMB) and Office of Science and Technology Policy (OSTP) Science and Technology Priorities for FY 2016. In a memorandum dated July 18, 2014, OMB and OSTP outlined eight (8) multi-agency R&D priorities. The entire DTRA RDT&E portfolio directly supports the "National and Homeland Security" priority. While the DTRA portfolio indirectly supports other priorities, DTRA's CWMD mission is completely aligned with the "National and Homeland Security" priority, and all projects and programs in the FY 2016 RDT&E budget submission are conceived, implemented and managed to support this mission space.

Real purchasing power has declined over the past three years, thus requiring DTRA to focus on finding more efficiencies to achieve mission goals. The FY 2016 RDT&E budget submission seeks to balance long-term strategic priorities with increased present-day CWMD requirements and provides an objective, responsible path forward.

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Defense-Wide
FY 2016 President's Budget
Exhibit R-1 FY 2016 President's Budget
Total Obligational Authority
(Dollars in Thousands)

07 Jan 2015

Appropriation: 0400D Research, Development, Test & Eval, DW

Line No	Program Element Number	Item	Act	FY 2014 (Base & OCO)	FY 2015 Base Enacted	FY 2015 OCO Enacted	FY 2015 Total Enacted	FY 2016 Base	FY 2016 OCO	FY 2016 Total	Sec
1	0601000BR	DTRA Basic Research Initiative	01	44,783	37,778		37,778	38,436		38,436	U
		Basic Research		44,783	37,778		37,778	38,436		38,436	
21	0602718BR	Weapons of Mass Destruction Defeat Technologies	02	151,669	151,443		151,443	155,415		155,415	U
		Applied Research		151,669	151,443		151,443	155,415		155,415	
28	0603160BR	Counterproliferation Initiatives - Proliferation Prevention and Defeat	03	282,719	291,694		291,694	290,654		290,654	U
		Advanced Technology Development		282,719	291,694		291,694	290,654		290,654	
121	0605000BR	Weapons of Mass Destruction Defeat Capabilities	05	12,511	6,887		6,887	7,156		7,156	U
		System Development And Demonstration		12,511	6,887		6,887	7,156		7,156	
151	0605502BR	Small Business Innovation Research	06	9,700							U
		Management Support		9,700							
		Total Research, Development, Test & Eval, DW		501,382	487,802		487,802	491,661		491,661	

R-1C1: FY 2016 President's Budget (Published Version of PB Position), as of January 7, 2015 at 08:18:53

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Defense Threat Reduction Agency • President's Budget Submission FY 2016 • RDT&E Program

Program Element Table of Contents (by Budget Activity then Line Item Number)

Budget Activity 01: Basic Research
Appropriation 0400: Research, Development, Test & Evaluation, Defense-Wide
••

Budget Activity 02: Applied Research
Appropriation 0400: Research, Development, Test & Evaluation, Defense-Wide
••

Budget Activity 03: Advanced Technology Development (ATD)
Appropriation 0400: Research, Development, Test & Evaluation, Defense-Wide
••

Program Element Table of Contents (Alphabetically by Program Element Title)

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ACRONYMS

AA-HPRT	Analytics Hard Problem Research Team
ACES	Arms Control Enterprise System
AD	Agent Defeat
AEHF	Advanced Extremely High Frequency
AFX	Air Force Explosive
AI	Active Interrogation
AOR	Area of Responsibility
ARAT	Adversarial Route Analysis Tool
ARIEL	Autonomous Reconnaissance Infrared Electro-optical Loitering
ASIC	Application Specific Integrated Circuit
ATAC	Advanced Targeting Assessment Capability
ATD	Advanced Technology Development
AUV	Autonomous Underwater Vehicle
AWE	Atomic Weapons Establishment
BAA	Broad Agency Announcement
BDA	Battle Damage Assessment
BDI	Battle Damage Information
BLADE	BDI Link Advanced Demonstrator
BLU	Bomb, Live Unit
C4I	Command, Control, Communications, Computers, and Intelligence
CANES	Consolidated Afloat Network and Enterprise Services
CAPE	Cost Assessment and Program Evaluation
CARDS	CBRN Air-droppable Remotely Deployed Sensor System
CATTS	Cost Analysis Tool for Test Sites
C-B	Chemical-Biological
CBP	Customs and Border Protection
CBRNE	Chemical, Biological, Radiological, Nuclear, and High-yield Explosives
CCDR	Combatant Commander
CFD	Computational Fluid Dynamics
CHAMP	Counter Electronics High Power Microwave Advanced Missile Project
CJCS	Chairman, Joint Chiefs of Staff
CNDSP	Computer Network Defense Service Provider
CCMD	Combatant Command
COE	Consequence of Execution
CoE-NI	Consequence of Execution – Nuclear Integration
COI	Community of Interest
CONOPS	Concept of Operations
CONUS	Continental United States
COOP	Continuity of Operations
COP	Common Operating Picture
CP	Counter-proliferation

CPGS	Conventional Prompt Global Strike
CSM	Computational Structure Mechanics
CTBT	Comprehensive Nuclear Test Ban Treaty
CT/CP	Counterterrorism / Counterproliferation
CTS	Component Test Structure
CTTS	CBRNE Tactical Training System
C-WAC	Counter-WMD Analysis Center
CWMD	Countering Weapons of Mass Destruction
CWMD-T	Combating Weapons of Mass Destruction –Terrorism
DAPSS	Denied Area Persistent Sensor System
DEL	DTRA Experimentation Lab
DHS	Department of Homeland Security
DIAMONDS	Defense Integration and Management of Nuclear Data Services
DIOCC/DIA	Defense Intelligence Operations Coordination Center/Defense Intelligence Agency
DITEC	DTRA Integration Technical Experimentation Center
DoD	Department of Defense
DO	DISCREET OCULUS
DOE	Department of Energy
DOJ	Department of Justice
DPG	Dugway Proving Ground
DPPG	Defense Policy and Planning Guidance
DRDC	Defence Research and Development Canada
DSCS	Defense Satellite Communications System
DTRA	Defense Threat Reduction Agency
DT&E	Development, Test and Evaluation
ECBC	Edgewood Chemical Biological Center
EDTC	Engineering and Development Test Center
EM-1	Capabilities of Nuclear Weapons: Effects Manual Number 1
EMP	Electromagnetic Pulse
EMREP	Electromagnetic Reliability and Effects Predictions
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
FEFLO	Finite Element Flow Solver
FFRDC	Federally Funded Research and Development Center
FinFets	Fin-Shaped Field Effect Transistors
FOC	Full Operational Capability
FYDP	Future Years Defense Program
GCC	Global Command and Control
GEF	Guidance for Employment of the Force
GKMC	Global Knowledge Management System
GSA	Global Situational Awareness
GSM	Global System for Mobile Communications
GUI	Graphical User Interface

HAMMER	Heated and Mobile Munitions Employing Rockets
HANE	High Altitude Nuclear Environments
HARP	High Altitude Radiological Phenomenology
HEBX	Hybridized Enhanced Blast Explosive
HEMP	High Altitude Electro Magnetic Pulse
HDBT	Hard and Deeply Buried Target
HPAC	Hazard Prediction and Assessment Capability
HPC	High Performance Computing
HPCMP	High Performance Computing Modernization Program
HTD	Hard Target Defeat
IBRD	Interagency Biological Restoration Demonstration
ICEPIC	Improved Concurrent Electromagnetic Particle-in-Cell
IED	Improvised Explosive Device
IMEA	Integrated Munitions Effects Assessment
IMS	International Monitoring System
IOC	Initial Operational Capability
IPODS	Integrated Precision Ordnance Delivery System
ISIS	Integrated Stand-off Inspection System
ISR	Intelligence, Surveillance, Reconnaissance
ISS	Integrated Sensor System
IR	Infrared
IT	Information Technology
ITD	Integrated Technology Demonstration
IWMDT	Integrated Weapons of Mass Destruction Toolset
JAIEG	Joint Atomic Information Exchange Group
JCAM	Joint Collaborative Analysis Model
JCDE	Joint Concept Development & Experimentation
JCIDS	Joint Capabilities Integration and Development System
JCTD	Joint Concept Technology Demonstration
JDAM	Joint Direct Attack Munition
JEM	Joint Effects Model
JMEWS	Joint Multi-Effects Warhead System
JSAF	Joint Semi-Automated Forces
KAFB	Kirtland Air Force Base
keV	kilo-electronvolt
LCP	Large Caliber Penetrator
LLE	Laboratory for Laser Energetics
LLNL	Lawrence Livermore National Laboratory
LTS	Large Test Structure
MACS	Modular Autonomous Countering WMD System
MASS	MILSATCOM Atmospheric Scintillation Simulator
MCNP	Monte Carlo N-Particle
MDA	Missile Defense Agency

M&S	Modeling and Simulation
MEEC	Maxwell's Equivalent Equations Circuit
MET	Modernization of Enterprise Terminals
MILSATCOM	Military Satellite Communications
MFK-R	Mobile Field Kit – Radiological
MIL STD	Military Standard
MPAS	Mission Planning and Assessment System
NACT	Nuclear Arms Control Technology
NATO	North Atlantic Treaty Organization
NAVSATCOMMFAC	Naval Satellite Communications Facility
NCNS	National Center for Nuclear Security
NCPC	National Counterproliferation Center
NIF	National Ignition Facility
NLP	Natural Language Processing
nm	nanometer
NM	Nuclear Matters
NMCC	National Military Command Center
NNSA	National Nuclear Security Administration
NNSS	Nevada National Security Site
NPS	Naval Postgraduate School
NSB	Navy Standardization Board
NSPD	National Security Presidential Directive
NST	New START Treaty
NTNF	National Technical Nuclear Forensics
NTPR	Nuclear Test Personnel Review
NuCS	Nuclear Capability Services
NWE	Nuclear Weapon Effects
NWEN	Nuclear Weapon Effects Network
NWEDS	Nuclear Weapons Effects Database System
NWRM	Nuclear Weapons Related Materiel
OCO	Overseas Contingency Operations
OCONUS	Outside the Continental United States
ODX	Operationally demonstrated/exercised
O&M	Operation and Maintenance
ORNL	Oak Ridge National Laboratory
OSD CAPE	Office of the Secretary of Defense Capability Assessment and Program Evaluation
OSD-NM	Office of the Secretary of Defense, Nuclear Matters Office (in the Office of the Assistant Secret Programs)
OSTP	Office of Science and Technology Policy
PASCC	Project on Advanced Systems and Concepts for Countering WMD
PDCALC	Probability of Damage Calculator
PDV	Product Demonstration Vehicle
PITAS	Photonuclear Inspection and Threat Analysis System

PMESII	Political, Military, Economic, Social, Infrastructure, and Information
PNAF	Prime Nuclear Airlift Forces
PPD	Presidential Policy Directive
PTS	Provisional Technical Secretariat
QDR	Quadrennial Defense Review
R2TD	Rapid Reaction Tunnel Detection
R&D	Research and Development
RadHard	Radiation Hardened
RFIS	Robust Fuzewell Instrumentation System
RHBD	Radiation Hardened by Design
RHM	Radiation Hardened Microelectronics
RL-16	US radionuclide laboratory
R/N	Radiological/Nuclear
ROM	Rough Order of Magnitude
S&T	Science & Technology
SBIR	Small Business Innovative Research
SCSP	Special Operations Command Combating Weapons of Mass Destruction-Terrorism Support Pro
SGEMP	System-Generated Electromagnetic Pulse
SHAMRC	Second-order Hydrodynamic Automatic Mesh Refinement Code
SHAPE	Supreme Headquarters Allied Powers, Europe
SHIST	Seismic Hardrock in Situ Test
SMDC	US Army Space and Missile Development Command
SNL	Sandia National Laboratory
SNM	Special Nuclear Material
SOF	Special Operations Forces
SOX	Standoff Operational Exercise
SPE	Source Physics Experiment
SPG	Short Pulse Gamma
SREMP	Source Region Electromagnetic Pulse
START	Strategic Arms Reduction Treaty
STTR	Small Business Technology Transfer
TACBRD	TransAtlantic Collaboration Biological Resiliency Demo
TB	Test Bed
TEAMS	Technical Evaluation Assessment and Monitor Site
TNF	Technical Nuclear Forensics
TOA	Total Obligation Authority
TOW	Tube-launched, Optically-tracked, Wireless-guided
TPMM	Technology Program Management Model
TRAC	Threat Reduction Advisory Committee
TRL	Technology Readiness Level
TSG	Technical Support Group
TTL	Tag, Track, Locate
TVT	Treaty Verification Technology

TWAC	Targeting and Weaponeering Analysis Cell
TXL	Transportable Xenon Laboratory
UAS	Unmanned Aerial Systems
UCP	Unified Command Plan
UGF	Underground Facility
UGT	Underground Test
UHPC	Ultra-High Performance Concrete
UK	United Kingdom
USANCA	U.S. Army Nuclear and Combating WMD Agency
USEUCOM	U.S. European Command
USFK	U.S. Forces Korea
USG	United States Government
USNORTHCOM	U.S. Northern Command
USPACOM	U.S. Pacific Command
USSOCOM	U.S. Special Operations Command
USSTRATCOM	U.S. Strategic Command
UTAS	Underground Targeting and Analysis System
VAPO	Vulnerability Assessment Protection Option
VEO	Violent Extremist Organization
VOIP	Voice Over Internet Protocol
WACS	WMD Aerial Collection System
WCF	West Coast Facility
WEP	Weapon Effects Phenomenology
WESC	Weapon Effects Steering Committee
WMD	Weapons of Mass Destruction
WSMR	White Sands Missile Range

Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Defense Threat Reduction Agency											Date: February 2015	

Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 1: *Basic Research*					R-1 Program Element (Number/Name) PE 0601000BR I *DTRA Basic Research Initiative*							

COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
Total Program Element	134.637	44.783	37.778	38.436	-	38.436	38.783	39.463	40.134	40.937	Continuing	Continuing
RU: *Fundamental Research for Combating WMD*	134.637	44.783	37.778	38.436	-	38.436	38.783	39.463	40.134	40.937	Continuing	Continuing

A. Mission Description and Budget Item Justification

The mission of the Defense Threat Reduction Agency (DTRA) is to safeguard the United States and its allies from global weapons of mass destruction (WMD) threats by integrating, synchronizing, and providing responsive expertise, technologies, and capabilities. This mission directly aligns with several national and Department of Defense (DoD) level guidance/vision documents. For Research, Development, Test & Evaluation (RDT&E), these documents include the National Security Strategy, Defense Strategic Guidance (Sustaining U.S. Global Leadership: Priorities for 21st Century Defense), 2014 Quadrennial Defense Review, National Strategy for Combating Terrorism, National Strategy to Combat WMD, Defense Planning Guidance, Guidance for Employment of the Force, 2014 DoD Strategy for Countering WMD, National Military Strategic Plan for the War on Terrorism, and Joint Strategic Capabilities Plan (including the Nuclear Annex). To achieve this mission, the DTRA has established strategies and tasks to meet the principal objectives of the above referenced documents. These objectives are: 1) Ensure a safe, secure, and effective nuclear deterrent; 2) Anticipate emerging WMD threats; 3) Provide Combating WMD situational awareness; 4) Assess infrastructure and personnel vulnerabilities; 5) Prevent proliferation and use of WMD; 6) Defend against WMD threats; 7) Defeat WMD threats; 8) Recover from WMD consequences; and 9) Synchronize countering WMD activities.

The Basic Research Initiative provides for the discovery and development of fundamental knowledge and understanding by research performers comprised from academia and world-class research institutions in Government and industry. This leverages the DoD's $2 billion plus annual investment in basic research by ensuring a motivation within the scientific community to conduct research benefiting WMD-related defense missions and by improving knowledge of research efforts that benefit nonproliferation, counter proliferation, and consequence management efforts. These efforts are closely coordinated with DTRA's Chemical and Biological Technologies Department, which executes a chemical/biological basic research program under DoD's Chemical and Biological Defense Program. DTRA's research interests are coordinated with the Defense Advanced Research Projects Agency and the Services' basic research programs through the Defense Basic Research Advisory Group. DTRA reviews research interests annually to focus on technological areas which are not clearly addressed by other basic research efforts.

DTRA's Basic Research portfolio supports several National and DoD initiatives directly related to Countering WMD (CWMD) including: Office of Science and Technology Policy Nuclear Defense Research and Development Roadmap, FY 2013-2017; Defense Budget Priorities and Choices for FY 2014; Countering Weapons of Mass Destruction Science and Technology Priority Steering Council Roadmap; 2012 Defense Strategic Guidance (Sustaining U.S. Global Leadership: Priorities for 21st Century Defense), and the 2014 Quadrennial Defense Review. In general, these documents direct capability enhancements, projects, and science and technology (S&T) investments that support CWMD and reduce global nuclear dangers. Specifically they include: accelerating the development of standoff radiological/nuclear detection capabilities; researching countermeasures and defenses to non-traditional agents; enhancing nuclear forensics; securing vulnerable materials; developing new verification technologies; developing an in-depth understanding of the capabilities, values, intent, and decision making of potential foes, whether they are states, networks, or individuals; defeating WMD agents; researching biologically-based or inspired materials for DoD applications; and leveraging science, technology, and

Exhibit R-2, **RDT&E Budget Item Justification:** PB 2016 Defense Threat Reduction Agency			**Date:** February 2015
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 1: *Basic Research*		**R-1 Program Element (Number/Name)** PE 0601000BR *I DTRA Basic Research Initiative*	

innovation through domestic and international partnerships and agreements. Basic research supporting all of these needs is included in this program element under Project RU-Fundamental Research for Combating WMD. Details are provided in the R-2a exhibit.

B. Program Change Summary ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016 Base**	**FY 2016 OCO**	**FY 2016 Total**
Previous President's Budget	45.837	37.778	38.436	-	38.436
Current President's Budget	44.783	37.778	38.436	-	38.436
Total Adjustments	-1.054	-	-	-	-
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.054	-			

Exhibit R-2A, **RDT&E Project Justification:** PB 2016 Defense Threat Reduction Agency										**Date:** February 2015	
Appropriation/Budget Activity 0400 *I* 1				**R-1 Program Element (Number/Name)** PE 0601000BR *I DTRA Basic Research Initiative*				**Project (Number/Name)** RU *I Fundamental Research for Combating WMD*			
COST ($ in Millions)	**Prior Years**	**FY 2014**	**FY 2015**	**FY 2016 Base**	**FY 2016 OCO**	**FY 2016 Total**	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**	**Cost To Complete**	**Total Cost**
RU: *Fundamental Research for Combating WMD*	134.637	44.783	37.778	38.436	-	38.436	38.783	39.463	40.134	40.937	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project provides for the discovery and development of fundamental knowledge and understanding by research performers drawn primarily from academia and world-class research institutions in government and industry. This leverages the Department of Defense's (DoD's) $2 billion plus annual investment in basic research by ensuring a motivation within the scientific community to conduct research benefiting weapons of mass destruction (WMD) related defense missions and by improving knowledge of research efforts that benefit nonproliferation, counter proliferation, and consequence management efforts. These efforts are closely coordinated with the DTRA's Chemical and Biological Technologies Department initiatives which execute a chemical/biological basic research program under the DoD Chemical and Biological Defense Program. The DTRA's research interests are coordinated with the Defense Advanced Research Projects Agency and the Services' basic research programs through the Defense Basic Research Advisory Group. DTRA reviews research interests annually to focus on technological areas which are not clearly addressed by other basic research efforts.

This project supports several national and Department initiatives directly related to countering WMD including: Office of Science and Technology Policy, Nuclear Defense Research and Development Roadmap, FY 2013-2017; Defense Budget Priorities and Choices for FY 2014; Countering Weapons of Mass Destruction Science and Technology Priority Steering Council Roadmap; 2012 Defense Strategic Guidance (Sustaining U.S. Global Leadership: Priorities for 21st Century Defense), and the 2014 Quadrennial Defense Review. In general, these documents direct capability enhancements, projects, and Science and Technology (S&T) investments that support Countering WMD (CWMD) and reduce global nuclear dangers. Specifically, they include: accelerating the development of standoff radiological/nuclear detection capabilities; researching countermeasures and defenses to non-traditional agents; enhancing nuclear forensics; securing vulnerable materials; developing new verification technologies; developing an in-depth understanding of the capabilities, values, intent, and decision making of potential adversaries, whether they are states, networks, or individuals; defeating WMD agents; researching biologically-based and inspired materials for DoD applications; and leveraging science, technology, and innovation through domestic and international partnerships and agreements. Specific activities for Project RU include: Sensing and Recognition – Generation of information that provides knowledge of the presence, identity, and/or quantity of material or energy in the environment that may be significant; Network Sciences – Enhance fundamental knowledge of theory, representations, and mapping to improve the WMD-related robustness, resiliency, recovery of, and informational and operational utility associated with and derived from, complex disparate but interdependent networks; Protection Sciences – Advance knowledge for protection of personnel, resources, sensitive systems and infrastructure from WMD; Sciences to Defeat WMD – Phenomena that improves success of defeat actions (use of weapons) including explosives, accessing and defeating target WMDs, such as biological agents and weapons modeling; and Sciences to Secure WMD – Improve understanding of phenomena for verification and compliance with treaties, including test detection. Additional activities for Project RU include the discovery of revolutionary control methods to monitor and secure components, materials, and weapons, and disrupt proliferation pathways; and cooperative research with global partners – research to reduce the global threat of WMD in collaboration with a broad range of international partners. Finally, this project supports and administers the Cooperative Biological Engagement Program for academic engagements which has the core goals of securing dangerous pathogens, promoting open and active disease reporting and response, advancing transparent research to understand pathogens, and developing potential countermeasures.

PE 0601000BR: *DTRA Basic Research Initiative*
Defense Threat Reduction Agency

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Exhibit R-2A, RDT&E Project Justification: PB 2016 Defense Threat Reduction Agency		Date: February 2015
Appropriation/Budget Activity 0400 / 1	**R-1 Program Element (Number/Name)** PE 0601000BR / *DTRA Basic Research Initiative*	**Project (Number/Name)** RU / *Fundamental Research for Combating WMD*

The decrease from FY 2014 to FY 2015 reflects a reduced effort in combating WMD basic research resulting in reductions to the number of active basic research awards. The increase from FY 2015 to FY 2016 maintains the investment in basic research to keep pace with inflation.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
Title: Project RU: Fundamental Research for Combating WMD	44.783	37.778	38.436

Description: This project provides for the discovery and development of fundamental knowledge and understanding by research performers drawn primarily from academia and world-class research institutions in government and industry.

FY 2014 Accomplishments:
- Managed over 200 active basic research awards on a three to five year cycle. The Agency's Basic Research portfolio continued the CWMD grand challenge for the DoD.
- Supported the development of the future Science, Technology, Engineering and Mathematics workforce by supporting world-class talent in WMD research at universities and laboratories.
- Conducted an annual technical review of each grant to assess the scientific advancements and progress in meeting the award's technical objectives, to foster collaboration, and build relationships within the scientific community.
- Conducted an annual external panel review of the basic research program open to DoD research stakeholders. The panel assessed the focus and scope of the program with respect to the CWMD challenges, and assessed the coordination of CWMD basic research across DoD mission space and across the broader basic research community to avoid unintended duplication and to ensure successful partnerships.
- Developed new model that optimizes timing of treaty inspections based on the probability of detecting relevant isotopes.
- Developed new formulations that in small scale testing showed an order of magnitude increase in ability to eliminate chemical and biological agents. Identified for potential use in the next generation counter-WMD weapons.

FY 2015 Plans:
- Manage over 150 active basic research awards on a three to five year cycle. The Agency's Basic Research portfolio directly addresses the DoD CWMD S&T priority and supports the DoD S&T Priorities on Autonomy, Data to Decisions, Electronic Protection, and Engineered Resilient Systems.
- Support the development of the future Science, Technology, Engineering, and Mathematics workforce by supporting world-class talent in WMD research at universities and laboratories.
- Conduct an annual technical review of each grant to assess the scientific advancements and progress in meeting the award's technical objectives, and to foster collaboration and build relationships within the scientific community.
- Conduct an annual external panel review of the basic research program which will be open to DoD research stakeholders. The panel will assess the focus and scope of the program with respect to the CWMD challenges and assess the coordination of

PE 0601000BR: *DTRA Basic Research Initiative*
Defense Threat Reduction Agency
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Exhibit R-2A, **RDT&E Project Justification:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
Appropriation/Budget Activity 0400 / 1	**R-1 Program Element (Number/Name)** PE 0601000BR / *DTRA Basic Research Initiative*	**Project (Number/Name)** RU / *Fundamental Research for Combating WMD*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
CWMD basic research across the DoD mission space and across the broader basic research community to avoid unintended duplication and ensure successful partnerships. ***FY 2016 Plans:*** - Manage over 150 active basic research awards on a three to five year cycle. The Agency's Basic Research portfolio directly addresses the DoD Combating WMD S&T priority and supports the DoD S&T Priorities on Autonomy, Data to Decisions, Electronic Protection, and Engineered Resilient Systems. - Support the development of the future Science, Technology, Engineering, and Mathematics workforce by supporting world-class talent in WMD research at universities and laboratories. - Conduct an annual technical review of each grant to assess the scientific advancements and progress in meeting the award's technical objectives, to foster collaboration and build relationships within the scientific community. - Conduct an annual external panel review of the basic research program which will be open to DoD research stakeholders. The review will assess the focus and scope of the program concerning CWMD challenges, and assess the coordination of CWMD basic research across the DoD mission space and the broader basic research community, to avoid duplication and ensure successful partnerships.			
Accomplishments/Planned Programs Subtotals	44.783	37.778	38.436

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• 21/0602718BR: *WMD Defeat Technologies*	0.919	-	-	-	-	-	-	-	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

Procurement methods include competitive selection awards through the DTRA's Broad Agency Announcement and collaborative funding through other organizations.

E. Performance Metrics

Project performance is measured via a combination of statistics including the number of publications generated, number of students trained in sciences and engineering supporting DoD educational goals, number of research organizations participating, and percentage of participating universities on the U.S. News & World Report "Best Colleges" list.

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Exhibit R-2, **RDT&E Budget Item Justification:** PB 2016 Defense Threat Reduction Agency										**Date:** February 2015		

Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I BA 2: Applied Research*	**R-1 Program Element (Number/Name)** PE 0602718BR I *WMD Defeat Technologies*

COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
Total Program Element	533.226	151.669	151.443	155.415	-	155.415	160.701	162.605	166.110	169.427	Continuing	Continuing
RA: *Information Sciences and Applications*	112.074	21.879	28.785	29.949	-	29.949	32.901	32.365	32.780	33.433	Continuing	Continuing
RD: *Detection Technologies*	0.000	-	-	26.401	-	26.401	26.893	27.430	28.039	28.600	Continuing	Continuing
RE: *Counter-Terrorism Technologies*	5.016	1.698	-	-	-	-	-	-	-	-	Continuing	Continuing
RF: *Forensics Technologies*	130.610	34.595	35.061	9.547	-	9.547	10.128	10.443	10.684	10.899	Continuing	Continuing
RG: *Defeat Technologies*	47.857	14.270	10.982	11.769	-	11.769	11.395	11.700	11.965	12.203	Continuing	Continuing
RI: *Nuclear Survivability*	57.264	20.351	19.416	29.988	-	29.988	30.264	30.826	31.592	32.224	Continuing	Continuing
RL: *Nuclear & Radiological Effects*	67.069	31.754	32.352	23.053	-	23.053	23.769	23.899	24.308	24.794	Continuing	Continuing
RM: *WMD Counterforce Technologies*	52.370	14.660	13.787	13.526	-	13.526	13.642	13.958	14.427	14.714	Continuing	Continuing
RR: *Combating WMD Test and Evaluation*	40.575	11.543	11.060	11.182	-	11.182	11.709	11.984	12.315	12.560	Continuing	Continuing
RU: *Fundamental Research for Combating WMD*	20.391	0.919	-	-	-	-	-	-	-	-	-	21.310

Note

 *Project RF-Detection and Forensics Technologies subdivides into Projects RD-Detection Technologies and RF-Forensics Technologies beginning in FY 2016.

A. Mission Description and Budget Item Justification

The mission of the Defense Threat Reduction Agency (DTRA) is to safeguard the United States and its allies from global weapons of mass destruction (WMD) threats by integrating, synchronizing, and providing responsive expertise, technologies, and capabilities. This mission directly aligns with several national and Department of Defense (DoD) level guidance/vision documents. For Research, Development, Test & Evaluation (RDT&E), these documents include the National Security Strategy, Defense Strategic Guidance (Sustaining U.S. Global Leadership: Priorities for 21st Century Defense), 2014 Quadrennial Defense Review, National Strategy for Combating Terrorism, 2014 DoD Strategy for Countering WMD, National Strategy to Combat WMD, Defense Planning Guidance, Guidance for Employment of the Force, 2006 National Military Strategy for Combating WMD, National Military Strategic Plan for the War on Terrorism, and Joint Strategic Capabilities Plan (including the Nuclear Annex). To achieve this mission, DTRA has established strategies and tasks to meet their principal objectives. These objectives are: 1) Ensure a safe, secure, and effective nuclear deterrent; 2) Anticipate emerging WMD threats; 3) Provide Combating WMD situational awareness; 4) Assess infrastructure and personnel

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Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Defense Threat Reduction Agency		Date: February 2015
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 2: *Applied Research*		**R-1 Program Element (Number/Name)** PE 0602718BR / *WMD Defeat Technologies*

vulnerabilities; 5) Prevent proliferation and use of WMD; 6) Defend against WMD threats; 7) Defeat WMD threats; 8) Recover from WMD consequences; and 9) Synchronize countering WMD activities.

A focused and strong WMD threat reduction technology base is critical to meeting these objectives. This technology base is closely tied with the operational support programs that make up DTRA's combat support mission. DTRA's has taken the steps to develop this technology base and provide a foundation for transformational activities within the WMD arena.

Activities funded by Program Element 0602718BR implement a wide set of National Security Presidential Directive 17 and emerging Presidential Policy Directive guidance for prevention of proliferation of WMD and WMD terrorism. Projects support the prevention and adversary use of WMD through the development of technology to locate and identify nuclear threats, post-detonation forensics, and treaty verification. Through development of new sensor systems, sensor networks, counterforce and fundamental Counter-WMD (CWMD) research, these programs contribute to securing and interdicting WMD, WMD delivery systems, and related materials. Finally, programs in this area fund the development of tools for the DTRA Technical Reachback analysis center which supports United States and allied forces, interagency, and civil authorities with 24 hour/7 days per week Chemical, Biological, Radiological, Nuclear, and High-yield Explosives (CBRNE) event analysis support.

B. Program Change Summary ($ in Millions)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Previous President's Budget	156.111	151.737	154.537	-	154.537
Current President's Budget	151.669	151.443	155.415	-	155.415
Total Adjustments	-4.442	-0.294	0.878	-	0.878
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-4.442	-			
• Realignments	-	-	0.878	-	0.878
• FFRDC	-	-0.294	-	-	-

Change Summary Explanation
The increase in FY 2016 from the previous President's Budget submission is due to realignments for increased investment in advanced analytics and effects modeling.

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Exhibit R-2A, RDT&E Project Justification: PB 2016 Defense Threat Reduction Agency										Date: February 2015	

Appropriation/Budget Activity 0400 I 2				R-1 Program Element (Number/Name) PE 0602718BR I *WMD Defeat Technologies*				Project (Number/Name) RA I *Information Sciences and Applications*			
COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
RA: *Information Sciences and Applications*	112.074	21.879	28.785	29.949	-	29.949	32.901	32.365	32.780	33.433	Continuing	Continuing

A. Mission Description and Budget Item Justification

The RA project provides (1) advanced data analytics, knowledge management, and systems engineering support across all other projects, (2) innovative counterproliferation Research & Development (R&D), (3) Technical Reachback support on weapons of mass destruction (WMD) effects and consequences, (4) collaborative Counter WMD (CWMD) analysis capabilities between Department of Defense (DoD) and key interagency and international partners through a globally accessible net-centric framework, and (5) other research activities that benefit the public through analysis and engagement to reduce and counter the threats posed by WMD via the Project on Advanced Systems and Concepts for Countering WMD at the Naval Postgraduate School. The advanced analytics program provides systems engineering and R&D with requirements, technology, architecture analyses, and proof-of-principle capabilities necessary for making decisions on strategic planning, R&D investments, new initiatives, cooperation, ventures with new customers, and accomplishment of high-level, short notice special projects. The innovative counterproliferation effort conducts R&D to investigate, identify, develop, and transition short term, high payoff technologies from the DTRA, other government agencies, industry, academia, and international Science and Technology (S&T) partners into DTRA's, and others R&D programs, and to end user organizations. The Technical Reachback effort provides 24 hour/7 days per week information and analyses on potential impacts of WMD events to warfighters and first responders in consult with the DTRA's CWMD R&D subject matter experts. Net-centric modeling access and support provides a real-time accessible framework which enables DTRA's Chemical, Biological, Radiological, and Nuclear (CBRN) Modeling & Simulation codes to provide an integrated suite of CWMD decision support capabilities. This project also provides support to international CWMD S&T cooperation including the development of modifications and improvements to new technologies and information tools suitable for foreign release and cooperative efforts. Other research activities via analysis and engagement include collaborating with scientific, technical, and social science faculty/experts to help understand and anticipate future WMD capabilities. This effort also provides management and support of the Threat Reduction Advisory Committee which provides independent expert advice to the Secretary of Defense on CWMD.

The increase from FY 2014 to FY 2015 is due to increased investment in advanced analytics, modeling and simulation (M&S), and hazardous effects characterization while reducing investment in systems engineering collaboration with external partners/customers. The increase from FY 2015 to FY 2016 is due to increased investment in advanced analytics and M&S.

B. Accomplishments/Planned Programs ($ in Millions)

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
Title: RA: Information Sciences and Applications	21.879	28.785	29.949
Description: Project RA develops innovative technologies and modeling and simulation capabilities; collaborative net-centric Chemical, Biological, Radiological, Nuclear, and High-yield Explosives (CBRNE) modeling access and support capabilities between DoD and key interagency and international partners; provides Technical Reachback support for the United States and our allies through improved situational understanding across the complete CWMD mission space; and funds research activities			

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Exhibit R-2A, **RDT&E Project Justification:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I WMD Defeat Technologies*	**Project (Number/Name)** RA *I Information Sciences and Applications*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
that benefit the public through analysis and engagement to reduce and counter the threats posed by WMD via the Project on Advanced Systems and Concepts for Countering WMD (PASCC) at the Naval Postgraduate School (NPS). ***FY 2014 Accomplishments:*** - Continued to solicit innovative research projects for developing new technologies and increased end-user capabilities to support "Data to Decisions" S&T development. - Provided Open Innovation and Technology Watch/Scouting in support of "Data to Decisions" S&T development for the DoD and other government agencies. - Via NPS/PASCC with support from National Defense University (NDU), completed 23 projects in five broad mission areas. This entailed global analyses of nuclear decision making, preventing escalation during nuclear wars, missile deterrence, non-proliferation, attribution marking for chemical and biological weapons use, and understanding the biological weapons convention. This further entailed eight international strategic dialogues in WMD with partners from Europe, the Middle East, South Asia, Russia, China and Singapore. - Supported the Next Generation Nuclear Scholars (NGNS) initiative through four engagements that provided scholars with invaluable insight and discourse on a myriad of nuclear issues. - Provided strategic advice and management oversight of logistics and operations for the Threat Reduction Advisory Committee. Conducted four full plenary/full committee sessions in 2014, augmented by 18 prepatory groups. This include priorities approved by the Undersecretary of Defense for Acquisition, Technology and Logistics in Global Health Security, Nuclear Strategic Stability, structure of the Chemical, Biological Defense Program, strategic guidance for the stand-up of the new WMD early, indications and warning capability (Constellation Program), and integral strategic advice pertaining to the destruction of chemical weapons and precursor chemicals in the Levant Region. - Continued requirements and gap analyses to enable R&D efforts to meet CWMD capability gaps. - Continued development on next generation capabilities for "real-time" reachback supporting radiological search and visualization; tested mesh network of hand-held radios to support radiation sensor data fusion during the 2014 Boston Marathon. - Delivered initial smartphone based simulation training system to enable teams to practice for radiological search missions without requiring deployment of real radiological sources and sensors. - Continued modifications and capability improvements to vulnerability assessment software and integrated WMD toolsets to contribute to new CWMD cooperative technology efforts. - Continued activities to implement Full Operational Capability for Mission Domain Information Technology architecture. - Made improvements to the DTRA Integration, Test and Experimentation Center. - Provided systems engineering support to numerous DTRA R&D programs, projects, and activities, to include nuclear detection activities, innovative new technologies, modeling and simulation activities, and R&D strategic planning efforts. - Continued to upgrade and manage the R&D portfolio management software tool for use across all DTRA R&D programs, projects, and activities.			

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Exhibit R-2A, RDT&E Project Justification: PB 2016 Defense Threat Reduction Agency		Date: February 2015
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I WMD Defeat Technologies*	**Project (Number/Name)** RA *I Information Sciences and Applications*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
- Developed and modernized a Global Knowledge Management Capability (GKMC) (subsequently integrated into the Constellation Program) software tool for Office of the Secretary of Defense (OSD) level and other users. ***FY 2015 Plans:*** - Create automated methods to operate DoD/Department of Homeland Security (DHS)/Department of Energy (DOE) radiation particle transport code suite on the DoD high performance computational network. - Integrate first principle blast and nuclear fallout codes into the DoD/DHS/DOE radiation particle transport code suite. - Deploy the Constellation software tool for OSD level and other users, providing an integrated unclassified CWMD collaboration environment supporting U.S. and Allied capabilities and CWMD situational awareness. - Develop and deploy enhanced geospatial and synthetic population services supporting more rapid Consequence of Execution and Consequence Management predictive modeling and Reachback support. - Support the DTRA exploratory development and initial real-time collaborative CBRNE integrated deployment framework. - Implement the FY 2014 developed design for a common information science and deployment environment, supporting training, operations, and mission support of CBRNE assessment for primary, secondary, and tertiary effects. - Conduct strategic analyses and assessments on emerging WMD threats using various strategic research methodologies. - Continue to manage and support the Threat Reduction Advisory Committee. - Conduct activities in support of leveraging cloud capabilities and demonstrate prototype capabilities. - Demonstrate initial information technology (IT) capabilities in support of achieving highly automated fusion and dissemination of comprehensive data necessary for providing global combating weapons of mass destruction situational awareness. ***FY 2016 Plans:*** - Participate in an interagency, large-scale testing series of dense gas release. Analyze data and develop models to improve atmospheric hazard predictions to enhance consequence management decision support. - Develop environmental degradation parameters of airborne chemical agents to better characterize collateral effects after a strike on a WMD facility. - In support of the United States Strategic Command (USSTRATCOM), develop capabilities to support analysis of higher order effects, such as infrastructure and economic impacts, from nuclear targeting. - Develop high fidelity Force-on-Force (phenomenology and effects) computational modeling and simulation capabilities integrated with real and virtual sensor responses. - Leverage commercial graphical processor technologies to enable near real-time high fidelity radiation transport calculations. - Integrate new first principle high fidelity blast and nuclear fallout codes into the DoD/DHS/DOE radiation particle transport code suite. - Deploy automated methods to consolidate multiple geospatial terrain types into a single virtual globe capable of supporting multiple modeling and simulation platforms. - Build a CWMD sensor framework with the Night Vision Laboratory to enable real-time data fusion of deployed sensors with modeling and simulation tools.			

Exhibit R-2A, RDT&E Project Justification: PB 2016 Defense Threat Reduction Agency		Date: February 2015
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I WMD Defeat Technologies*	**Project (Number/Name)** RA *I Information Sciences and Applications*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
- Deploy mobile device-based situational awareness, mission planning, and training tools for the warfighter featuring up-to-date capabilities for route planning, force tracking, and geo-tagging items of interest. - Deploy and support implementation of faster than real-time analysis code with large scale exercises in support of nuclear physical security threat and vulnerability assessments. - Develop high fidelity radiation detection trainer technologies utilizing mobile devices and augmented reality displays to enable training with virtual radiation source surrogates. - Sponsor and co-lead CBRNE topics as part of the Defense Advanced Research Projects Agency's XData and similar cloud computing challenges supporting the development of new data awareness and large scale anomaly detection capabilities. - Develop CWMD-Situational Awareness and data analysis/anomaly detection technology as part of a DoD Distributed Common Ground/Surface System and Intelligence Community Information Technology Enterprise compliant architectures. - Support advanced topics research including CWMD object-based intelligence, computational reasoning, and knowledge management tool development and testing. - Support research on integration of unclassified and open source data into tools and capabilities supporting "long view" shaping of the CBRNE environment prior to direct integration done in collaboration with the Department of State and Combating Terrorism Technical Support Office. - Support the cross-DTRA Advanced Analytics Hard Problem Research Team which coordinates analytic science activities across the Agency. - Support the rapid development of secure software and toolsets through code vulnerability analysis. - Continue activities in support of leveraging evolving Department and commercial cloud capabilities and services. - Continue to develop and mature IT capabilities in support of achieving highly automated fusion and dissemination of comprehensive data necessary for providing global combating weapons of mass destruction situational awareness. - Continue to conduct strategic analyses and assessments on emerging WMD threats using various strategic research methodologies. - Bring scientific, technical, and social science faculty/experts together and to look into the future and help understand and anticipate WMD capabilities and the technology needed to combat those capabilities. - Continue to manage and support the Threat Reduction Advisory Committee.			
Accomplishments/Planned Programs Subtotals	21.879	28.785	29.949

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• 28/0603160BR: *Proliferation, Prevention, and Defeat*	0.107	-	12.244	-	12.244	11.501	11.397	12.839	13.085	Continuing	Continuing

Exhibit R-2A, **RDT&E Project Justification:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I WMD Defeat Technologies*	**Project (Number/Name)** RA *I Information Sciences and Applications*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• 151/0605502BR: *Small Business Innovation Research*	9.700	-	-	-	-	-	-	-	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

Assess government, academic, and industrial performers and make selections based upon a "best fit for task" criteria. Common government awardees include DoD Service Laboratories and Department of Energy National Laboratories. For efforts associated with the Project on Advanced Systems and Concepts for Countering WMD/ Naval Postgraduate School, DTRA utilizes an annual, competitive Broad Agency Announcement to select the best WMD research topics and engagements.

E. Performance Metrics

Number of customer requests for data analysis compared to historical level.
Number of changes to investments based on systems engineering analyses.
Number of exercises and operations supported.
Number of Defense Acquisition Workforce Improvement Act certified systems engineers.
New capabilities delivered and transitioned to operational capabilities.
Mission Enclave computing environment moves from development to Initial Operational Capability (IOC).
Mission Enclave moves from IOC to Full Operational Capability.
Segment architectures for the Mission Enclave and supported mission systems.
Integrated segment architectures into the DTRA Enterprise Architecture.
Development of network modeling and system-in-the-loop testing capabilities within the DTRA Integration, Test and Experimentation Center.
Timely delivery of updated DTRA WMD force-on-force and radiation particle transport code to the development team and external customers
Number of project agreements/interactions with foreign partners and Allies.
Number of users of Advanced Analytics tools deployed through the Advanced Analytics Program.

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Exhibit R-2A, RDT&E Project Justification: PB 2016 Defense Threat Reduction Agency											Date: February 2015	
Appropriation/Budget Activity 0400 / 2				**R-1 Program Element (Number/Name)** PE 0602718BR / *WMD Defeat Technologies*					**Project (Number/Name)** RD / *Detection Technologies*			
COST ($ in Millions)	**Prior Years**	**FY 2014**	**FY 2015**	**FY 2016 Base**	**FY 2016 OCO**	**FY 2016 Total**	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**	**Cost To Complete**	**Total Cost**
RD: *Detection Technologies*	-	-	-	26.401	-	26.401	26.893	27.430	28.039	28.600	Continuing	Continuing

Note
 *Project RF-Detection and Forensics Technologies subdivides into Projects RD-Detection Technologies and RF-Forensics Technologies beginning in FY 2016.

A. Mission Description and Budget Item Justification

The detection mission is to conduct Research, Development, Test, & Evaluation (RDT&E) to 1) identify, develop, and exploit signatures associated with nuclear threat enablers such as nuclear expertise, financing, or unique materials to advance U.S. capabilities to detect and interdict such threats; and 2) locate, identify, and track special nuclear material and improve detection factors such as range, time, sensitivity, or accuracy to enhance Service/Special Mission Unit capabilities. These efforts support Department of Defense (DoD) requirements for combating terrorism, counter/nonproliferation, and homeland defense.

The increase from FY 2015 to FY 2016 is due to the subdivision of Project RF-Detection and Forensics Technologies into Projects RD-Detection Technologies and RF-Forensics Technologies beginning in FY 2016.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
Title: RD: Detection Technologies *Description:* Conducts RDT&E to detect, locate, identify, track, and interdict nuclear and radiological threats, which include weapons, material, and enablers to acquisition and development such as nuclear expertise, financing, or unique technologies. These efforts support DoD requirements for combating terrorism, counter/nonproliferation, and homeland defense. *FY 2016 Plans:* - Discover/identify nuclear threat signatures, characteristics, and corresponding detection modalities and collection systems. - Develop algorithms/tools for rapidly and effectively analyzing all-source intelligence to identify nuclear threats. - Prototype systems to remotely monitor small and wide areas which may produce or contain nuclear threats. - Develop algorithms/tools to synthesize the collection and analysis of multiple nuclear threat signatures to improve assessment confidence and cuing of potential nuclear threat events. - Execute robust and operationally relevant testing and evaluation of developmental radiation detection systems to determine and select the best performing technologies and techniques for further development and transition to user groups. - Downselect sensor materials for the most effective/efficient capability and integrate into detection systems. - Downselect detection system algorithms for most effective/efficient processing and integrate into detection systems to improve user capabilities. - Research and develop advanced three-dimensional imaging technologies for high-resolution source characterization and identification to provide new and improved capabilities to detect, locate, identify, and characterize threat materials. - Investigate viability of ultra-low-power, long-duration programmable remote radiation monitoring systems.	-	-	26.401

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Exhibit R-2A, **RDT&E Project Justification:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602718BR / *WMD Defeat Technologies*	**Project (Number/Name)** RD / *Detection Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
- Investigate organic semiconductors and photo-detectors to improve detection system performance.			
Accomplishments/Planned Programs Subtotals	-	-	26.401

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• 28/0603160BR: *Proliferation, Prevention, and Defeat*	-	-	29.893	-	29.893	29.689	30.137	30.832	31.447	Continuing	Continuing

Remarks

D. Acquisition Strategy

Assess government, academic, and industrial performers and make selections based upon a "best fit for task" criteria. Common government awardees include the Department of Energy National Laboratories, DoD Laboratories, and DoD Services.

E. Performance Metrics

Identification of three nuclear threat signatures that can be operationalized/exploited.
Transition of two algorithms/tools to the analyst community for testing and evaluation.
Delivery of neutron detection testing campaign final report.
Final military utility assessment of active interrogation testing.
Disposition of active interrogation test and evaluation equipment/infrastructure.
Delivery of modeling results for a classified detection system for prototype development.
Delivery of high-resolution focal plane for incorporation into three-dimensional gamma imaging to increase detector sensitivity.

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Appropriation/Budget Activity 0400 / 2				R-1 Program Element (Number/Name) PE 0602718BR / *WMD Defeat Technologies*				Project (Number/Name) RE / *Counter-Terrorism Technologies*			

COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
RE: *Counter-Terrorism Technologies*	5.016	1.698	-	-	-	-	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Counter-Terrorism Technologies project is an over-arching project that develops and transitions a full spectrum of new technologies to counter emergent Weapons of Mass Destruction (WMD) thus enabling warfighters to improve their ability to detect, disable, interdict, neutralize, and destroy chemical, biological, nuclear production, storage, and weaponization facilities. See paragraph C. for other program funding.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
Title: RE: Counter-Terrorism Technologies	1.698	-	-
Description: Project RE provides R&D support to Joint U.S. Military Forces, specifically USSOCOM, in the areas of Explosive Ordnance Disposal (EOD) Device Defeat; Counter WMD (CWMD) technologies for warfighters; the USSOCOM Combating WMD – Terrorism Support Program; and oversight of counterproliferation R&D resources sent directly to USSOCOM for warfighter-unique counterproliferation technologies. *FY 2014 Accomplishments:* Conducted signatures collection campaign at Nevada National Security Site benefiting seventy interagency participants.			
Accomplishments/Planned Programs Subtotals	1.698	-	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• 28/0603160BR: *Proliferation, Prevention, and Defeat*	109.679	116.630	104.628	-	104.628	106.132	108.171	110.182	112.388	Continuing	Continuing

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

Number of technologies developed and delivered, and/or proof of concept, or successful Military Utility Assessments conducted that increase the potential mission success and reduces the number of current gaps in Special Operations Forces capabilities to counter weapons of mass destruction.

Exhibit R-2A, RDT&E Project Justification: PB 2016 Defense Threat Reduction Agency										Date: February 2015	

Appropriation/Budget Activity 0400 / 2				R-1 Program Element (Number/Name) PE 0602718BR / *WMD Defeat Technologies*					Project (Number/Name) RF / *Forensics Technologies*		

COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
RF: *Forensics Technologies*	130.610	34.595	35.061	9.547	-	9.547	10.128	10.443	10.684	10.899	Continuing	Continuing

Note

 *Project RF-Detection and Forensics Technologies subdivides into Projects RD-Detection Technologies and RF-Forensics Technologies beginning in FY 2016.

A. Mission Description and Budget Item Justification

 This project supports the attribution process through development, demonstration, and transition of improved post-detonation National Technical Nuclear Forensics (NTNF) capabilities in the areas of materials collection, debris diagnostics, materials analysis, prompt diagnostics, and device reconstruction. Starting in FY 2016, detection-related technologies transition to Project RD (Detection Technologies). Project RF includes Research, Development, Test, & Evaluation (RDT&E) to detect, locate, identify, track, and interdict nuclear and radiological threats. This includes weapons, material, and enablers to their acquisition, and development such as nuclear expertise, financing, or unique technologies. These efforts support Department of Defense (DoD) requirements for combating terrorism, counter/nonproliferation, and homeland defense.

 The increase from FY 2014 to FY 2015 is due to increased investments in both nuclear detection Intelligence, Surveillance and Reconnaissance efforts and nuclear forensics. The decrease from FY 2015 to FY 2016 in Project RF is due to the realignment of nuclear threat detection activities into Project RD-Detection Technologies.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
Title: RF: Forensics Technologies *Description:* Through FY 2015, Project RF develops technologies, systems and procedures for post detonation nuclear forensics and to detect, locate, identify, track, and interdict nuclear and radiological threats, which include not only weapons and material, but enablers to their acquisition and development such as nuclear expertise, financing, or unique technologies in support of DoD requirements for combating terrorism, counterproliferation and nonproliferation, homeland defense, and international initiatives and agreements. Beginning FY 2016 Project RF becomes Forensics Technologies, developing technologies, systems, and procedures for post detonation nuclear forensics. *FY 2014 Accomplishments:* - Developed, (accelerated development where appropriate), demonstrated, and fielded (prototype) upgraded technical capabilities for prompt diagnostics (under DISCREET OCULUS and MINIKIN ECHO), debris sample collection, sample analysis, modeling to support nuclear device reconstruction, and forensics data to lower uncertainties/increase confidence and improve timeliness of technical nuclear forensics conclusions. Included development of new debris collection, field analysis concepts, improved in-laboratory timelines, new signature development, improved modeling and simulation capabilities, and other supporting technologies. - Developed methods to rapidly determine post-event nuclear weapon yields and reaction history by investigating alternative prompt nuclear weapons effects, effects on the environment, and developing/fielding prototype capabilities.	34.595	35.061	9.547

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Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I WMD Defeat Technologies*	**Project (Number/Name)** RF *I Forensics Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
- Identified all-source nuclear threat signatures, characteristics, and corresponding detection modalities; identified the proper tipping, queuing, and data fusion techniques and algorithms to enable the rapid and effective accumulation of all-source intelligence on nuclear threat scenarios. - Developed and improved an advanced algorithm to increase the speed, accuracy, and reliability of isotope identification in fielded hand-held and portable detectors. - Conducted testing and evaluation of a photon Bremsstrahlung capability for active interrogation of Special Nuclear Material (SNM) in order to determine possible military utility. - Researched and developed a new, high resolution gamma-ray imaging and isotope identification prototype. - Researched and developed new detector materials that improve the capability to detect, locate, and identify Special Nuclear Materials. - Developed and demonstrated novel and advanced neutron detection technologies as alternatives to Helium-3-based neutron detectors. *FY 2015 Plans:* - Complete initial development of two neutron detection materials as alternatives to helium-3 neutron detectors - Complete development of room-temperature high-resolution gamma imaging detector electronics and semiconductor materials. - Research and develop new detector materials to improve the capability to detect, locate, and identify Special Nuclear Materials. - Improve the manufacturing readiness level by maturing technologies, designs, and production processes. - Execute robust and operationally relevant testing and evaluation of developmental radiation detection systems in order to determine and select the best performing technologies and techniques for further development and transition to user groups. - Demonstrate and field methods to remotely monitor small and wide areas. - Progress development of advanced three-dimensional imaging technologies for high resolution source characterization and identification to provide new and improved capabilities to detect, locate, and identify threat materials. - Research, develop, test, and evaluate software tools and capabilities to locate and identify the signatures of Special Nuclear Materials on both existing and newly developed hardware platforms. - Enhance algorithms to increase speed and reliability of isotope identification in fielded portable radiation detectors. - Begin testing, evaluation, and selection of best-performing developed software tools and algorithms to improve user capabilities and extend capabilities of existing radiation detection technologies. - Field an advanced detection algorithm to improve capabilities to detect, locate, and identify threat materials. - Continue identifying comprehensive all-source nuclear threat signatures, characteristics, and corresponding detection modalities; continue the identification and development of the proper tipping, queuing, data fusion techniques, and algorithms to enable the rapid and effective accumulation of all-source intelligence on nuclear threat scenarios. - Develop, (accelerate development where appropriate), test, demonstrate, and field prototype ground-based sensor capabilities for post-detonation prompt diagnostics under DISCREET OCULUS.			

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Exhibit R-2A, RDT&E Project Justification: PB 2016 Defense Threat Reduction Agency		Date: February 2015
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602718BR / *WMD Defeat Technologies*	**Project (Number/Name)** RF / *Forensics Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
- Develop, test, demonstrate, and field (prototype) upgraded technical capabilities for prompt diagnostics, debris collection, sample analysis, modeling to support nuclear device reconstruction, and forensics data to decrease timeline, lower uncertainties, and increase confidence in technical nuclear forensics conclusions. *FY 2016 Plans:* - Accelerate development and evaluate the propagation of prompt diagnostics phenomenology to support the deployment of ground-based sensor capabilities in three US cities for post-detonation prompt diagnostics under the DISCREET OCULUS program. - Develop, test, and demonstrate upgraded technical capabilities for prompt diagnostics, debris collection, sample analysis, modeling to support nuclear device reconstruction, and forensics data to decrease timeline, lower uncertainties, and increase confidence in technical nuclear forensics conclusions.			
Accomplishments/Planned Programs Subtotals	34.595	35.061	9.547

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• 28/0603160BR: *Proliferation Prevention and Defeat*	73.919	66.707	38.427	-	38.427	39.725	40.219	41.414	42.242	Continuing	Continuing
• 121/0605000BR: *WMD Defeat Capabilities*	6.867	6.887	7.156	-	7.156	7.340	7.437	7.563	7.715	Continuing	Continuing

Remarks

D. Acquisition Strategy

Assess government, academic, and industrial performers and make selections based upon a "best fit for task" criteria. Common government awardees include the DoD Laboratories, Department of Energy National Laboratories, and DoD Services.

E. Performance Metrics

Identification of five nuclear threat signatures for further evaluation.
Delivery of one algorithm fusing new nuclear threat signatures with existing all-source intelligence.
Incorporation of Gamma Detector Response and Analysis Software Algorithms on three additional detectors to improve detection capability.
Bench-top demonstration of digital Polaris viability for potential system integration.
Delivery of solid-state neutron detectors to provide alternate detection capability to end users.
Test and evaluation of two RadCam prototypes to determine feasibility of integrated, dual radiation (both gamma and neutron) detection capability.
Initial military utility assessment of active interrogation testing.
Delivery of boron-loaded plastic scintillators to provide alternate detection capability to end users.

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Exhibit R-2A, **RDT&E Project Justification:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
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Delivery of neutron detection testing campaign initial report.
Successfully test, demonstrate, field, and/or transition prototype nuclear forensics technologies/capabilities to an operational customer.
Down-select of new signatures, surrogate urban debris production routes, and technology requirements for field analysis capabilities.
Successful demonstration of the capability to exfiltrate data to a remote platform.

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Exhibit R-2A, RDT&E Project Justification: PB 2016 Defense Threat Reduction Agency											Date: February 2015	
Appropriation/Budget Activity 0400 / 2				**R-1 Program Element (Number/Name)** PE 0602718BR / *WMD Defeat Technologies*					**Project (Number/Name)** RG / *Defeat Technologies*			
COST ($ in Millions)	**Prior Years**	**FY 2014**	**FY 2015**	**FY 2016 Base**	**FY 2016 OCO**	**FY 2016 Total**	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**	**Cost To Complete**	**Total Cost**
RG: *Defeat Technologies*	47.857	14.270	10.982	11.769	-	11.769	11.395	11.700	11.965	12.203	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Defeat Technologies project develops, integrates, demonstrates and transitions innovative kinetic and non-kinetic weapon capabilities to expand traditional and asymmetric options available to Combatant Commanders to deny, disrupt, and defeat adversarial use of weapons of mass destruction (WMD) while minimizing collateral effects. Technology development focuses on the physical or functional defeat of (1) chemical, biological, radiological, and nuclear threat materials, (2) an adversary's ability to deliver the same, and (3) the physical and non-physical support networks enabling both. This project achieves its goals through the systematic identification and maturation of technologies capable of defeating WMD agents or agent based processes, then integrating them into weapons delivery systems for rapid WMD elimination. This project includes developing specific WMD agent/agent-based process simulants, test infrastructure, and sampling capability required for effective development, testing, and evaluation of next-generation Counter-WMD (CWMD) technologies.

The project places a high priority on understanding, characterizing, and validating potential weapon effects within mathematical confidence as it relates to the unintended release of hazardous threat materials.

The decrease from FY 2014 to FY 2015 is due to reduced investment in next generation CWMD technologies to balance other priorities. The increase from FY 2015 to FY 2016 is due to increased investment in component demonstrations and sub-scale and field testing of WMD defeat and assessment technologies.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
Title: RG: Defeat Technologies	14.270	10.982	11.769
Description: Project RG (Defeat Technologies) develops advanced technologies and weapon concepts and validates their applicability as counter WMD weapon systems. *FY 2014 Accomplishments:* - Continued to mature an automated system for the analysis of electronics susceptibility to electromagnetic fields. - Continued classified components testing. - Began classified component design. - Continued testing in support of a WMD agent defeat penetrator bomb development. - Continued development of potential WMD target access denial or denial-of-use technologies. - Continued advanced testing of non-energetic WMD Defeat sub-munitions. - Continued small-scale testing of CWMD payloads. - Continued to explore integration of kinetic and non-kinetic capabilities into single payload for CWMD testing. - Continued testing and demonstrations of payloads capable of neutralizing large amounts of WMD agent. - Continued to catalog the accuracy and precision of WMD sampling equipment used in CWMD testing. - Continued development of a capability to conduct full-scale agent defeat testing with acceptable accuracy and precision.			

Exhibit R-2A, **RDT&E Project Justification:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I WMD Defeat Technologies*	**Project (Number/Name)** RG *I Defeat Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
- Conducted large-scale target testing of functional defeat technologies.			
FY 2015 Plans: - Mature classified component testing. - Continue classified integration and component design. - Continue development of access denial and denial-of-use technologies for WMD targets. - Continue development and integration of concepts for exploiting susceptibility of electronics to electromagnetic fields.			
FY 2016 Plans: - Conduct static demonstration of initial capability of access denial and denial-of-use technologies against WMD representative targets. - Complete electronics susceptibility to electromagnetic fields algorithm development and characterization testing. - Downselect electromagnetic source and start system development and integration. - Continue classified component/system design and integration and conduct initial demonstrations. - Conduct sub-scale tests to assess capability to accurately measure WMD simulant released in plume.			
Accomplishments/Planned Programs Subtotals	14.270	10.982	11.769

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• 28/0603160BR: *Proliferation, Prevention, and Defeat*	15.861	19.591	22.489	-	22.489	22.986	23.365	23.764	24.238	Continuing	Continuing

Remarks

D. Acquisition Strategy

Assess government, academic, and industrial performers and make selections based upon a "best fit for task" criteria. Common government awardees include DoD Service Laboratories, Department of Energy National Laboratories, and specialized university laboratories.

E. Performance Metrics

Research and develop potential technologies and mature at least three new capabilities to counter WMD between FY 2016 and FY 2020 to Technology Readiness Level 3/4.

Exhibit R-2A, RDT&E Project Justification: PB 2016 Defense Threat Reduction Agency										Date: February 2015	

Appropriation/Budget Activity 0400 / 2				R-1 Program Element (Number/Name) PE 0602718BR / WMD Defeat Technologies				Project (Number/Name) RI / Nuclear Survivability			

COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
RI: *Nuclear Survivability*	57.264	20.351	19.416	29.988	-	29.988	30.264	30.826	31.592	32.224	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Nuclear Survivability project provides innovative technologies for DoD nuclear and conventional forces, associated control and support systems, and facilities to protect and deter nuclear threats to enable mission-essential functions to continue during and after the onset of hostile action by extremists and rogue states. The Nuclear Survivability project provides electromagnetic pulse (EMP) research and standards, Nuclear Weapons Effects (NWE) experimentation, advanced Radiation Hardened Microelectronics (RHM), and human survivability research. The research from this project supports the 487 mission critical systems identified under DoDI 3150.09, Chemical, Biological, Radiological, and Nuclear (CBRN) Survivability Policy.

DTRA is the DoD designated EMP center of excellence to provide electromagnetic pulse survivability assessments to support national and military operational planning, weapons effects predictions, and national strategic system designs. DTRA publishes nuclear related military standards and handbooks for the strategic and non-strategic warfighters and program offices as the DoD NWE subject matter expert.

The RHM program responds to DoD space and missile system requirements for nanoelectronics and photonics technology to support DoD strategic mission needs. This program develops and demonstrates radiation-hardened, high-performance prototype microelectronics to ensure their availability from both private sector and government organizations. Further, the program develops DoD space and satellite nuclear survivability standards and handbooks that provide engineering level detail and defined metrics for all entities with space asset equities.

Pulsed power and laser-driven NWE simulators are available to validate nuclear survivability requirements for DoD missile and space systems, conduct radiation effects research in materials and electronics, and validate computational models. The Experimental Capabilities Program is working with the National Nuclear Security Administration (NNSA) and the United Kingdom's (UK) Atomic Weapons Establishment to jointly develop new enabling technologies for improved NWE experimentation capabilities for x-rays, gamma rays, and neutrons.

Human survivability conducts research to develop and validate mortality and morbidity models associated with radiological and nuclear weapons effects in urban environments.

The decrease from FY 2014 to FY 2015 is due to reduced investment in nuclear effects simulation/experimentation capability and radiation hardened nanoelectronics. The increase from FY 2015 to FY 2016 is due to the realignment of the system vulnerabilities and assessment activities from Project RL-Nuclear & Radiological Effects to Project RI.

B. Accomplishments/Planned Programs ($ in Millions)

	FY 2014	FY 2015	FY 2016
Title: RI: Nuclear Survivability	20.351	19.416	29.988

Exhibit R-2A, **RDT&E Project Justification:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I WMD Defeat Technologies*	**Project (Number/Name)** RI *I Nuclear Survivability*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
Description: Project RI (Nuclear Survivability) provides the capability for DoD nuclear forces and their associated control and support systems and facilities in wartime to avoid, repel, endure, or withstand attack or other hostile action, to the extent that essential functions can continue or be resumed after the onset of hostile action. *FY 2014 Accomplishments:* - Demonstrated RadHard-by-Design 45nm /32nm technology. - Conducted radiation effects on advanced 14nm technology testing and characterization. - Completed 45nm and 32nm hardness assurance methods for testing and assurance projects. - Transitioned radiation effects modeling and simulation project from planar 45nm / 32nm Electronic Design Automation to 28nm / 14nm Fin-Shaped Field Effect Transistors. - Improved the electron beam test capabilities and expertise of the DTRA West Coast Facility in support of US and UK strategic systems survivability certification. - Demonstrated the Short Pulse Gamma prototype as a new and unique test capability within the West Coast Facility for hardening and validation of military systems without over-dosing to improve the long-term performance of mission critical electronics. - Demonstrated strategic level direct laser blow-off impulse test capability to support material modeling & simulation and to establish a low-cost alternative technology to the development of a new magnetic flyer plate facility for future strategic re-entry systems. - Generated and distributed a Guide to Nuclear Weapons Effects Simulation Facilities and Applications, which documents all of the major NEW test capabilities in the United States. - Developed combined radiation and burn prompt injury models and code including time-dependent clinical parameters for integration into nuclear weapons effects code. - Initiated update of MIL-STD-188-125-1 High-Altitude Electromagnetic Pulse Protection For Ground-Based C4I Facilities Performing Critical, Time-Urgent Missions Part 1 Fixed Facilities. - Completed verification test of Modernization of Enterprise Terminals Hardened Transportable Terminal to MIL-STD-188-125-2. - Completed Consolidated Afloat Network and Enterprise Services Military Standard. - Completed draft MIL-STD-4023 Maritime EMP Standard for surface ships. *FY 2015 Plans:* - Collaborate with the UK on EMP research on power grid transformers. - Deliver new warm x-ray (10-50 keV) test capability on the Double-Eagle and ZR simulators, in collaboration with Naval Research Laboratory and Sandia National Laboratories. - Upgrade the Short Pulse Gamma facility within the West Coast Facility for hardening and validation of satellite and stockpile subsystems and components. - Explore and validate new pulsed-power neutron and dust test capabilities. - Complete Program Manager's Handbook for Nuclear Survivability.			

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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
- Publish survivability standards in support of satellite systems, all air domain effects, and source region electromagnetic pulse environment. - Complete 32nm Product Demonstration Vehicle. - Initiate a <22nm Rad Hard-by-Design program. - Initiate development of maskless e-beam lithography. *FY 2016 Plans:* - Upgrade electron-beam (cold x-ray) test capability at the DTRA West Coast Facility to allow testing at 2X current capability. - Develop innovative techniques to produce 5X improvement in warm x-ray (10-50 keV) test capability for DTRA Double-Eagle simulator. - Perform a System Generated Electro-Magnetic Pulse radiation effects experiments for 2-D code validation on the National Ignition Facility (NIF). - Publish MIL-STD-4023, High-Altitude Electromagnetic Pulse Protection for Maritime Assets and Comprehensive Atmospheric Nuclear Environment military standards. - Update MIL-STD-188-125-1/2, High-Altitude Electromagnetic Pulse Protection for Fixed and Transportable Facilities and Systems. - Update MIL-HDBK-423 High-Altitude Electromagnetic Pulse Protection for Fixed facilities. - Publish Aircraft High Altitude EMP Protection Handbook. - Conduct electromagnetic pulse assessments on Defense critical infrastructure for electric power and telecommunications networks. - Update cost estimates to harden methodology protocols for aircraft, missile, and satellite systems. - Transition Single Event Transient research and mitigation from legacy to 32 nanoscale technology nodes. - Initiate a RadHard-by-Design development for less than 22nm commercial technology. - Transition maskless e-Beam lithography from Small Business Innovation Research project to trusted Rad Hard Foundry. - Publish Satellite System Nuclear Survivability Protection Military Standard. - Initiate development of Satellite System Nuclear Survivability protection design handbook. - Initiate a low power design using one 1-D gridded design guidelines in a RadHard foundry.			
Accomplishments/Planned Programs Subtotals	20.351	19.416	29.988

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• 28/0603160BR: *Proliferation Prevention and Defeat*	5.939	5.570	6.191	-	6.191	6.640	6.727	6.814	6.942	Continuing	Continuing

Exhibit R-2A, **RDT&E Project Justification:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
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C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost

Remarks

D. Acquisition Strategy

Assess government, academic, and industrial performers and make selections based upon a "best fit for task" criteria. Common government awardees include DoD Service Laboratories and Department of Energy National Laboratories, and specialized university laboratories.

E. Performance Metrics

Develop advanced x-ray experimental and computational capabilities to meet emerging survivability requirements.
Demonstrate Short Pulse Gamma prototype to support high temporal fidelity for validation of prompt gamma Nuclear Weapons Effects on advanced electronics.
Publish/update Nuclear Weapons Effects survivability standards and protection handbooks
Update cost estimates to harden studies and protocols.
Perform nuclear survivability assessments for Services and Combatant Commands.
Provide advanced hardened nanoelectronics circuits and mitigation techniques.

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Appropriation/Budget Activity 0400 / 2				**R-1 Program Element (Number/Name)** PE 0602718BR / *WMD Defeat Technologies*				**Project (Number/Name)** RL / *Nuclear & Radiological Effects*			
COST ($ in Millions)	**Prior Years**	**FY 2014**	**FY 2015**	**FY 2016 Base**	**FY 2016 OCO**	**FY 2016 Total**	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**	**Cost To Complete**	**Total Cost**
RL: *Nuclear & Radiological Effects*	67.069	31.754	32.352	23.053	-	23.053	23.769	23.899	24.308	24.794	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Nuclear and Radiological Effects project develops nuclear and radiological assessment modeling tools to support military operational planning, weapon effects predictions, and strategic system design decisions; consolidate validated Defense Threat Reduction Agency (DTRA) modeling tools into the Joint Information Environment for integrated functionality; predict system response to nuclear and radiological weapons producing electromagnetic, thermal, blast, shock and radiation environments - key systems include Nuclear Command and Control System, Global Information Grid, space assets, structures, humans and environment; provide detailed adversary nuclear infrastructure characterization to enhance counterforce operations and hazard effects; conduct analyses in support of nuclear and radiological science and technology and address the priority needs of the Combatant Commands and the Department of Defense (DoD); and develop foreign nuclear weapon outputs.

The increase from FY 2014 to FY 2015 is due to the net effect of the cancellation of the Experimental Situational Awareness Center, a shift in priorities from weapon effects modeling to electromagnetic pulse modeling, and increased investment in full effects modeling. The decrease from FY 2015 to FY 2016 is due to an administrative realignment of the System Vulnerability and Assessment program to Project RI-Nuclear Survivability due to the nature of that effort.

B. Accomplishments/Planned Programs ($ in Millions)

	FY 2014	FY 2015	FY 2016
Title: RL: Nuclear & Radiological Effects	31.754	32.352	23.053

Description: Project RL (Nuclear & Radiological Effects) develops nuclear and radiological assessment modeling tools to support military operational planning, weapons effects predictions, and strategic system design decisions.

FY 2014 Accomplishments:
- Started Atmospheric Nuclear Environment Military Standard.
- Began Communication in Disturbed Environment Military Standard.
- Complete Verification Test of Modernization of Enterprise Terminals Hardened Transportable Terminal to MIL-STD-188-125-2.
- Completed draft MIL-STD-4023, High Altitude Electromagnetic Pulse protection for maritime assets.
- Via the Nuclear Weapons Effects Network, modeled fire start to support United States Strategic Command (USSTRATCOM) interest in Consequences of Execution, fire start experiments, and tunnel defeat.
- Modeled nuclear infra-red effects for global assessment of missile defense systems' capabilities.
- Updated radar and infra-red system models.
- Updated Source Region Electromagnetic Pulse model to support USSTRATCOM requirements.
- Modified input requirements of engineering level codes to take advantage of Redbook and Bluebook output.
- Modeled the effects of urban nuclear detonations for underground tunnels (e.g., subways) in support of infrastructure assessments.

Exhibit R-2A, **RDT&E Project Justification:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
- Expanded Nuclear Weapons Effects Database System functionality with additional targets and damage calculations. Enhanced the following: reports, plot rendering, combined and multiple weapons effects, and Nuclear Weapons Database. - Provided model for analysis of the high altitude nuclear environments and the effects of electromagnetic pulse and non-ideal air-blast on defense systems for an integrated net-centric application. *FY 2015 Plans:* - Begin transition of improved airblast, fallout, fire and Source Region Electromagnetic Pulse models to the DTRA net-centric environment for USSTRATCOM (and other nuclear targeting/consequences of execution users). - Improve weapon outputs, environment models, and Effects Manual 1 (EM-1) chapters. - Deliver upgraded database of foreign nuclear weapon outputs for DoD and the Services. - Develop System Generated Electromagnetic Pulse simulation codes by adapting physics capabilities of the Maxwell's Equations Equivalent Circuit code and the Improved Concurrent Electromagnetic Particle-In-Cell high performance computing code. - Further develop a database with selected nuclear weapon output and effects for use in validation of nuclear weapon effects codes. - Develop component level electromagnetic pulse response model for better modeling/predictions of effects on electronic systems. - Via the Nuclear Weapon Effects Network, continue modeling economic and social consequences of nuclear detonation effects, collateral building damage due to nuclear-induced airblast, assess nuclear dust/debris effects on airborne systems, and model nuclear fire initiation. - Begin enhancement and fix current shortfalls of High Altitude Radiation Phenomenology functionality for use on modern computer systems. - Complete transfer of contracting vehicle for continued development of nuclear weapon environment on airborne strategic systems at low, medium, and high-altitudes to include non-steady, non-level flight to modernize modeling and simulation tools in airblast, thermal, and fallout applicable areas. - Complete transfer of contracting vehicle for development of the Atmospheric Nuclear Environment Military Standard. - Develop new magnetosphere experiments using microsatellites (CubeSats) for quantification of the artificial radiation belt formation and decay in order to define the source term for damage and degradation of space assets. - Complete transfer of contracting vehicle for development of the Communication in Disturbed Environment Military Standard. - Complete engineering level modeling of the response of airborne systems in nuclear dust clouds, and transition the capability to nuclear hardness databases. - Begin implementation of first principle modeling tools for nuclear fire initiation and spread in urban and suburban environments. - Publish MIL-STD-4023, High Altitude Electromagnetic Pulse Protection for Maritime Assets. - Publish Comprehensive Atmospheric Nuclear Environment MIL-STD. - Update MIL-STD-188-125-1/2, High Altitude Electromagnetic Pulse Protection for Fixed and Transportable Facilities and Systems. - Perform an electromagnetic pulse assessment on a U.S. Navy warship.			

Exhibit R-2A, **RDT&E Project Justification:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
- Update MIL-HDBK-423, High Altitude Electromagnetic Pulse protection for fixed facilities. - Publish Aircraft Electromagnetic Pulse Protection Handbook. - Add Source Region Electromagnetic Pulse to the Electromagnetic Reliability and Effects Prediction Toolkit. - Conduct electromagnetic pulse assessments on defense critical infrastructure power, specifically the power grid and telecommunications networks. *FY 2016 Plans:* - Deliver airblast, fallout, fire and Source Region Electromagnetic Pulse models to USSTRATCOM (and other nuclear targeting/ consequences of execution users) for improved nuclear targeting using nuclear effects that have not been considered in the past. - Provide improved foreign nuclear weapon outputs, environment models, and Effects Manual 1 (EM-1) chapters. - Develop System Generated Electromagnetic Pulse simulation codes by adapting physics in the Maxwell's Equations Equivalent Circuit code and the Improved Concurrent Electromagnetic Particle-In-Cell high performance computing code. - Further develop a gold standard database with selected historical nuclear weapon output and effects for use in validation of Nuclear Weapons Effects codes. - Via the Nuclear Weapons Effects Network, continue modeling economic and social consequences of nuclear detonation effects, collateral building damage due to nuclear-induced airblast, assess nuclear dust/debris effects on airborne systems, and model nuclear fire initiation, allowing these considerations to be part of the targeting analyses. - Improve high altitude nuclear effects functionality for use in analyzing satellite and missile defense response to a nuclear environment. - Continue implementation of first principle modeling tools for nuclear fire initiation and spread in urban and suburban environments.			
Accomplishments/Planned Programs Subtotals	31.754	32.352	23.053

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• 121/0605000BR: *WMD Defeat Capabilities*	5.644	-	-	-	-	-	-	-	-	-	5.644

Remarks

D. Acquisition Strategy

Assess government, academic, and industrial performers and make selections based upon a "best fit for task" criteria. Common government awardees include DoD Service Laboratories and Department of Energy National Laboratories, and specialized university laboratories.

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E. Performance Metrics

Provide DoD the ability to predict the survival and mission impact of military critical systems exposed to nuclear weapon environments within acceptability criteria defined during the model accreditation process.

Continuously improve USSTRATCOM official strategic targeting capability to determine the consequences of execution from nuclear weapons.

Weapon Effects Steering Committee: Coordinate and integrate nuclear weapon effects needs, capabilities, and programs across the United States and United Kingdom defense communities.

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Appropriation/Budget Activity 0400 *I* 2				**R-1 Program Element (Number/Name)** PE 0602718BR *I WMD Defeat Technologies*					**Project (Number/Name)** RM *I WMD Counterforce Technologies*		

COST ($ in Millions)	**Prior Years**	**FY 2014**	**FY 2015**	**FY 2016 Base**	**FY 2016 OCO**	**FY 2016 Total**	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**	**Cost To Complete**	**Total Cost**
RM: *WMD Counterforce Technologies*	52.370	14.660	13.787	13.526	-	13.526	13.642	13.958	14.427	14.714	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Weapons of Mass Destruction (WMD) Counterforce Technologies Project provides applied research to support 1) full and sub-scale testing required to investigate countering WMD weapon effects and sensor performance, 2) weapon effects modeling algorithm development, and 3) development of visualization and situational awareness tools to support the next generation Defense Threat Reduction Agency (DTRA) Technical Reachback analysis cell.

This project provides Combatant Commanders with the prediction capability and the attack options to engage WMD targets. The project conducts weapon effects phenomenology tests, analyzes data, conducts high performance computer simulations, and creates/modifies software to more accurately model and simulate weapons effects on WMD and related targets. These efforts will lead to advanced capabilities in countering WMD planning tools. The Advanced Energetics Program develops new novel energetic materials and weapon design technology for rapid, directed, and enhanced energy release, providing new capability to defeat difficult WMD/Hard and Deeply Buried Targets. The Advanced Energetics Program develops new high energy systems well above current chemical energy levels to defeat WMD targets beyond the reach of traditional high explosive blast/frag warhead technology.

The decrease from FY 2014 to FY 2015 is due to reduced investment in small and medium-scale validation and parametric study experiments for advanced energetics. The decrease from FY 2015 to FY 2016 is due to decreased investment in weapons effects modeling.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
Title: RM: WMD Counterforce Technologies	14.660	13.787	13.526
Description: Project RM (WMD Counterforce Technologies) provides (1) novel and enhanced weapons energetic materials and structures, full-scale testing of counter WMD weapons effects, weapons effects modeling, and weapon delivery optimization, (2) WMD sensor, surveillance and data processing technologies, and (3) the DTRA Experimentation Lab. *FY 2014 Accomplishments:* - Developed Blast Propagation Through Failed Walls Model. - Completed testing to update Agent Release Model for container perforated translation/collision. - Optimized Finite Element Flow Solver for agent defeat calculations in complex tunnels. - Completed General Near Miss Lethality Model. - Continued model development for blast and fragment propagation through failing blast doors and multi-blast doors. - Continued lab and scale testing for validation of high fidelity models for penetration mechanics through ultra-high strength materials. - Developed test data for steel columns for near contact detonations to feed global response models for agent defeat planning and consequence of execution estimation.			

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Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I WMD Defeat Technologies*	**Project (Number/Name)** RM *I WMD Counterforce Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
- Continued global response testing and modeling for progressive collapse analyses for consequence of execution estimation. - Coordinated a new project agreement with Singapore for testing and modeling of mega columns. - Completed a model for blast propagation through bunker walls for inventory weapons. - Performed annual cycle of requirements collection, challenge proposals, resource allocation, and technical support through high performance computing. - Enhanced one high performance computing production code to better leverage capabilities of the Department of Defense (DoD) high performance computers for improved modeling and simulation time to response. - Delivered a 70% increase in high end computational cycles to numerical modeling and simulation community. - Produced scaled quantities of three novel explosives having output performance greater than conventional explosives. - Initiated effort to produce greater scaled quantity of novel explosive material for performance testing. - Invented four new polymers with better performance than existing energetic polymers for potential counter-WMD technology applications. - Filed patent application for two polymers which have photovoltaic properties with potential counter-WMD technology applications. - Discovered and employed methods for production of energetic polymers. - Completed standardization of sensitivity test methods. - Conducted a large scale test of hybrid enhanced blast explosives and reactive cases for defeat of biological agents using simulants. - Scaled up synthesis of novel explosives, prepared their metalized composites, and conducted field tests. - Developed real-time reachback requirements and gap solutions through wide area search Table Top Exercise. ***FY 2015 Plans:*** - Develop Hybrid Enhanced Blast Explosives; demonstrate ability to embed detonator system and disperse along with the fuel to initiate cloud reaction as designed. - Conduct a large-scale test of Hybrid Enhanced Blast Explosives and reactive cases for defeat of biological agents using simulants. - Modeling and test support to optimize and improve reactive case technology for use in Joint Multi-Effects Warhead System, Tube-launched, Optically-tracked, Wireless-guided bunker buster, and Hellfire warheads. - Conduct field tests to support optimization and improve effectiveness of biocidal effect fuels used in explosive formulations, innovative common data methods supporting advanced WMD effects modeling and simulation capabilities for consequence management. - Conduct lab and field tests of two new high explosive formulations for use in Conventional Prompt Global Strike warheads: one optimized for blast/fragmented, one optimized for high speed penetration warheads.			

Exhibit R-2A, RDT&E Project Justification: PB 2016 Defense Threat Reduction Agency		Date: February 2015
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I WMD Defeat Technologies*	**Project (Number/Name)** RM *I WMD Counterforce Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
- Improve hydrocodes to provide high fidelity capability to model post-detonation energy release from non-ideal detonation and other new advanced energetics systems. - Integrate weapons effects model for blast propagation through bunker walls for inventory weapons into planning tools. - Develop weapons effects debris model from bunker walls subjected to internal detonations with inventory weapons. - Complete testing of response of dry-agent stimulant in container undergoing perforation, translation, and collision from weapons induced loads. Deliver new Agent Release Model. - Begin large-scale testing for validation of high fidelity models for penetration mechanics through ultra-high strength materials. - Complete testing and begin model development for response of massive columns to near-contact charges. - Conduct testing to validate high fidelity computational methods for predicting progressive collapse analysis of steel buildings. - Perform annual cycle of requirements collection, challenge proposals, resource allocation, and technical support through high performance computing. - Submit proposal(s) to the DoD High Performance Computing Modernization Program (HPCMP) to fund dedicated high performance computing hardware to meet unique DTRA requirements. - Submit proposal(s) to the HPCMP to fund software development to meet unique DTRA requirements. *FY 2016 Plans:* - Complete technology gap analysis for chemical/biological source term modeling. - Enhance computational fluid and structure codes for chemical/biological source term modeling. - Conduct component level, small-scale testing for chemical/biological source term modeling. - Develop fast running engineering models for dispersion of chemical/biological agents. - Test modeling of response of mega columns to near-contact charges. - Perform annual cycle of requirements collection, frontier proposals, resource allocation, and technical support through high performance computing. - Develop/demonstrate small-scale Hybrid Enhanced Blast Explosives. - Test/demonstrate Hybrid Enhanced Blast Explosives and reactive cases for simulated biological agent defeat. - Model and test reactive case technologies for Joint Multi-Effects Warhead System and various warheads. - Improve modeling capability for weapon post detonation reaction using reactive case technologies. - Improve modeling capability for agent defeat using novel weapon energetic payloads. - Conduct field tests to support optimization and improve effectiveness of explosive formulations for chemical, biological, radiological, and nuclear agent defeat. - Conduct lab and field tests of two new explosive formulations tailored (temperature, pressure and outgases) for WMD defeat operations.			
Accomplishments/Planned Programs Subtotals	14.660	13.787	13.526

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Exhibit R-2A, **RDT&E Project Justification:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I WMD Defeat Technologies*	**Project (Number/Name)** RM *I WMD Counterforce Technologies*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• 28/0603160BR: *Proliferation, Prevention, and Defeat*	29.644	29.346	20.717	-	20.717	22.846	23.216	23.739	24.212	Continuing	Continuing

Remarks

D. Acquisition Strategy

Assess government, academic, and industrial performers and make selections based upon a "best fit for task" criteria. Common government awardees include DoD Service Laboratories and Department of Energy National Laboratories, and specialized university laboratories. Technologies are transitioned to users via Service and Interagency Program Management Offices (e.g., WMD Aerial Collection System transitioned via the Army's Program Manager Unmanned Aircraft System, Counter WMD Planning Tools via Joint Munitions Effectiveness Manual Weaponeering System and Target Acquisition Workstation, and other modeling and simulation capabilities are transitioned via DTRA Technical Reachback.

E. Performance Metrics

Delivery of optimized Finite Element Flow Solver for agent defeat calculations in complex tunnels.
Submittal of high performance computing annual cycle of requirements collection, challenge proposals, if any, and provide technical support.
Completion and integration of one enhanced high performance computing production code to better leverage capabilities of DoD high performance computers for improved modeling and simulation time to response.
Completion of lab and scale testing for validation of high fidelity models for penetration mechanics through ultra-high strength materials.
Delivery of test data for steel columns for near-contact detonations to feed global response models for agent defeat planning and consequence of execution estimation.
Completion of global response testing and modeling for progressive collapse analyses for consequence of execution estimation.
Completion of a model for blast propagation through bunker walls for inventory weapons.
Completion of a large scale test of Hybrid Enhanced Blast Explosives and reactive cases for defeat of biological agents using simulants.
Completion of synthesis of novel explosives, prepare their metalized composites and complete field tests.
Completion of modeling and testing support to optimize and improve reactive case technology for use in Joint Multi-Effects Warhead System, Tube-launched, Optically-tracked, Wireless-guided bunker buster, and Hellfire warheads.
Completion of testing of response of dry-agent stimulant in container undergoing perforation, translation, and collision from weapons induced loads.
Delivery of new Agent Release Model.
Completion of large-scale testing for validation of high fidelity models for penetration mechanics through ultra-high strength materials.
Completion of testing and begin model development for response of massive columns to near-contract charges.
Completion of testing to validate high fidelity computational methods for predicting progressive collapse analysis of steel buildings.
Delivery of technology gap analysis for chemical/biological source term modeling.
Completion of computational fluid and structure codes and component level, small-scale testing for chemical/biological source term modeling.
Completion of testing for and development of fast running engineering model for dispersion of chemical/biological agents.
Completion of demonstration of Hybridized Enhance Blast Explosive and reactive cases for simulated biological agent defeat.

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Exhibit R-2A, **RDT&E Project Justification:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I WMD Defeat Technologies*	**Project (Number/Name)** RM *I WMD Counterforce Technologies*

Completion of tests for reactive case technologies for Joint Multi-Effects Warhead System and various warheads.

Delivery of modeling capability for weapon post detonation reaction using reactive case technologies.

Completion of lab and field tests of two new explosive formulations tailored (temperature, pressure, and outgases) for WMD defeat operations.

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Exhibit R-2A, RDT&E Project Justification: PB 2016 Defense Threat Reduction Agency										Date: February 2015	
Appropriation/Budget Activity 0400 *I* 2				**R-1 Program Element (Number/Name)** PE 0602718BR *I WMD Defeat Technologies*				**Project (Number/Name)** RR *I Combating WMD Test and Evaluation*			
COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
RR: *Combating WMD Test and Evaluation*	40.575	11.543	11.060	11.182	-	11.182	11.709	11.984	12.315	12.560	Continuing	Continuing

Note

 RR Project title changed from Test Infrastructure to Combating WMD Test and Evaluation starting in FY 2015.

A. Mission Description and Budget Item Justification

 The Combating Weapons of Mass Destruction (WMD) Test and Evaluation Project provides a unique national test bed capability for simulated WMD facility characterization, weapon-target interaction, and WMD facility defeat testing to respond to operational needs by developing and maintaining test beds used by the Department of Defense (DoD), the Military Services, the Combatant Commanders, and other Federal Agencies to evaluate the implications of WMD, conventional, and other special weapon use against United States military or civilian systems and targets. It leverages 50 years of testing expertise to investigate weapons effects and target response across the spectrum of hostile environments that could be created by proliferate nations or terrorist organizations with access to advanced conventional weapons or WMD (nuclear, biological, and chemical). The project provides capabilities that support the testing requirements of warfighters, other government agencies, and friendly foreign countries. It creates testing strategies and a WMD Test Bed infrastructure focusing on the structural response of buildings and Hard and Deeply Buried Targets that house nuclear, biological, and chemical facilities. It provides support for full and sub-scale tests that focus on weapon-target interaction with fixed soft and hardened facilities to include above ground facilities, cut-and-cover facilities, and deep underground tunnels. This capability does not exist anywhere else within the DoD and supports the counterproliferation pillar of the National Strategy to Combat WMD.

 The decrease from FY 2014 to FY 2015 is due to the cancellation of the Infrastructure Development and Improvement program to balance priorities.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
Title: RR: Combating WMD Test and Evaluation	11.543	11.060	11.182
Description: Project RR provides a unique national test bed capability for simulated WMD facility characterization, weapon-target interaction, and WMD facility defeat testing to respond to operational needs by developing and maintaining test beds used by the DoD, the Military Services, the Combatant Commanders and other Federal Agencies to evaluate the implications of WMD, conventional, and other special weapon use against U.S. military or civilian systems and targets. *FY 2014 Accomplishments:* - Continued Combating WMD (CWMD) testing/demonstration at Nevada National Security Site to defeat credible and threat-based scenarios; continued with transition into several related projects/planned events through FY 2017. - Supported development and demonstration of TransAtlantic Collaboration Biological Resiliency Demo, a DoD capability to shape interagency approach to counter a wide area biological event impacting U.S. and partner nations' key civilian/military infrastructure.			

Exhibit R-2A, RDT&E Project Justification: PB 2016 Defense Threat Reduction Agency		Date: February 2015
Appropriation/Budget Activity 0400 *I* 2	R-1 Program Element (Number/Name) PE 0602718BR *I WMD Defeat Technologies*	Project (Number/Name) RR *I Combating WMD Test and Evaluation*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
- Continued research of biological re-aerosolization in conjunction with DoD/Department of Homeland Security (DHS)/ Environmental Protection Agency (EPA) to help develop precise measurement technologies for residual biological pathogens reentering air after settling. - Continued intergovernmental Biological Agent Defeat test program between DTRA and Defence Research and Development Canada. - Conducted testing in support of Treaty Verification Technology Program and Source Physics Experiment to support Comprehensive Test Ban Treaty initiatives, New START warhead verification, and detection and verification of biological and chemical weapons. - Continued testing Chemical, Biological, Radiological, Nuclear, and High-yield Explosives (CBRNE) sensors, WMD countermeasures, remote geological sensing, and battle management systems designed for surveillance and tracking targets used for WMD activities. - Continued environmental remediation and compliance activities at the Nevada National Security Site, White Sands Missile Range, and Kirtland Air Force Base (AFB) in accordance with EPA, safety, and environmental guidelines. Deferred major demolition and restoration efforts of major test articles while ensuring they are safely closed and sealed at acceptable standards. - Maintained current inventory of infrastructure and instrumentation, extending the life-cycle of these items as long as possible to ensure test beds meet customers' advanced technology testing needs. *FY 2015 Plans:* - Continue CWMD testing/demonstration at Nevada National Security Site to defeat credible and threat-based scenarios; continue with transition into several related projects/planned events through FY 2017. - Continue technical and testing development and demonstration of TransAtlantic Collaboration Biological Resiliency Demo, a DoD capability to shape interagency approach to counter a wide area biological event impacting U.S. and partner nations' key civilian/military infrastructure. - Continue testing in support of "Speed of Sound" nuclear forensic program estimated to continue through FY 2015. - Support revitalized Weapons Effects Phenomenology Program supporting DTRA test programs. - Continue testing in support of Treaty Verification Technology Program and Source Physics Experiment to support Comprehensive Test Ban Treaty initiatives, New START warhead verification, and detection and verification of biological and chemical weapons. - Continue support of WMD sensor testing at the Technical Evaluation Assessment and Monitor Site to detect and prevent nuclear grade material from entering the United States, U.S. territories, and Allied Nations through air, rail, and ship ports. - Continue testing CBRNE sensors, WMD countermeasures, remote geological sensing, and battle management systems designed for surveillance and tracking targets used for WMD activities. - Continue nuclear detection and forensics testing to prevent weapons grade material/dirty bombs from entering the United States, U.S. territories, and Allied Nations.			

Exhibit R-2A, **RDT&E Project Justification:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I WMD Defeat Technologies*	**Project (Number/Name)** RR *I Combating WMD Test and Evaluation*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
- Continue environmental remediation and compliance activities at the Nevada National Security Site, White Sands Missile Range, and Kirkland AFB in accordance with EPA, safety, and environmental guidelines. Defer major demolition and restoration efforts of major test articles while ensuring they are safely closed and sealed at acceptable standards. - Maintain current inventory of infrastructure and instrumentation, extending life-cycle of these items as long as possible to ensure test beds meet customers' advanced technology testing needs. - Document, prioritize, and support test infrastructure requirements. *FY 2016 Plans:* - Begin testing at Nevada National Security Site in support of the nonproliferation portion of the National Center for Nuclear Security portfolio. - Conduct CWMD testing/demonstration at Nevada National Security Site to defeat credible and threat-based scenarios with transition into several related projects/planned events. - Continue technical and testing development/support of Transatlantic Collaborative Biological Resiliency Demonstration, a DoD capability to shape interagency approach to counter a wide area biological event impacting U.S. and partner nations' key civilian/ military infrastructure. - Perform testing in support of Treaty Verification Technology Program and Source Physics Experiment to support Comprehensive Test Ban Treaty initiatives. - Continue support of WMD sensor testing at the Technical Evaluation Assessment and Monitor Site to detect and prevent nuclear grade material from entering the United States, U.S. territories, and Allied Nations through air, rail, and ship ports. - Test CBRNE sensors, WMD countermeasures, remote geological sensing, and battle management systems designed for surveillance and tracking targets used for WMD activities. - Conduct environmental remediation and compliance activities at the Nevada National Security Site, White Sands Missile Range, and Kirkland AFB in accordance with EPA, safety, and environmental guidelines. Secure major demolition and restoration efforts of major test articles while ensuring they are safely closed and sealed at acceptable standards. - Maintain current inventory of infrastructure and instrumentation, extending life-cycle of these items as long as possible, to ensure test beds meet customers' advanced technology testing needs. - Document, prioritize, and support test infrastructure requirements. - Conduct collection campaigns with interagency participation specific to relevant counter WMD data collection requirements.			
Accomplishments/Planned Programs Subtotals	11.543	11.060	11.182

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• 28/0603160BR: *Proliferation, Prevention, and Defeat*	0.092	-	-	-	-	-	-	-	-	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: PB 2016 Defense Threat Reduction Agency		Date: February 2015
Appropriation/Budget Activity 0400 / 2	**R-1 Program Element (Number/Name)** PE 0602718BR / *WMD Defeat Technologies*	**Project (Number/Name)** RR / *Combating WMD Test and Evaluation*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost

Remarks

D. Acquisition Strategy

Assess government, academic, and industrial performers and make selections based upon a "best fit for task" criteria. Common government awardees include DoD Service Laboratories and Department of Energy National Laboratories, and specialized university laboratories.

E. Performance Metrics

Number of tests executed safely, (i.e., no personal injury and no unintentional significant damage of property)
Number of tests that are evaluated and completed in accordance with scheduled milestones.
Number of tests that undergo environmental assessment consistent with existing Environmental Impact Statements. All tests executed undergo environmental review consistent with existing Environmental Impact Statements.

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Appropriation/Budget Activity 0400 I 2	R-1 Program Element (Number/Name) PE 0602718BR I *WMD Defeat Technologies*	Project (Number/Name) RU I *Fundamental Research for Combating WMD*

COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
RU: *Fundamental Research for Combating WMD*	20.391	0.919	-	-	-	-	-	-	-	-	-	21.310

A. Mission Description and Budget Item Justification

The Fundamental Research for Combating Weapons of Mass Destruction (CWMD) project conducts technology reviews of the Defense Threat Reduction Agency's (DTRA's) Basic Research Program to identify promising emerging science with potential to be matured into CWMD technologies. The advancement of technology and science into applied technology development efforts focuses upon increasing the stability and utility of mid-to-long term, moderate risk but high payoff science, and emerging technologies for transition to other DTRA applied technology programs. This effort serves as the bridge between the bench scientist and the applied technologist.

The decrease from FY 2014 to FY 2015 is due to the completion of the University Strategic Partnership activities with the University of New Mexico and Pennsylvania State University.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
Title: RU: Fundamental Research for Combating WMD	0.919	-	-
Description: This project provides (1) strategic studies to support the Department of Defense (DoD), (2) decision support tools and analysis to support CWMD research and development investments, and (3) early applied research for technology development. *FY 2014 Accomplishments:* - Provided technical and programmatic support to DTRA's basic research program.			
Accomplishments/Planned Programs Subtotals	0.919	-	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• 1/0601000BR: *DTRA Basic Research Initiative*	44.783	37.778	38.436	-	38.436	38.783	39.463	40.134	40.937	Continuing	Continuing

Remarks

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Appropriation/Budget Activity 0400 *I* 2	**R-1 Program Element (Number/Name)** PE 0602718BR *I WMD Defeat Technologies*	**Project (Number/Name)** RU *I Fundamental Research for Combating WMD*

D. Acquisition Strategy

Assess government, academic, and industrial performers and make selections based upon a "best fit for task" criteria. Common government awardees include DoD Service Laboratories and Department of Energy National Laboratories.

E. Performance Metrics

Project performance is measured via a combination of statistics including the number of publications generated, number of students trained in sciences and engineering supporting DoD's educational goals, number of research organizations participating, and the percentage of participating universities on the U.S. News & World Report "Best Colleges" list.

Additional performance indicators include the publication of an annual basic research technical and external programmatic review report.

Each study/project will commence within three months of customer's requests and results delivered within three months of completion.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Defense Threat Reduction Agency											Date: February 2015	
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* I BA 3: *Advanced Technology Development (ATD)*					**R-1 Program Element (Number/Name)** PE 0603160BR I *Counterproliferation Initiatives - Proliferation, Prevention and Defeat*							
COST ($ in Millions)	**Prior Years**	**FY 2014**	**FY 2015**	**FY 2016 Base**	**FY 2016 OCO**	**FY 2016 Total**	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**	**Cost To Complete**	**Total Cost**
Total Program Element	828.364	282.719	291.694	290.654	-	290.654	283.236	270.609	277.688	283.217	Continuing	Continuing
RA: *Information Sciences and Applications*	21.175	0.107	-	12.244	-	12.244	11.501	11.397	12.839	13.085	Continuing	Continuing
RD: *Detection Technologies*	-	-	-	29.893	-	29.893	29.689	30.137	30.832	31.447	Continuing	Continuing
RE: *Counter-Terrorism Technologies*	336.540	109.679	116.630	104.628	-	104.628	106.132	108.171	110.182	112.388	Continuing	Continuing
RF: *Forensics Technologies*	219.783	73.919	66.707	38.427	-	38.427	39.725	40.219	41.414	42.242	Continuing	Continuing
RG: *Defeat Technologies*	49.913	15.861	19.591	22.489	-	22.489	22.986	23.365	23.764	24.238	Continuing	Continuing
RI: *Nuclear Survivability*	26.641	5.939	5.570	6.191	-	6.191	6.640	6.727	6.814	6.942	Continuing	Continuing
RM: *WMD Counterforce Technologies*	74.392	29.644	29.346	20.717	-	20.717	22.846	23.216	23.739	24.212	Continuing	Continuing
RR: *Combating WMD Test and Evaluation*	1.810	0.092	-	-	-	-	-	-	-	-	Continuing	Continuing
RT: *Target Assessment Technologies*	98.110	47.478	53.850	56.065	-	56.065	43.717	27.377	28.104	28.663	Continuing	Continuing

Note

 *Project RF-Detection and Forensics Technologies subdivides into Projects RD-Detection Technologies and RF-Forensics Technologies beginning in FY 2016.

A. Mission Description and Budget Item Justification

The mission of the Defense Threat Reduction Agency (DTRA) is to safeguard the United States and its allies from global weapons of mass destruction (WMD) threats by integrating, synchronizing, and providing responsive expertise, technologies, and capabilities. This mission directly reflects several national and Department of Defense (DoD) level guidance/vision documents. For Research, Development, Test & Evaluation, these documents include the National Security Strategy, Defense Strategic Guidance (Sustaining U.S. Global Leadership: Priorities for 21st Century Defense), 2014 Quadrennial Defense Review, National Strategy for Combating Terrorism, 2002 National Strategy to Combat WMD, Defense Planning Guidance, Guidance for Employment of the Force, 2014 DoD Strategy for Countering WMD, National Military Strategic Plan for the War on Terrorism, Joint Strategic Capabilities Plan (including the Nuclear Annex), and 2010 Nuclear Posture Review. To achieve this mission, DTRA has identified principal objectives along with strategies and tasks to ensure the objectives are met. These objectives are: 1) Ensure a safe, secure, and effective nuclear deterrent; 2) Anticipate emerging WMD threats; 3) Provide Combating WMD situational awareness; 4) Assess infrastructure and personnel vulnerabilities; 5) Prevent proliferation and use of WMD; 6) Defend against WMD threats; 7) Defeat WMD threats; 8) Recover from WMD consequences; and 9) Synchronize countering WMD activities.

PE 0603160BR: *Counterproliferation Initiatives - Proli...*
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Exhibit R-2, **RDT&E Budget Item Justification:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603160BR *I Counterproliferation Initiatives - Proliferation, Prevention and Defeat*	

The Counterproliferation Initiatives - Proliferation, Prevention, and Defeat program element reduces WMD proliferation and enhances WMD defeat capabilities through advanced technology development. To accomplish this objective, the DTRA established the following projects: RA-Information Sciences and Applications, RD-Detection Technologies, RE-Counter-Terrorism Technologies, RF-Forensics Technologies, RG-Defeat Technologies, RI-Nuclear Survivability, RM-WMD Counterforce Technologies, and RT-Target Assessment Technologies. These projects support technology requirements in line with the Joint Functional Concepts (Chairman, Joint Chiefs of Staff Instruction 3170.01).

B. Program Change Summary ($ in Millions)

	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Previous President's Budget	274.033	283.694	277.955	-	277.955
Current President's Budget	282.719	291.694	290.654	-	290.654
Total Adjustments	8.686	8.000	12.699	-	12.699
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	8.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	12.500	-			
• SBIR/STTR Transfer	-3.814	-			
• Realignments	-	-	1.750	-	1.750
• Programmatic - Increases	-	-	11.000	-	11.000
• Inflation	-	-	-0.051	-	-0.051

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2014	FY 2015
Project: RE: *Counter-Terrorism Technologies*		
Congressional Add: *Technology Solutions Supporting Operations in Subterranean Environments*	-	8.000
Congressional Add Subtotals for Project: RE	-	8.000
Congressional Add Totals for all Projects	-	8.000

Change Summary Explanation

The increase in FY 2016 from the previous President's budget submission is due to increased investments in Counter WMD-Terrorism, the Counterproliferation research and development program, and the development and integration of high-priority find, characterize and assess sensor technologies and supporting algorithms and software.

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| Appropriation/Budget Activity
0400 I 3 | | | | R-1 Program Element (Number/Name)
PE 0603160BR I *Counterproliferation Initiatives - Proliferation, Prevention and Defeat* | | | | | | Project (Number/Name)
RA I *Information Sciences and Applications* | |

COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
RA: *Information Sciences and Applications*	21.175	0.107	-	12.244	-	12.244	11.501	11.397	12.839	13.085	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Information Sciences and Applications project provides technical reachback support to create decision advantage for the United States and our allies through improved situational understanding across the complete Combating Weapons of Mass Destruction (CWMD) mission space. The Technical Reachback effort provides 24 hour/7 days per week information and analyses on potential impacts of a weapon of mass destruction (WMD) event to warfighters and first responders in consult with the DTRA's CWMD research and development subject matter experts. This effort develops and integrates capabilities and processes to support assessment and estimation of WMD effects and consequences, to include secondary and tertiary effects. This project has also provided support (through FY 2014) to international CWMD science and technology cooperation by developing modifications, improvements, or new technologies and information tools suitable for foreign release and cooperative efforts.

The decrease from FY 2014 to FY 2015 was due to the completion of efforts in building partner capacity development activities. The increase from FY 2015 to FY 2016 is due to the realignment of funding for Technical Reachback from Project RM-WMD Counterforce Technologies to Project RA to better reflect the nature of those activities.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
Title: RA: Information Sciences and Applications	0.107	-	12.244
Description: Project RA develops innovative technologies and modeling and simulation capabilities and provides technical reachback support to create decision advantage for the United States and our allies through improved situational understanding across the complete CWMD mission space. *FY 2014 Accomplishments:* - Continued modifications and capability improvements to vulnerability assessment software and integrated WMD. *FY 2016 Plans:* - Continue development of global synthetic population and activity database for modeling secondary and tertiary effects using agent-based, socially coupled simulations to enable rapid modeling of infectious disease propagation and impacts of population behaviors and movement after a WMD event. - Develop detailed models of specified nuclear facilities to analyze vulnerabilities and estimate hazard.			
Accomplishments/Planned Programs Subtotals	0.107	-	12.244

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C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• 21/0602718BR: *WMD Defeat Technologies*	21.879	28.785	29.949	-	29.949	32.901	32.365	32.780	33.433	Continuing	Continuing
• 151/0605502BR: *Small Business Innovation Research*	9.700	-	-	-	-	-	-	-	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

Assess government, academic, and industrial performers make selections based upon a "best fit for task" criteria. Common government awardees include DoD Service Laboratories and Department of Energy National Laboratories.

E. Performance Metrics

Technical Reachback will provide information and analysis on potential impacts of WMD events, to include secondary and tertiary effect, to all requests from warfighters and first responders within the requestor's decision cycle.

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Appropriation/Budget Activity 0400 / 3				**R-1 Program Element (Number/Name)** PE 0603160BR / *Counterproliferation Initiatives - Proliferation, Prevention and Defeat*						**Project (Number/Name)** RD / *Detection Technologies*	
COST ($ in Millions)	**Prior Years**	**FY 2014**	**FY 2015**	**FY 2016 Base**	**FY 2016 OCO**	**FY 2016 Total**	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**	**Cost To Complete**	**Total Cost**
RD: *Detection Technologies*	-	-	-	29.893	-	29.893	29.689	30.137	30.832	31.447	Continuing	Continuing

Note
*Project RF-Detection and Forensics Technologies subdivides into projects RD-Detection Technologies and RF-Forensics Technologies beginning in FY 2016.

A. Mission Description and Budget Item Justification
The United States has long recognized the challenges associated with a state actor losing custody of a nuclear weapon or of a violent extremist organization gaining control of such a device. The Defense Threat Reduction Agency's research and development mitigates these challenges by enabling Countering Weapons of Mass Destruction efforts through advancing radiation detection capabilities. There are physical limits to the efficacy of traditional radiation detection, and the successful recovery or interdiction of a weapon may depend on detection capabilities that apply much earlier in the nuclear threat chain continuum. The nuclear threat chain continuum can be defined as the entire spectrum of activities that might lead to the state loss or violent extremist organization acquisition of a nuclear weapon. Beginning FY 2016, Project RD will conduct research, development, test, & evaluation (RDT&E) to 1) advance detection—both sensor technology and related methodologies—for signatures/indicators associated with nuclear threat enablers such as nuclear expertise, financing, or unique materials in order to advance U.S. Government capabilities to detect and interdict such threats; and 2) locate, identify, and track Special Nuclear Material by integrating new technologies into detection systems and delivering prototypes for evaluation and further procurement by Services/Special Mission Units. These efforts support Department of Defense (DoD) requirements for combating terrorism, counter/nonproliferation, and homeland defense.

The increase from FY 2015 to FY 2016 is due to the subdivision of Project RF-Detection and Forensics Technologies into projects RD-Detection Technologies and RF-Forensics Technologies beginning in FY 2016.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
Title: RD: Detection Technologies	-	-	29.893

Description: Project RD conducts RDT&E to detect, locate, identify, track, and interdict nuclear and radiological threats, which include weapons, material, and enablers to their acquisition and development such as nuclear expertise, financing, or unique technologies. Efforts support DoD requirements for combating terrorism, counter/nonproliferation, and homeland defense.

FY 2016 Plans:
- Analyze nuclear threat signatures to improve or integrate their collection into sensor systems.
- Integrate nuclear threat analysis algorithms into existing systems to test and evaluate their effectiveness in reducing processing time.
- Demonstrate, test, and field systems to remotely monitor small and wide areas which may produce or contain nuclear threats.

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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
- Design and fabricate prototype passive detection systems for determining the location and signature of nuclear material and test and characterize developmental prototype passive detection systems. - Improve performance of new detector materials; imaging and spectroscopy systems; and signals analysis methods through rigorous laboratory and field testing. - Integrate advances in materials science into lightweight, high-resolution radiation spectrometers for use in field operations. - Transition near-term technologies to generate prototypes and design packages that will assist operational users. - Conduct advanced/operational testing and evaluation of radiation detection systems to assess their performance. - Develop and build a new high resolution detector with reduced weight and improved form factors that can be concealed in container consistent with the operational environment. - Integrate new cellular technology into the R/N search network to ensure rapid flow of data from detectors. - Exploit the prototype testing of Oak Ridge National Laboratory to develop an operationally useful roadside detector capable of detecting nuclear material in moving vehicles. - Test and evaluate the integration of high resolution detectors with lower resolution detectors to determine the potential to meet threshold R/N detection requirements.			
Accomplishments/Planned Programs Subtotals	-	-	29.893

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• 21/0602718BR: *WMD Defeat Technologies*	-	-	26.401	-	26.401	26.893	27.430	28.039	28.600	Continuing	Continuing

Remarks

D. Acquisition Strategy

Assess government, academic, and industrial performers and make selections based upon a "best fit for task" criteria.   Common government awardees include Department of Energy National Laboratories, DoD laboratories, and DoD Services. In concert with anticipated/potential end-users define requirements for the development of fieldable prototype systems. These systems are both stand-alone systems and components of larger, integrated systems. When possible, transition stand-alone systems to programs of record or to the commercial sector for further development or distribution. Transition system components via incorporation into larger, existing systems as upgrades that advance the state-of-the art of radiation detection.

E. Performance Metrics

Integration of three nuclear signatures into existing Intelligence Community production and analysis cycles.

Exhibit R-2A, **RDT&E Project Justification:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
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Successful development of a new class of semiconductor detectors that increase resolution and compactness of imaging systems.

Improvements to detection system algorithms that result in improved detection factors such as range, accuracy, sensitivity, and time.

Receipt of 3D Polaris system incorporating a high-resolution focal plane for increased accuracy.

Receipt of an ultra-compact, low-power, high-resolution spectrometer for test and evaluation.

Receipt of two organic scintillators for test and evaluation.

Receipt of prototype detection equipment incorporating nanosemiconductors for test and evaluation.

Receipt of prototype wearable neutron detection device for test and evaluation and user feedback.

Receipt of solid state neutron detectors for test and evaluation.

Receipt of initial prototype trace analysis kit for test and evaluation and user feedback.

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Appropriation/Budget Activity 0400 / 3				**R-1 Program Element (Number/Name)** PE 0603160BR / *Counterproliferation Initiatives - Proliferation, Prevention and Defeat*						**Project (Number/Name)** RE / *Counter-Terrorism Technologies*	

COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
RE: *Counter-Terrorism Technologies*	336.540	109.679	116.630	104.628	-	104.628	106.132	108.171	110.182	112.388	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Counter-Terrorism Technologies project is an over-arching project that develops and transitions a full spectrum of new technologies to counter emergent weapons of mass destruction (WMD) thus enabling warfighters to improve their ability to detect, disable, interdict, neutralize, and destroy chemical, biological, nuclear production, storage, and weaponization facilities and systems. This high priority project focuses on support to the U.S. Special Operations Command (USSOCOM). Through enhancing USSOCOM capabilities, this project supports the highest priority mission areas in the National Security Strategy, the National Strategy to Combat WMD, the National Military Strategy to Combat WMD, the Quadrennial Defense Review, and the Guidance on the Employment of the Force. The following efforts are included:

The CWMD-T technologies program builds upon collaborative efforts with the warfighter. This program develops proofs of concept and subsequent advancements in research, development, testing, and evaluation and provides multi-mission capabilities that may be applied throughout the entire spectrum of warfare while significantly eliminating collateral damage. The CWMD-T technologies program develops technologies to enable the warfighter to locate, identify, characterize, and access Chemical, Biological, Radiological, and Nuclear WMDs, their production and storage facilities, and associated enablers at multiple nodes along the terrorist development/acquisition pathway in order to disrupt, delay, degrade, destroy, or deny WMDs while minimizing risk to U.S. forces.

The Counter WMD-Terrorism (CWMD-T) Counterproliferation research and development (R&D) program is a collaborative effort with USSOCOM in which DTRA manages and sub-allocates a portion of this funding directly to USSOCOM to develop warfighter-unique technologies in support of USSOCOM's counterterrorism and counterproliferation mission. New counterterrorism and counterproliferation technologies are developed under USSOCOM management, and in coordination with DTRA, to provide warfighters with the operational capability to counter WMD threats.

Under Project RE, the USSOCOM CWMD-T Support Program integrates and federates all-source intelligence and other information with operational analysis to support Combatant Command (CCMD) planning processes related to CWMD-T. Research is focused on developing and improving technologies to ingest, organize, interpret, and operationalize large amounts of data from many sources, multiple formats, and all relevant classification levels to provide the warfighter with a dynamic picture of the WMD-T operational environment.

The increase from FY 2014 to FY 2015 was due to increased investments in technology solutions supporting operations in subterranean environments. The decrease from FY 2015 to FY 2016 is due to the deferment of lower priority projects until further maturation in technology readiness level.

B. Accomplishments/Planned Programs ($ in Millions)

	FY 2014	FY 2015	FY 2016
Title: RE: Counter-Terrorism Technologies	109.679	108.630	104.628

Exhibit R-2A, **RDT&E Project Justification:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603160BR / *Counterproliferation Initiatives - Proliferation, Prevention and Defeat*	**Project (Number/Name)** RE / *Counter-Terrorism Technologies*

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
Description: Project RE provides R&D support to Joint U.S. Military Forces, specifically USSOCOM, in the areas of Explosive Ordnance Disposal (EOD) Device Defeat; Counter WMD (CWMD) technologies for warfighters; the USSOCOM Combating WMD – Terrorism Support Program; and oversight of counterproliferation R&D resources sent directly to USSOCOM for warfighter-unique counterproliferation technologies. *FY 2014 Accomplishments:* - Continued other planned development and transitioned new counterproliferation technologies for Joint U.S. Military Forces to counter WMD, enabling warfighters to improve their ability to detect, disable, interdict, neutralize, and destroy chemical, biological, and nuclear production, storage, and weaponization facilities. - Continued work on successive multi-year efforts to develop high fidelity test articles and enhanced electronic test objects for the EOD Device Defeat program. - Developed impede tools for Improvised Explosive Device (IED) triggers. - Continued to support Combatant Commanders' planning efforts related to CWMD-T. - Continued multi-year efforts to develop and transition innovative CWMD tools designed to locate, identify, characterize, assess, and attack WMD production and storage facilities with minimal-to-no collateral damage or loss of life. - Built precision shaped charges using a proven manufacturing process through the use or modification of an existing shaped charge design. - Transitioned next generation imaging technologies to allow EOD forces advanced diagnostic capabilities. - Continued to improve and further enhance the usability and capability of the CWMD-T global dynamic picture of the operating environment for use by the DoD and U.S. Government Community of Interest. Incorporated need-to-know verification. - Continued to improve upon Combatant Commanders' planning efforts related to CWMD-T by successfully releasing improvements to automated planning and analyst support tools for large-scale data management and information extraction. - Began development/integration of an Intent Model to address human socio-cultural and behavioral aspects in existing Causal Bayesian Networks. - Applied developmental tools to formulate a comprehensive summary of a biological threat in a specific CCMD Area of Responsibility - Integrated and installed a system for automated data extraction of more than 200,000 documents per day from numerous sources across the DoD, Intelligence Community, other US Government Agencies, and numerous non-Government sources with cataloging capabilities for efficient and quick recall of stored information for analysis. *FY 2015 Plans:*			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
- Continue other planned development and transition of new counterproliferation technologies for Joint U.S. Military Forces to counter WMD, enabling warfighters to improve their ability to detect, disable, interdict, neutralize, and destroy chemical, biological, and nuclear production, storage, and weaponization facilities. - Continue work on successive multi-year efforts to develop high fidelity test articles and enhanced electronic test objects for the EOD Device Defeat program. - Develop impeded tools for IED triggers. - Continue to support Combatant Commanders' planning efforts related to CWMD-T. - Continue multi-year efforts to develop and transition innovative CWMD tools designed to locate, identify, characterize, assess, and attack WMD production and storage facilities with minimal-to-no collateral damage or loss of life. - Build precision shaped charges using a proven manufacturing process through the use or modification of an existing shaped charge design. - Transition next generation imaging technologies to allow EOD forces advanced diagnostic capabilities. - Integrate Natural Language Processing and Machine Reading capabilities into knowledge discovery and data/information pipeline for Combatant Command CWMD-T WMD analysis and planning. - Begin application of Natural Language Processing to audio, photographic, and videographic data. *FY 2016 Plans:* - Continue other planned development and transition of new counterproliferation technologies for Joint U.S. Military Forces to counter WMD, enabling warfighters to improve their ability to detect, disable, interdict, neutralize, and destroy chemical, biological, and nuclear production, storage, and weaponization facilities. - Continue work on successive multi-year efforts to develop high fidelity test articles and enhanced electronic test objects for the EOD Device Defeat program. - Develop tools used to impede IED triggers and conduct render safe diagnostics validation tests on emergent threat articles. - Continue to support Combatant Commanders' planning efforts related to CWMD-T. - Continue multi-year efforts to develop and transition innovative CWMD tools designed to locate, identify, characterize, assess, and attack WMD production and storage facilities with minimal-to-no collateral damage or loss of life. - Build precision shaped charges using a proven manufacturing process through the use or modification of an existing shaped charge design. - Transition next generation imaging technologies to allow EOD forces advanced diagnostic capabilities. - Begin exploration and application of techniques to extract information from audio, photographic, and videographic files. - Apply rational choice and game theory constructs to prototype advanced Bayesian models.			
Accomplishments/Planned Programs Subtotals	109.679	108.630	104.628

Exhibit R-2A, **RDT&E Project Justification:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
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	FY 2014	FY 2015
Congressional Add: Technology Solutions Supporting Operations in Subterranean Environments	-	8.000
FY 2015 Plans: - Mature prototypes and demonstrate capabilities in support of the Army to disable and neutralize Weapons of Mass Destruction (WMD) and their associated facilities. DTRA will work with the Army to adapt solutions most applicable to the Army's needs and support FY 2015/FY 2016 Army experimentation and assessments of technologies to disable and neutralize underground facilities and their associated components (including WMD).		
Congressional Adds Subtotals	-	8.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• 21/0602718BR: *WMD Defeat Technologies*	1.698	-	-	-	-	-	-	-	-	-	1.698

Remarks

D. Acquisition Strategy

Assess government, academic, and industrial performers and make selections based upon a "best fit for task" criteria. Common awardees include DoD Services, Laboratories, Department of Energy National Laboratories, and specialized university laboratories. The USSOCOM Combating WMD – Terrorism Support Program uses an evolutionary acquisition profile leveraging ongoing Defense Advanced Research Projects Agency and National Lab research programs in Natural Language Processing, Machine Reading, visual analytics directly linked to USSOCOM WMD Enterprise and supporting all Combatant Command WMD-T plans.

E. Performance Metrics

Number of technologies developed, delivered, proof of concept demonstrations, and successful Military Utility Assessments. A high priority focus of these metrics is increasing potential mission success and reducing the number of current gaps in Special Operations Forces capabilities to counter WMD.

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Appropriation/Budget Activity 0400 / 3				R-1 Program Element (Number/Name) PE 0603160BR / Counterproliferation Initiatives - Proliferation, Prevention and Defeat						Project (Number/Name) RF / Forensics Technologies	

COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
RF: Forensics Technologies	219.783	73.919	66.707	38.427	-	38.427	39.725	40.219	41.414	42.242	Continuing	Continuing

Note
 *Project RF-Detection and Forensics Technologies subdivides into Project RD-Detection Technologies and Project RF-Forensics Technologies beginning in FY 2016.

A. Mission Description and Budget Item Justification
 The Forensics Technologies project under the Counterproliferation Initiatives - Proliferation, Prevention and Defeat Program Element emphasizes the advanced technology development and engineering portion of the overall National Technical Nuclear Forensics (NTNF) effort. This project supports the attribution process through development, demonstration, and transition of improved post-detonation NTNF capabilities in the areas of materials collection, debris diagnostics, materials analysis, prompt diagnostics, and device reconstruction. Efforts under this project also support international peacekeeping and nonproliferation objectives, on-site and aerial inspections and monitoring, on-site sampling and sample transport, and on- and off-site analysis to meet forensic, verification, monitoring, and confidence-building requirements. Prior to FY 2016, Project RF included funding to detect, locate, identify, track, and interdict nuclear and radiological threats. This included weapons, material, and enablers to their acquisition and development, such as nuclear expertise, financing, or unique technologies. Efforts support Department of Defense (DoD) requirements for combating terrorism, counter/nonproliferation, and homeland defense.

 The decrease from FY 2014 to FY 2015 was due to reduced investment in novel advanced nuclear/radiological detection technologies and restructuring DoD-relevant monitoring and verification activities in support of the DoD proliferation monitoring mission. The decrease from FY 2015 to FY 2016 in Project RF is due to the realignment of nuclear threat detection activities into Project RD-Detection Technologies.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
Title: RF: Forensics Technologies	73.919	66.707	38.427
Description: Through FY 2015, Project RF includes funding to 1) develop technologies, systems and procedures for post detonation nuclear forensics, on-site and off-site analysis to meet forensic, verification, monitoring and confidence-building requirements, and 2) to detect, locate, identify, track, and interdict nuclear and radiological threats, which include weapons, material, and enablers to their acquisition and development such as nuclear expertise, financing, or unique technologies in support of DoD requirements for combating terrorism, counterproliferation and nonproliferation, homeland defense, and international initiatives and agreements. In FY 2016 this project focuses on developing technologies, systems and procedures for monitoring, verification and confidence-building requirements, and for post detonation nuclear forensics, including on-site and off-site forensic analysis.			
FY 2014 Accomplishments:			

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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
- Conducted near-source strong-motion experiments using small High Explosive shots and lasers to generate intense shocks in soil-like materials. This, coupled with high fidelity analysis, improved confidence in regional seismic monitoring and improved the capability for detection and identification of low yield and evasive testing. - Conducted field experiments to investigate the detectability of underground electromagnetic pulses for purposes of monitoring compliance with nuclear testing prohibitions. - Conducted standoff imaging experiments for warheads deployed on strategic delivery systems that could lead to adoption of this technology for verification of future Strategic Arms Reduction Treaties. - Demonstrated a prototype for an on-site inspection system and virtual training tool for nuclear materials production monitoring in support of the potential Fissile Material Cutoff Treaty and the Army nuclear disablement mission. - Developed and tested advanced materials for particulate and gaseous radionuclide emissions associated with underground nuclear testing, in support of Air Force and international treaty monitoring requirements. - Delivered initial look-up tables as a stop-gap to help the Air Force Technical Applications Center predict the optimal window of opportunity for radionuclide gas detection (e.g., Xe-133) and estimated surface concentration. - Explored international partnerships and designed high explosive field tests to improve confidence in seismic and infrasound international monitoring systems. - Continued preparations for radiological/nuclear (R/N) detector program of record decisions. - Expanded the level of non-radiological sensor support for R/N search operations. - Developed, accelerated development where appropriate, demonstrated, and fielded (prototype) upgraded technical capabilities for prompt diagnostics (under DISCREET OCULUS and MINIKIN ECHO), debris sample collection, sample analysis, modeling to support nuclear device reconstruction, and forensics data to lower uncertainties/increase confidence and improve timeliness of technical nuclear forensics conclusions. Included development of new debris collection, field analysis concepts, in-laboratory timeline improvements, new signature development, improved modeling and simulation capabilities, and other supporting technologies; transfer of the prototype Harvester Particulate Airborne Collection System (PACS) to the operational user under the NTNF Joint Capability Technology Demonstration (JCTD); completed operational demonstration/exercise of the prototype Advanced Ground Sample Collection Platform (AGSCP) under the NTNF JCTD; and completed installation of a prototype ground-based prompt diagnostics system in the first of three US cities. - Developed methods to rapidly determine post-event nuclear weapon yields and reaction history by investigating alternative prompt nuclear weapons effects, effects on the environment, and developing/fielding prototype capabilities. - Continued exploiting all-source nuclear threat signatures, characteristics, and corresponding detection modalities; develop the proper tipping, queuing, and data fusion techniques and algorithms to enable the rapid and effective accumulation of all-source intelligence on nuclear threat scenarios. - Continued the design and fabrication of prototype passive detection systems for determining the location and signature of nuclear material; test and characterize developmental prototype passive detection systems.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
- Continued to develop and demonstrate alternative neutron detection technologies for replacement of helium-3 neutron detectors. - Completed the development of a modular based detection system using near term technologies to generate prototypes and design packages to assist operational users. - Completed the development of room temperature high-resolution spectrometers to determine signature of nuclear material. - Continued to develop Counter-Weapons of Mass Destruction (CWMD) network technologies. - Continued the development of force protection modifications to R/N detector technologies. - Developed and assessed software improvements to current R/N detector technologies. - Expanded the development of CWMD/Technical Support Group training technologies for R/N search equipment. - Conducted first-ever outdoor testing of active and passive detectors using Special Nuclear Material-based test objects. ***FY 2015 Plans:*** - Continue identifying all-source nuclear threat signatures, characteristics, and corresponding detection modalities; continue the identification and development of the proper tipping, queuing, and data fusion techniques and algorithms to enable the rapid and effective accumulation of all-source intelligence on nuclear threat scenarios. - Design and fabricate prototype passive detection systems for determining the location and signature of nuclear material; test and characterize developmental prototype passive detection systems. - Improve performance of new detector materials, imaging and spectroscopy systems, and signals analysis methods through rigorous laboratory and field testing. - Begin to integrate recent advances in materials science into lightweight, high-resolution radiation spectrometers for use in field operations. - Develop, demonstrate, and field methods to remotely monitor small and wide areas which may contain nuclear threats. - Research and develop advanced 3D imaging technologies for high resolution source characterization and identification to provide new and improved capabilities to detect, locate, identify, and characterize threat materials. - Begin transitioning multiple near term technologies to generate prototypes and design packages to assist operational users. - Conduct advanced and operational testing and evaluation of radiation detection systems. - Begin design, development, and fabrication of new radiological test objects. - Improve performance of new detector materials, imaging and spectroscopy systems, and signals analysis methods through rigorous laboratory and field testing. - Research, develop, test, evaluate, and deliver software tools and capabilities to locate and identify the signatures of Special Nuclear Materials on both existing and newly developed hardware platforms. - Continue development, accelerate development where appropriate, demonstrate, and field methods to remotely monitor small and wide areas which may contain nuclear threats.			

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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
- Develop, accelerate development where appropriate, test, demonstrate, and field prototype ground-based sensor capabilities for post-detonation prompt diagnostics under DISCREET OCULUS. - Complete installation of prompt diagnostics systems in a second U.S. city. - Continue to develop, test, demonstrate, and field (prototype) upgraded technical capabilities for prompt diagnostics, debris collection, sample analysis, modeling to support nuclear device reconstruction, and forensics data to decrease timeline, lower uncertainties, and increase confidence in technical nuclear forensics conclusions. - Continue near-source strong-motion small-scale tests and high fidelity analyses for detection and identification of low yield and evasive testing. - Develop modular prototype using advanced materials for particulate and gaseous radionuclides detection of evasive testing in support of U.S. and international treaty monitoring requirements. - Provide science and technology development to support onsite inspections. - Begin implementing R/N detector Program of Record decisions. - Transition wide area search modular prototypes into an operational configuration to replace the current systems - Transition software improvements to current R/N detector technologies. - Transition selected ship search capabilities into an operational configuration for fielding to the Technical Support Groups. - Continue to enhance CWMD network technologies by exploiting the operational advantages of DoD's cellular communications program. - Continue to expand non-radiological sensor support for R/N search operations. - Expand the development of CWMD/Technical Support Group training technologies for R/N search equipment. *FY 2016 Plans:* - Complete development, test, demonstration, and fielding of prototype ground-based sensor capabilities in three U.S. cities for post-detonation prompt diagnostics under DISCREET OCULUS. - Continue to develop, test, demonstrate, and field (prototype) upgraded technical capabilities for prompt diagnostics, debris collection, sample analysis, modeling to support nuclear device reconstruction, and forensics data to decrease timeline, lower uncertainties, and increase confidence in technical nuclear forensics conclusions. - Continue to develop tools based on near-source small-scale strong-motion science to assist detection and characterization of low yield and evasive testing. - Conduct additional laboratory experiments with lasers to assess shock/seismic signatures from underground nuclear tests. - Develop international technical partnership for high explosive test calibration of seismic and infrasound elements of international monitoring stations. - Develop and flight-certify a modular prototype using advanced materials and techniques to collect and detect gaseous radionuclide signatures of evasive nuclear testing.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
- Develop long-term, optimal, integrated and operational solutions to detect, collect, and analyze gas and radionuclide signatures of nuclear testing. - Develop prototype cosmic-ray muon imaging solution for standoff detection of nuclear warheads in storage or deployed on strategic launch and delivery systems that could lead to adoption of this technology for verification of future Strategic Arms Reduction Treaties. - Validate alternate signatures of nuclear weapons testing and develop measurement techniques. - Evaluate advanced methods to better integrate the collection, detection, and analysis of low-yield or evasive nuclear weapons testing signatures. - Provide technical support for implementation and compliance with the Open Skies Treaty. - Develop infrastructure and capability for iterative testing, refinement, and integration of national monitoring capabilities. - Test and evaluate prototype version of the Knowledge Management Strategic Information System software for future Strategic Arms Reduction Treaty and other treaty database and notification needs. - Enhance the on-site inspection system and virtual training tool with additional operational scenarios for nuclear materials production monitoring in support of the Fissile Material Cutoff Treaty and the Army nuclear disablement/elimination mission. - Stand up National Monitoring and Verification test-bed ensemble for iterative tool and method testing and refinement.			
Accomplishments/Planned Programs Subtotals	73.919	66.707	38.427

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• 21/0602718BR: *WMD Defeat Technologies*	34.595	35.061	9.547	-	9.547	10.128	10.443	10.684	10.899	Continuing	Continuing
• 121/0605000BR: *WMD Defeat Capabilities*	6.867	6.887	7.156	-	7.156	7.340	7.437	7.563	7.715	Continuing	Continuing

Remarks

D. Acquisition Strategy

Assess government, academic, and industrial performers and make selections based upon a "best fit for task" criteria. Common government awardees include the Department of Energy National Laboratories, DoD laboratories, and DoD Services. Provide operationally effective monitoring and analysis capabilities and modernization of existing capabilities and tools to Air Force Technical Applications Center as prototype or capability demonstrations. In concert with anticipated/potential end-users such as Special Mission Units, define requirements for the development of field-able prototype systems. These systems are both stand-alone systems and

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components of larger, integrated systems. When possible, transition stand-alone systems to programs of record or to the commercial sector for further development or distribution. Transition system components via incorporation into larger, existing systems as upgrades that advance the state-of-the art of radiation detection.

E. Performance Metrics

Testing of the first algorithm fusing new nuclear threat signature with existing all-source intelligence.
Development and operational acceptance of transitional technologies.
Completion of the Intelligent Personal Radiation Locator program to improve speed of end user detection.
Completion of the radiation sensor with tagging, tracking, and locating project to provide new capability for autonomous, low-visibility, long-endurance detection.
Completion and transition of the modular radiation detector system to better align detector form to user requirements.
Completion and transition of the Man-Portable Detection System to better align detector form to user requirements.
Testing of the first prototype hand-held, high-resolution detector to verify detector characteristics.
Completion of imaging and characterization test to down-select threat device characterization system for further development.
Delivery of three plutonium test objects that will simulate/represent larger quantities of material.
Delivery of two highly-enriched uranium test objects that will simulate/represent larger quantities of material.
Conduct/support end-to-end NTNF capabilities exercises and supporting demonstration(s).
Installation of prototype ground-based prompt diagnostics systems in three U.S. cities by the end of FY 2016.
Successfully test, demonstrate, field, and/or transition nuclear forensics technologies/capabilities to an operational customer.
Down-select new signatures, surrogate urban debris production routes, and technology requirements for field analysis capabilities.
Support development of NTNF capabilities through development of technologies/prototypes addressing gaps and shortfalls in DoD NTNF capabilities, and through participation in the interagency process. Note: More specific metrics associated with NTNF gaps and shortfalls are classified.
Demonstrate utility of alternate nuclear test signatures.
Deliver useful strong-shock based analysis tool.
Deliver advanced operational gas collection capability.
Deliver operational prototype of multi-mission tool kit.
Demonstrate effectiveness of cosmic-ray muon remote imaging of nuclear warhead in facilities and on platforms.

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COST ($ in Millions)	**Prior Years**	**FY 2014**	**FY 2015**	**FY 2016 Base**	**FY 2016 OCO**	**FY 2016 Total**	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**	**Cost To Complete**	**Total Cost**
RG: *Defeat Technologies*	49.913	15.861	19.591	22.489	-	22.489	22.986	23.365	23.764	24.238	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Defeat Technologies project develops, integrates, demonstrates and transitions innovative kinetic and non-kinetic weapon capabilities to expand traditional and asymmetric options available to Combatant Commanders (CCDRs) to deny, disrupt, and defeat adversarial use of weapons of mass destruction (WMD) while minimizing collateral effects from incidentally released agents. Technology development focuses on the physical or functional defeat of (1) chemical, biological, radiological and nuclear threat materials, (2) an adversary's ability to deliver the same, and (3) the physical and non-physical support networks enabling both. It does so through the systematic identification and maturation of advanced technologies capable of defeating WMD agents or agent based processes, then integrating them into weapons, delivery systems or rapid WMD elimination capabilities. This project includes developing specific WMD agent/agent-based process simulants, test infrastructure, and sampling capability required for effective development, testing, and evaluation of next-generation capabilities to ensure optimum weapon solutions are achieved based on this technology. The project addresses defeat of adversaries' offensive WMD programs through integration of current conventional weapons capabilities and next generation kinetic and non-kinetic solutions to provide full-spectrum asymmetric defeat options. The project addresses requirements delineated in the Quadrennial Defense Review and Strategic Planning Guidance as codified in the Joint Capabilities Integration and Development System, Service requirements documents, and Combatant Command and Agency Priority Lists for lethal and non-lethal Countering Weapons of Mass Destruction (CWMD) capability.

The increase from FY 2014 to FY 2015 was due to increased investment in CWMD Hard Target Defeat Weapons Technologies. The increase from FY 2015 to FY 2016 is due to increased investment to build and conduct the initial full-scale testing of the Next Generation of CWMD weapon concept.

B. Accomplishments/Planned Programs ($ in Millions)

	FY 2014	**FY 2015**	**FY 2016**
Title: RG: Defeat Technologies	15.861	19.591	22.489

Description: Project RG develops advanced technologies and weapon concepts and validates their applicability to C-WMD.

FY 2014 Accomplishments:
- Continued developing improvements for defeat of WMD in soft targets.
- Continued maturation of diagnostic capability to meet emerging needs and field improved capabilities for agent defeat.
- Completed preparations to award a contract by second quarter FY 2015 to develop the Heated and Mobile Munitions Employing Rockets (HAMMER) technology concept demonstration.
- Continued Modular Autonomous Countering WMD System (MACS) component integration.
- Continued designing MACS Family of Systems architecture.

FY 2015 Plans:
- Develop access denial or denial-of-use technologies for WMD targets.

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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
- Complete Next Generation Counter WMD weapon design. - Initiate full-scale lethality tests for Next Generation Agent Defeat weapon. - Continue work on functional defeat test-bed with initial test events. *FY 2016 Plans:* - Manufacture initial Next Generation CWMD weapon components and sub-systems and conduct sub-system and initial full scale static test. - Continue development of access denial or denial-of-use technologies for CWMD applications. - Continue functional defeat system development and testing. - Conduct MACS follow-on incremental component/system demonstration. - Conduct functional defeat system demonstration. - Transition initial MACS concept to Military Services/CCDRs. - Develop and integrate MACS Family of System Enabling Technologies. - Plan MACS Family of Systems component demonstration. - Mature diagnostic capability to meet emerging needs and field improved capabilities for agent defeat. - Initiate HAMMER Subsystem Test. - Complete HAMMER Weapon Design.			
Accomplishments/Planned Programs Subtotals	15.861	19.591	22.489

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• 21/0602718BR: *WMD Defeat Technologies*	14.270	10.982	11.769	-	11.769	11.395	11.700	11.965	12.203	Continuing	Continuing

Remarks

D. Acquisition Strategy

Assess government, academic, and industrial performers and make selections based upon a "best fit for task" criteria. Common awardees include DoD Services' laboratories, Department of Energy National Laboratories, and specialized university laboratories. In addition, partnering with Government entities, such as the Air Force Life Cycle Management Center, enables the Defense Threat Reduction Agency to develop a sound transition strategy to the warfighter.

E. Performance Metrics

Complete MACS Operational Demonstration and transition technology to a Quick Reaction Capability program.

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Complete HAMMER weapon design and integration and conduct a technical demonstration.
Complete development and testing of improved CWMD biological agent defeat weapon fills to provide greater than 95% performance improvement over existing high explosive fills.
Push promising access denial or denial-of-use technologies for CWMD applications to Technology Readiness Level 4/5.

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COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
RI: *Nuclear Survivability*	26.641	5.939	5.570	6.191	-	6.191	6.640	6.727	6.814	6.942	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Nuclear Survivability project develops Radiation Hardened Microelectronics and survivability standards; provides radiation dose assessments; and provides for the execution of force-on-force evaluations and nuclear weapons surety efforts to enhance the protection of nuclear resources.

The Nuclear Test Personnel Review (NTPR) Program, established in public law, confirms participation in nuclear testing and related events and provides radiation dose assessments for atomic veterans. The Defense Threat Reduction Agency (DTRA) provides subject matter expertise for the dose reconstructions. The NTPR is administered by the Department of Veterans Affairs and the Department of Justice for radiogenic disease compensation programs.

The Mighty Guardian force-on-force tests aid in satisfying requirements for the Military Services by providing denial of access to nuclear resources in all environments: operational, storage, and in transit. The results of the evaluations identify security vulnerabilities to weapons systems that are then addressed through targeted application of research and development projects requested by the resource owners. These projects are designed to demonstrate, test, and evaluate security enhancement systems prior to the Services' procurement.

Nuclear Weapons Surety, as tasked by the Department of Defense (DoD) Nuclear Weapon System Safety Program, provides Combatant Commands (CCMDs), Military Services, and Joint Chiefs of Staff with technical analyses, studies, research, and experimental data necessary to identify and quantify risks of plutonium dispersal and loss of assured safety due to accidents, fires, or natural causes during peacetime operations of the nation's nuclear weapon systems. Additionally, this will provide studies necessary to quantify the probability of success against targeted terrorist attacks on DoD facilities, while leveraging these risk assessment advances. It also provides new and innovative technologies for the protection of nuclear resources in support of CCMDs and Military Services.

The decrease from FY 2014 to FY 2015 was due to the net impact of increased investment in stockpile logistics and decreased investment in nuclear surety in FY 2015. The increase from FY 2015 to FY 2016 is due to increased investment in the nuclear surety program.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
Title: RI: Nuclear Survivability	5.939	5.570	6.191
Description: Project RI provides the capability for DoD nuclear forces and their associated control and support systems and facilities in wartime to avoid, repel, or withstand attack or other hostile action, to the extent that essential functions can continue or be resumed after the onset of hostile action. *FY 2014 Accomplishments:* - Tested and characterized radiation effects on advanced 32nm technology.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
- Conducted Mighty Guardian XVI force-on-force test to evaluate nuclear security policy for the Prime Nuclear Airlift Force mission at Kirtland Air Force Base, NM. - Conducted research, development, test, & evaluation (RDT&E) on physical security technologies designed to enhance protection of the nuclear stockpile as determined by the Services. - Performed 1,600 written atomic veteran claim responses. *FY 2015 Plans:* - Develop Satellite Protection Standard. - Continue RDT&E on physical security technologies designed to enhance protection of the nuclear stockpile as determined by the Services. - Develop next generation of Defense Integration and Management of Nuclear Data Services (DIAMONDS) network and infrastructure design, leverage information technology (IT) improvements, and modernize DIAMONDS software code; and conduct preliminary design review and meet with users. - Continue out-of-cycle test planning and execution in support of Mighty Guardian XV and plan and execute Mighty Guardian XVII Force-on-Force test to evaluate nuclear security policy for convoy operations in support of Francis E. Warren Air Force Base, WY. Test will be conducted at Camp Guernsey, WY. - Address 1,200 written atomic veteran claim responses. *FY 2016 Plans:* - Publish Satellite Protection Standard. - Address 1,000 written atomic veteran claim responses. - Plan and execute Mighty Guardian XVIII force-on-force test to evaluate nuclear security policy at the Navy's Strategic Weapons Facility Pacific, Naval Base Kitsap, WA. - Continue the development of the next generation of DIAMONDS network and infrastructure design. - Leverage IT improvements and recommendations from industry/Agency. - Modernize DIAMONDS software code with design reviews and meeting with users for future needs/requirements. - Field test-bed system at select user sites and continue to evaluate system.			
Accomplishments/Planned Programs Subtotals	5.939	5.570	6.191

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C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• 21/0602718BR: *WMD Defeat Technologies*	20.351	19.416	29.988	-	29.988	30.264	30.826	31.592	32.224	Continuing	Continuing

Remarks

D. Acquisition Strategy

Assess government and industrial performers and make selections based upon a "best fit for task" criteria which includes demonstrations of components and capabilities for transition. Common awardees include DoD Services' laboratories, Department of Energy National Laboratories, and specialized university laboratories.

E. Performance Metrics

Achieve Radiation Hardened and Radiation Hardened by Design 90nm application-specific integrated circuit design flow capability.
Successful completion of Mighty Guardian exercises is measured by completing:
- all necessary planning and logistics steps,
- troops arriving when required,
- training completed,
- execution of the exercise,
- redeployment of forces, and
- publishing a final report within 90 days of completion.
Successful completion of RDT&E for physical security technologies is determined by:
- performers completing the project on-time and within budget,
- all stated tasks in the statement of work/objectives are met,
- proper reporting and coordination of decision areas,
- receipt of final reports closing out the project, and
- transitioning the project to the requesting Military Service.

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COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
RM: *WMD Counterforce Technologies*	74.392	29.644	29.346	20.717	-	20.717	22.846	23.216	23.739	24.212	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Weapons of Mass Destruction (WMD) Counterforce Technologies project develops, integrates, demonstrates and transitions emerging/innovative technologies to find, characterize, plan for the defeat of, and assess WMD threats. The two major components of this project are: (1) WMD battlespace awareness and (2) counter WMD (CWMD) weapons effects and planning tools. WMD battlespace awareness efforts seek to provide warfighters with capabilities to find, characterize, and assess WMD threats. This project provides capabilities through the development and integration of multi-mission Unmanned Aerial Systems payloads to emplace sensing technologies, and remotely sense, identify, track, and target WMD-related threats; and, through the development and integration of low visibility, stand-off, and man-portable chemical agent and biological agent intelligence, surveillance, and reconnaissance technologies to sense, identify, track, target, and assess WMD-related threats. The CWMD weapons effects and planning tools effort develops modernized, fast-running, and validated CWMD planning tools and integrates modeling and simulation software to aid Combatant Commanders' targeting and aid weapons officers in choosing the proper weapon, fuze, and employment parameters to optimize the defeat of WMD and related hard targets.

The decrease from FY 2015 to FY 2016 is due to the realignment of funding for Technical Reachback from Project RM to Project RA-Information Sciences and Applications.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
Title: RM: WMD Counterforce Technologies	29.644	29.346	20.717
Description: Project RM provides (1) novel and enhanced weapons energetic materials and structures, full-scale testing of CWMD weapons effects, weapons effects modeling, and weapon delivery optimization, (2) WMD sensor, surveillance, and data processing technologies, and (3) Technical Reachback support. *FY 2014 Accomplishments:* - Developed and delivered Integrated Munitions Effectiveness Assessment (IMEA) software 11.1 (Software improvements include; Cratering model improvements Collateral Damage Estimation integration, Warfighter Wizard improvements, Large Caliber Penetrator enhancements). - Developed and delivered Vulnerability Assessment & Protection Option (VAPO)software 6.0 (Improved Blast Model/Ability to predict blast effects on complex 3D models/New close-in blast on concrete columns/Improved window response model/Added Forward Operating Base (FOB) models). - Developed and delivered Vulnerability Assessment & Protection Option (VAPO) software 6.1 (structural and human injury damage contours for 3D models).			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
- Delivered a modified version of Vulnerability Assessment & Protection Option (VAPO) software to the Norway Defense Estates Agency (NDEA) under the US/Norwegian Hardened Facility Analysis Project Agreement (HFA PA). - Completed WMD Aerial Collection System, Army Shadow Unmanned Aircraft System (UAS) integration R&D efforts as required for future Army procurement and fielding. - Conducted Shadow UAS and WACS payload launcher and Tactical Automatic Landing System qualification testing necessary for future Air Worthiness Certification. - Completed technical support requirements for Army validation of the WMD Aerial Collection System post-strike battle damage assessment. Operational Needs Statement now under consideration by the Army Council for Combatting Weapons of Mass Destruction Capability Working Group. - Conducted warfighter training on WMD Aerial Collection System hardware, and provided exercise support during the Warpath III and Ulchi Freedom Guardian USFK command post exercises. - Completed a comprehensive CBRN Air-Droppable, Remotely Deployed Sensor (CARDS) delivery system Proof-of-Concept demonstration culminating in development of the preliminary design for a platform incorporating a high-efficiency aerodynamic profile and propulsion system. - Planned and conducted a key Table Top Exercise (TTX) to solicit Community of Interest requirements for CBRN sensor emplacement operations and facilitate continued end-user input during the development process. - Conducted a VTOL Autonomous Payload Emplacement System (VAPES) precision emplacement proof-of-concept demonstration using both EO and IR optical navigation solutions, and custom designed an autopilot and sensor system on a VTOL platform. - Completed construction and instrumentation of the Robotics FIT sensor test bed. - Conducted extensive sensor verification and validation testing including operational demonstrations to leadership and other interested parties. - Conducted development of multi-mode sensor systems for use in detection of small-scale biological threats. - Initiated development of WMD Intelligence, Surveillance, and Reconnaissance (ISR) system architecture. - Conducted WMD ISR signature characterization and phenomenology research. - Developed WMD Intelligence, Surveillance, and Reconnaissance (ISR) system architecture. - Conducted WMD ISR signature characterization and phenomenology research. - Continued development and integration of agent based modeling capabilities, including secondary and tertiary effects linked with social behavior resulting from WMD insult. - Demonstrated Silent Scout Chemical/Rad Sensor. - Demonstrated Nano-scale Transformational Rad Tag. - Continued to support the Combatant Commands (CCMDs) with the further refinement and development of operation center critical technologies that will enhance the capability of rapid response in relation to next generational reachback capabilities.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
- Began development of technologies and methods for comprehensive WMD consequence assessment to potentially include PMESII (Political, Military, Economic, Social, Infrastructure, and Information) implications – supports United States Strategic Command's consequence of execution analyses. - Enhanced parallel version of transport and dispersion code to allow faster and more complex data analysis execution on high performance computing resources. - Supported requests for information providing technical advisory reachback support on WMD effects and consequences of over 2,080 requests for information. ***FY 2015 Plans:*** - Develop parallel version of transport and dispersion code to allow faster analysis execution on high performance computing resources. Coupled with FY 2014 enhancements, provide upgraded capability to run faster, finer, and larger analyses. - Develop and integrate agent based modeling capabilities. - Demonstrate a novel chemical/biological sensor for a CWMD Tagging, Tracking, and Locating application. - Demonstrate a multi-modal chemical sensor integrated in a Tagging, Tracking, and Locating device. - Conduct a demonstration of scintillating transformational material for CWMD application within an operational architecture. - Support U.S. Army Program Manager (PM) UAS in completing WMD Aerial Collection System transition activities, fielding, and procurement. - Design, integrate, and demonstrate CARDS payload captive carry system for CBRN sensor packages. - Conduct a CARDS system demonstration of precision emplacement using representative CBRN sensor packages. - Conduct Phase I demonstration of enhanced near-term bio-search/detection sensors for Department of Defense (DoD) and Intelligence Community customers. - Conduct down-select of multi-mode sensor systems for bio-terrorism threat detection. - Initiate Phase II development of select sensor systems for use in detecting small-scale biological labs. - Deliver the VAPO planning tool with improved infrastructure modeling capabilities, including secondary effects from improved vehicle borne improvised explosive device models and tertiary effects linked with social behavior resulting from WMD insult. - Develop coarse, worldwide population and activity database to enable rapid emergent refined, country level synthetic infrastructures for agent-based improved urban site modeling operational capabilities. - Deliver capabilities developed in FY 2014 (IMEA 11.1). - Demonstrate high performance computing integration using improved software infrastructure developed in FY 2014. - Develop Enhanced Tunnel/ Hard and Deeply Buried Targets defeat modeling capabilities in the areas of High Strength Concrete weapon penetration and Steep Slope cratering/rubble model. - Start development to support non-kinetic weapons effects and full-spectrum defeat capability. - Develop improved Agent Defeat modeling capabilities for WMD target attack planning.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
- Deliver Targeting/Weaponeering academics and targeting recommendation packages supporting CCMD requirements. *FY 2016 Plans:* - Transition initial biological search technologies (Bio-ISR Spiral 1) to DoD and Interagency end-users. - Continue technology development for enhanced area search, localization, and point detection/ identification tools for biological threats of interest (Spiral 2). - Initiate planning for Bio-ISR Spiral 2 demonstration of improved biological search technologies. - Demonstrate unmanned platform capable of high-altitude/long-range glide, vertical takeoff and landing transition and egress for covert emplacement of CBRN payloads/sensors. - Design, develop, integrate, and test computer vision, autonomous navigation on unmanned systems to enable precise CBRN payload emplacement. - Complete WMD Aerial Collection System transition activities, fielding, and procurement. - Deliver agent defeat modeling capabilities (Human Injury, Dynamic Pressure, and Structural Response) for the DTRA's Reachback mission. - Utilize high performance computing capabilities to enhance scalable model fidelity. - Enhance software development architecture for more efficient integration of modeling and simulation capabilities into planning tools. - Deliver prototype 64-bit version of counter WMD modeling and simulation planning tools for analysis of large data sets. - Develop improved agent defeat modeling capabilities for WMD target attack planning. - Deliver Targeting/Weaponeering academics and targeting recommendation packages for CCMDs. - Develop and demonstrate a low-visibility sensor / detection device for chemical search missions. - Demonstrate nano-material based sensor/reporting system for detection of biological/chemical threats. - Conduct prototype demonstration of scintillating transformational material for CWMD application.			
Accomplishments/Planned Programs Subtotals	29.644	29.346	20.717

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• 21/0602718BR: *WMD Defeat Technologies*	14.660	13.787	13.526	-	13.526	13.642	13.958	14.427	14.714	Continuing	Continuing

Remarks

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Appropriation/Budget Activity 0400 *I* 3	**R-1 Program Element (Number/Name)** PE 0603160BR *I Counterproliferation Initiatives - Proliferation, Prevention and Defeat*	**Project (Number/Name)** RM *I WMD Counterforce Technologies*

D. Acquisition Strategy

Assess government, academic, and industrial performers and make selections based upon a "best fit for task" criteria. Common awardees include DoD Services, Laboratories, DoE National Laboratories, and specialized university laboratories. Technologies are transitioned to users via Service and Interagency Program Management Offices (e.g. WMD Aerial Collection System transitioned via U.S. Army PM UAS; Counter WMD Planning Tools via Joint Munitions Effectiveness Manual Weaponeering System and Target Acquisition Workstation.

E. Performance Metrics

Completion of WMD Aerial Collection System transition activities, fielding, and procurement to U.S. Army PM UAS.

Demonstration of acceptable standoff detection range for WMD reconnaissance system.

Demonstration of a low-visibility sensor/detection device for Chemical search missions.

Demonstration of high performance computing integration using improved software infrastructure for enhanced modeling and simulation capabilities.

Demonstration of WMD Tag, Track, Locate technologies.

Complete test for computer vision, autonomous navigation on unmanned systems to enable precise CBRN payload emplacement.

Demonstration of unmanned platform capable of high-altitude/long-range glide, vertical takeoff and landing transition and egress for covert emplacement of CBRN payloads/sensors.

Delivery of counter WMD planning capabilities (Near Miss Lethality model/Multi-Hit Weapon model/Ultra-High Performance Concrete Penetration model/Large Caliber Penetrator modeling and simulation enhancements/Glass Curtain Wall model/Vehicle Borne Improvised Explosive Device model/Human Injury model/Blast Dynamic Pressure model/Structural Response model) to counter WMD planners.

Delivery of scheduled Targeting/Weaponeering academics to WMD defeat planners.

Delivery of requested target recommendation packages and weaponeering solutions to CCMDs.

Delivery of 64-bit version of counter WMD modeling and simulation planning tools for improved processing capability of large and complex data sets.

Transition of initial biological search technologies (Bio-ISR Spiral 1) to DoD and inter-agency end-users.

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Exhibit R-2A, **RDT&E Project Justification:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
Appropriation/Budget Activity 0400 *I* 3	**R-1 Program Element (Number/Name)** PE 0603160BR *I Counterproliferation Initiatives - Proliferation, Prevention and Defeat*	**Project (Number/Name)** RR *I Combating WMD Test and Evaluation*

COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
RR: *Combating WMD Test and Evaluation*	1.810	0.092	-	-	-	-	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

Project RR provides a unique national test bed capability for simulated WMD facility characterization, weapon-target interaction, and WMD facility defeat testing to respond to operational needs by developing and maintaining test beds used by the DoD, the Military Services, the Combatant Commanders and other Federal Agencies to evaluate the implications of WMD, conventional, and other special weapon use against U.S. military or civilian systems and targets.

B. Accomplishments/Planned Programs ($ in Millions)

	FY 2014	FY 2015	FY 2016
Title: RR: Combating WMD Test and Evaluation **Description:** Project RR provides a unique national test bed capability for simulated WMD facility characterization, weapon-target interaction, and WMD facility defeat testing to respond to operational needs by developing and maintaining test beds used by the DoD, the Military Services, the Combatant Commanders and other Federal Agencies to evaluate the implications of WMD, conventional, and other special weapon use against U.S. military or civilian systems and targets. **FY 2014 Accomplishments:** - Provided test support to a program that demonstrated a Bremsstrahlung-based active interrogation system capable of detecting special nuclear material at standoff distances through various construction materials.	0.092	-	-
Accomplishments/Planned Programs Subtotals	0.092	-	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• 21/0602718BR: *WMD Defeat Technologies*	11.543	11.060	11.182	-	11.182	11.709	11.984	12.315	12.560	Continuing	Continuing

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, **RDT&E Project Justification:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
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E. Performance Metrics

 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2016 Defense Threat Reduction Agency										Date: February 2015	
Appropriation/Budget Activity 0400 *I* 3				**R-1 Program Element (Number/Name)** PE 0603160BR *I Counterproliferation Initiatives - Proliferation, Prevention and Defeat*						**Project (Number/Name)** RT *I Target Assessment Technologies*	

COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
RT: *Target Assessment Technologies*	98.110	47.478	53.850	56.065	-	56.065	43.717	27.377	28.104	28.663	Continuing	Continuing

A. Mission Description and Budget Item Justification

For some weapons of mass destruction (WMD) targets and hard and deeply buried targets (HDBTs), physical destruction may not be possible, practical, or desirable with current conventional weapons and employment techniques. It may be possible or preferable to achieve operational objectives by denying or disrupting the mission or function of the target facility. Functional defeat, however, requires extensive and highly detailed analysis of the target. The functional defeat process includes finding and identifying a facility, characterizing its function and physical layout, determining its vulnerabilities to available defeat mechanisms, planning and executing an attack, assessing damage, and if necessary, suppressing reconstitution efforts and re-attacking the facility. Target Assessment Technologies develops for both the Combatant Commands (CCMDs) and the Intelligence Community (IC), the analytical tools and processes required to find and characterize WMD targets and HDBTs; and then, in near-real-time, assess the results of attacks against those targets. Overall objectives are to develop new methodologies, processes and technologies for detecting, locating, identifying, physically and functionally characterizing, modeling, and assessing new and existing hard and deeply buried targets to support physical or functional defeat. Applying these processes to WMD time-dependent target characterization and threat analysis presents a further technical challenge.

The increase from FY 2014 to FY2015 was due to increased investment in the development and integration of high-priority find, characterize and assess sensor technologies and supporting algorithms and software. This project has the only identified solution capable of meeting a time sensitive mission critical technology gap. The increase from FY 2015 to FY 2016 reflects the continuing increased investment in the development and integration of high-priority find, characterize and assess sensor technologies and supporting algorithms and software.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
Title: RT: Target Assessment Technologies	47.478	53.850	56.065
Description: Project RT provides the COCOMs and the IC with technologies and processes to find and characterize WMD targets and HDBTs and then assess the results of attacks against those targets. *FY 2014 Accomplishments:* - Demonstrated Denied Area Persistent Sensor System enhanced detection/discrimination capability. - Developed a chemical/biological virtual laboratory model for support of foreign weapons program analysis. - Collected data and then developed an initial evaporative cooling analytical validation and verification model for support of the Underground Targeting and Analysis System thermal analysis capability. - Demonstrated an initial thermal process model interface for the Underground Targeting and Analysis System (UTAS). - Provided target characterization training for the Underground Facility and WMD target defeat communities.			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
- Completed requirements analysis, development and test plans, risk analysis and mitigation plans for prototype (Spiral 1) sensor development. - Developed initial detection algorithms for support of the prototype sensor development. - Developed and demonstrated breadboard version of the prototype sensor. *FY 2015 Plans:* - Deliver Find Characterize and Assess detection and characterization on-node data fusion algorithm improvements in support of near-real time target update capabilities. - Deliver Find Characterize and Assess UTAS tool suite interface improvement for near real time support of IC target characterization and assessment. - Develop Adversarial Route Analysis Tool with Global Expansion for support of counter-WMD intelligence analysis. - Develop Full Operational Capability (FOC) for UTAS thermal process modeling capability in support of IC target analysis. - Develop Find Characterize and Assess detection and characterization hardware and software to support near-real time target update capabilities. *FY 2016 Plans:* - Develop, and demonstrate Nuclear WMD Defeat Model for support of IC counter-WMD analysis and functional defeat targeting. - Develop and demonstrate Chemical–Biological Weapons Emerging Threats Model capability for support of IC counter-WMD analysis and course of action selection. - Demonstrate FOC for UTAS thermal process modeling capability for support of IC functional vulnerability analysis of hard or deeply buried WMD related targets. - Demonstrate sensor detection hardware and characterization software integration to support IC near-real time target characterization updates for time critical targeting of WMD related targets. - Conduct developmental demonstration and testing of Spiral 1 prototype sensor nodes in a realistic mission-representative environment. - Conduct Spiral 1 operational assessment of deployable sensor nodes in a realistic mission-representative environment with operational personnel in accordance with the designed concept of operations. - Deliver 24 Spiral 1 prototype deployable sensor units. - Develop new and enhanced (range/sensitivity) detection capabilities and enhanced delivery capabilities as Spiral 2 of the deployable sensor project. - Produce additional prototype sensor units for follow-on (Spiral 2) integration testing and algorithm validation.			
Accomplishments/Planned Programs Subtotals	47.478	53.850	56.065

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Appropriation/Budget Activity 0400 *I* 3	**R-1 Program Element (Number/Name)** PE 0603160BR *I Counterproliferation Initiatives - Proliferation, Prevention and Defeat*	**Project (Number/Name)** RT *I Target Assessment Technologies*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Assess government, academic, and industrial performers and make selections based upon a "best fit for task" criteria. Common government awardees include the Department of Defense (DoD) Services' Laboratories, Department of Energy National Laboratories, and specialized university laboratories. Mature analytical tool capabilities are transitioned to the IC through partnership with the Defense Intelligence Agency Defense Counterproliferation Program.

E. Performance Metrics

Improve capability of IC to physically and functionally characterize WMD related targets through successful incorporation of WMD systems and process characterization modeling and assessment capabilities into the Underground Targeting and assessment System analytical tool.
Improve Underground Targeting and Analysis System characterization capabilities by incorporating functionality to handle a broader range of WMD-related equipment.
Improve sensor-on-node data fusion capability for deployable ground sensors in order to reduce communications burden.
Improve DoD's ability to analyze adversary WMD development capability through new modeling and analysis tool capabilities.
Demonstrate a compact, low power integrated sensor-on-node seismic and acoustic system with an operating prototype for characterization of WMD related targets by the IC for support of CCMD targeting.
Deliver a virtual laboratory for chemical, biological, and radiological models as a framework to analyze adversary WMD capabilities.
Demonstrate a deployable, remote sensor capability in response to a documented emerging operational need.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Defense Threat Reduction Agency											Date: February 2015	
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 5: *System Development & Demonstration (SDD)*					**R-1 Program Element (Number/Name)** PE 0605000BR I *WMD Defeat Capabilities*							
COST ($ in Millions)	**Prior Years**	**FY 2014**	**FY 2015**	**FY 2016 Base**	**FY 2016 OCO**	**FY 2016 Total**	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**	**Cost To Complete**	**Total Cost**
Total Program Element	58.555	12.511	6.887	7.156	-	7.156	7.340	7.437	7.563	7.715	Continuing	Continuing
RF: *Forensics Technologies*	0.000	6.867	6.887	7.156	-	7.156	7.340	7.437	7.563	7.715	Continuing	Continuing
RL: *Nuclear & Radiological Effects*	58.555	5.644	-	-	-	-	-	-	-	-	-	64.199

Note

*Project RF-Detection and Forensics Technologies subdivides into projects RD-Detection Technologies and RF-Forensics Technologies beginning in FY 2016. This impacts these projects in PE 0602718BR and PE 0603160BR. See C. Other Program Funding Summary below.

*Integrated Weapons of Mass Destruction Toolset investments are to be completed in FY 2014.

A. Mission Description and Budget Item Justification

The mission of the Defense Threat Reduction Agency is to safeguard the United States and its allies from global weapons of mass destruction (WMD) threats by integrating, synchronizing, and providing responsive expertise, technologies, and capabilities. This mission directly aligns with several National and Department of Defense (DoD) level guidance/vision documents. For Research, Development, Test & Evaluation, these documents include the National Security Strategy, Defense Strategic Guidance (Sustaining U.S. Global Leadership: Priorities for 21st Century Defense), Quadrennial Defense Review, National Strategy for Combating Terrorism, 2014 DoD Strategy for Countering WMD, National Strategy to Combat WMD, Defense Planning Guidance, Guidance for Employment of the Force, National Military Strategic Plan for the War on Terrorism, and Joint Strategic Capabilities Plan (including the Nuclear Annex). To achieve this mission, DTRA established strategies and tasks to meet their principal objectives. These objectives are: 1) Ensure a safe, secure, and effective nuclear deterrent; 2) Anticipate emerging WMD threats; 3) Provide Combating WMD situational awareness; 4) Assess infrastructure and personnel vulnerabilities; 5) Prevent proliferation and use of WMD; 6) Defend against WMD threats; 7) Defeat WMD threats; 8) Recover from WMD consequences; and 9) Synchronize countering WMD activities.

This program element supports the development of system capabilities for the countering weapons of mass destruction (CWMD) mission. This funding specifically supports technologies to meet International Monitoring System technology requirements in support of nuclear arms control activities under the Nuclear Arms Control Technology program. Through FY 2014, funding also supported the development of collaborative CWMD analysis capabilities between the DoD and key interagency and international partners through a globally accessible net-centric framework in the form of the Integrated Weapons of Mass Destruction Toolset.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Defense Threat Reduction Agency				**Date:** February 2015	
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 5: *System Development & Demonstration (SDD)*			**R-1 Program Element (Number/Name)** PE 0605000BR I *WMD Defeat Capabilities*		
B. Program Change Summary ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016 Base**	**FY 2016 OCO**	**FY 2016 Total**
Previous President's Budget	12.901	6.887	7.156	-	7.156
Current President's Budget	12.511	6.887	7.156	-	7.156
Total Adjustments	-0.390	-	-	-	-
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.390	-			

Exhibit R-2A, **RDT&E Project Justification:** PB 2016 Defense Threat Reduction Agency | | **Date:** February 2015

Appropriation/Budget Activity 0400 / 5	R-1 Program Element (Number/Name) PE 0605000BR / *WMD Defeat Capabilities*	Project (Number/Name) RF / *Forensics Technologies*

COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
RF: *Forensics Technologies*	-	6.867	6.887	7.156	-	7.156	7.340	7.437	7.563	7.715	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

 *Project RF-Detection and Forensics Technologies subdivides into projects RD-Detection Technologies and RF-Forensics Technologies beginning in FY 2016.

A. Mission Description and Budget Item Justification

This project supports the development of verification and monitoring capabilities for the Defense Threat Reduction Agency (DTRA) to counter proliferation and weapons of mass destruction (WMD). DTRA's Nuclear Arms Control Technologies (NACT) program performs Research, Development, Test, and Evaluation (RDT&E) to improve the sustainability, reliability, and effectiveness of capabilities related to its operational mission to install, operate, maintain, and sustain the waveform and radionuclide nuclear detonation detection stations comprising the U.S. portion of the International Monitoring System (IMS). This delivers data to the U.S. monitoring and verification community and enables U.S. compliance with the Comprehensive Nuclear-Test-Ban Treaty (CTBT) in support of U.S. and Department of Defense (DoD) nonproliferation objectives.

The project addresses WMD monitoring, implementation of, and compliance with arms control agreement requirements validated by the Office of the Under Secretary of Defense, Acquisition, Technology, and Logistics. This project conforms to the administration's research and development priorities related to WMD arms control and disablement. Technical assessments are made against CTBT implementation requirements and U.S. objectives to provide the basis for sound project development, evaluate existing programs, provide data required to inform compliance assessments and support U.S. monitoring policy, decision-makers, and negotiation teams.

The primary RDT&E program emphasis is on improvements that enable the installation of treaty-specific stations, which reduce costs and increase the reliability in diverse and often harsh environments; improve efficiency, performance, reliability, and sustainability of existing stations and treaty-specified verification capabilities; and improve capabilities to detect, characterize, and enable discrimination of, nuclear weapons tests. The NACT program directly supports U.S. and allied warfighter and national technical monitoring requirements and provides vital data used by the treaty monitoring community, warfighter planners, DoD, other U.S. Government agencies, and international agencies.

The increase from FY 2015 to FY 2016 is for an enhanced level of investment in research on radionuclide sampling and analytical capabilities.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
Title: RF - Forensics Technologies	6.867	6.887	7.156
Description: Project RF supports the NACT Program, conducting RDT&E to meet IMS technology requirements in support of CTBT implementation, compliance, monitoring, inspection, and other emerging nuclear arms control activities. **FY 2014 Accomplishments:**			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
- Supported Office of the Secretary of Defense (OSD) treaty management objectives and participation in joint U.S.-International Comprehensive Test Ban Office Provisional Technical Secretariat sponsored technology development exchanges and developmental exercises in support of technology development and IMS operations and maintenance objectives. - Developed prototype sensor, station calibration, and metrology planning. - Developed monitoring station array element calibration with focus on developing in-situ array calibration and performance monitoring capabilities. - Conducted signal capture and identification studies to reduce signal clutter and false alarms; and improve noise rejection methods and algorithms. - Continued radio-xenon gas detection system development and research. Studied and evaluated atmospheric and subsurface xenon backgrounds and transport phenomenon. - Continued a study of baseline noble gas detection schemes. Selected the pathway for future radio-xenon detection options providing enhanced detection and operational capabilities and reliability. - Completed infrasound information system enhancements and development of infrasound propagation models to improve detection, identification, and discrimination of sources and signatures of interest. - Conducted field experiments to collect data required to constrain and validate models. Models will include fine-scale atmospheric conditions, topography, 3-D winds and effects of non-linear propagation. - Continued to develop a portable/rapid deployable infrasound array and standard sound source for calibrating infrasound stations/ arrays. - Continued research and development on support system to collect and prioritize station operator requirements to inform required design-build-test activities across the monitoring system. - Continued U.S. IMS sensor event signal identification technique research and development of the transportable xenon laboratory (TXL) and associated xenon detection system and prepare for international deployment exercises and demonstrations. Work performed in advance of the TXL foreign deployment will establish a baseline for this xenon monitoring capability and provide unique opportunities to diagnose and resolve remaining technical concerns and issues, including investigating the "memory effect" recently encountered in these systems as a result of the unintended radio-xenon releases from the Fukushima reactors. Continued infrasound event clutter and false alarm reduction and noise mitigation analyses. - Drove improvements in radionuclide detection and measurement, including xenon gas collection/analysis systems research. Evaluate detection limits, and yields. Technical requirements continue to dictate that the U.S. radionuclide laboratory (RL-16) gas system requires additional capability to meet required detection thresholds. - Develop test methods to increase xenon gas yields, improve detection efficiencies, and decrease dead volume. To ensure RL-16 is making a high precision measurement, analysis samples will be peer reviewed and calibrated at certified laboratories. *FY 2015 Plans:* - Continue to improve the sustainability, reliability, and effectiveness of the 36 IMS stations			

Exhibit R-2A, **RDT&E Project Justification:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
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B. Accomplishments/Planned Programs ($ in Millions)	**FY 2014**	**FY 2015**	**FY 2016**
- Complete Provisional Technical Secretariat certification of U.S. IMS Infrasound monitoring station on Wake Island and Auxiliary Seismic monitoring station on Shemya Island, Alaska. - Continue to improve U.S. IMS operations efficiency, capabilities, and quality of monitoring data and decrease false alarms. - Continue support of OSD treaty management objectives. - Continue participating in International Comprehensive Test Ban Office Provisional Technical Secretariat sponsored technology development exchanges and field exercises. - Continue research and development to inform required design-build-test activities across the monitoring system. - Continue IMS prototype sensor and station calibration capabilities development. - Continue development of monitoring station in-situ calibration and performance monitoring capabilities. - Continue performing experiments or field demonstrations to evaluate monitoring system performance. - Continue to enhance baseline radionuclide particulate and noble gas detection capabilities, efficiency, and reliability. - Continue development and calibration of infrasound and seismic propagation models. - Continue field experiments to collect data required to calibrate and constrain and validate IMS relevant propagation models. - Continue U.S. IMS sensor event signal identification technique research and development of the transportable xenon laboratory. *FY 2016 Plans:* - Continue support of OSD Threat Reduction and Arms Control treaty management objectives. - Continue development and implementation of IMS sensor and station calibration capabilities. - Continue development and implementation of in-situ calibration concepts. - Participate in CTBT Organization Provisional Technical Secretariat sponsored technology development exchanges. - Sponsor U.S. specific technology development exchanges. - Develop and implement U.S. IMS specific life-cycle management software to enable costs effective and efficient spare part replacement and long-range recapitalization. - Develop and implement concepts to improve the reliability of the radionuclide stations. - Develop and implement concepts to improve radionuclide and infrasound signal to noise. - Improve and develop system of health monitoring software.			
Accomplishments/Planned Programs Subtotals	6.867	6.887	7.156

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• 23/0602718BR: *WMD Defeat Technologies*	34.595	35.061	9.547	-	9.547	10.128	10.443	10.684	10.899	Continuing	Continuing
• 30/0603160BR: *Proliferation Prevention and Defeat*	73.919	66.707	38.427	-	38.427	39.725	40.219	41.414	42.242	Continuing	Continuing

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C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost

Remarks

D. Acquisition Strategy

Assess government, academic, and industrial performers and make selections based upon a "best fit for task" criteria.   Common government awardees include DoD Service Laboratories and the Department of Energy National Laboratories.

E. Performance Metrics

The goal of the NACT RDT&E program is to enable full compliance of all emerging data quality requirements and other requirements as documented in CTBT treaty language, CTBT-issued Radionuclide and Waveform Operations Manuals, and other CTBT Organization communications. RDT&E is conducted in support of NACT's operational mission to operate, maintain, and sustain the Provisional Technical Secretariat certified waveform and radionuclide CTBT monitoring stations in accordance with CTBT requirements. CTBT IMS data availability/timeliness performance specifications/requirements are currently 98% data availability for IMS waveform and 95% for IMS radionuclide systems. Data quality metrics continue to evolve as the entire CTBT IMS capability is exercised and tested.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2016 Defense Threat Reduction Agency												Date: February 2015		
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Support ($ in Millions)				FY 2014		FY 2015		FY 2016 Base		FY 2016 OCO		FY 2016 Total		
Cost Category Item	**Contract Method & Type**	**Performing Activity & Location**	**Prior Years**	**Cost**	**Award Date**	**Cost**	**Award Date**	**Cost**	**Award Date**	**Cost**	**Award Date**	**Cost**	**Cost To Complete**	**Total Cost**	**Target Value of Contract**
Radionuclide Analysis Technology	FFRDC	Pacific Northwest National Laboratory : Richland, WA	-	2.317	Jun 2014	1.000	Jun 2015	1.000	Jun 2016	-		1.000	4.480	8.797	8.797
Waveform Analysis Technology	C/Various	Space and Missile Defense Labs : Huntsville, AL	-	1.669	Aug 2014	-		-		-		-	-	1.669	1.669
Radionuclide Analysis Improvements	C/CPFF	General Dynamics : Fairfax, VA	-	0.500	Jun 2014	0.500	Mar 2015	0.500	Mar 2016	-		0.500	2.240	3.740	3.740
Waveform Analysis Improvements	TBD	TBD : TBD	-	-		0.500	Apr 2015	0.500	Apr 2016	-		0.500	2.240	3.240	3.240
Waveform Testing and Analysis	FFRDC	Sandia National Laboratory : Albuquerque, NM	-	0.506	Mar 2014	0.506	Mar 2015	0.506	Mar 2016	-		0.506	2.267	3.785	3.785
Sample Analysis	MIPR	Air Force Technical Application Center : Patrick AFB, FL	-	0.800	Aug 2014	0.800	Aug 2015	0.800	Aug 2016	-		0.800	3.552	5.952	5.952
Infrasound Standards and Improvements	TBD	TBD : TBD	-	-		1.000	Mar 2015	1.000	Mar 2016	-		1.000	4.480	6.480	6.480
Deficiency Improvement Research & Development	TBD	TBD : TBD	-	-		1.481	Mar 2015	1.750	Mar 2016	-		1.750	5.880	9.111	9.111
Engineering & Technical Services	C/CPFF	TASC, Inc. : Chantilly, VA	-	0.800	Dec 2013	0.800	Dec 2014	0.800	Dec 2015	-		0.800	3.584	5.984	5.984
Subtotal			-	6.592		6.587		6.856		-		6.856	28.723	48.758	48.758

Management Services ($ in Millions)				FY 2014		FY 2015		FY 2016 Base		FY 2016 OCO		FY 2016 Total		
Cost Category Item	**Contract Method & Type**	**Performing Activity & Location**	**Prior Years**	**Cost**	**Award Date**	**Cost**	**Award Date**	**Cost**	**Award Date**	**Cost**	**Award Date**	**Cost**	**Cost To Complete**	**Total Cost**	**Target Value of Contract**
A&AS Support to Program Office	C/CPFF	TASC, Inc. : Chantilly, VA	-	0.200	Dec 2013	0.200	Dec 2014	0.200	Dec 2015	-		0.200	0.888	1.488	1.488
Travel	C/Various	Various : Various	-	0.075		0.100		0.100		-		0.100	0.444	0.719	0.719
Subtotal			-	0.275		0.300		0.300		-		0.300	1.332	2.207	2.207

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Exhibit R-3, **RDT&E Project Cost Analysis:** PB 2016 Defense Threat Reduction Agency | **Date:** February 2015

Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605000BR / *WMD Defeat Capabilities*	**Project (Number/Name)** RF / *Forensics Technologies*

	Prior Years	**FY 2014**	**FY 2015**	**FY 2016 Base**	**FY 2016 OCO**	**FY 2016 Total**	**Cost To Complete**	**Total Cost**	**Target Value of Contract**
Project Cost Totals	-	6.867	6.887	7.156	-	7.156	30.055	50.965	50.965

Remarks

The Defense Threat Reduction Agency (DTRA) Nuclear Arms Control program installs, operates, maintains, and sustains the waveform and radionuclide nuclear detonation detection stations comprising the U.S. portion of the International Monitoring Systems (IMS) in order to deliver data to the U.S. monitoring and verification community and to enable U.S. compliance to the terms of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) in support of U.S. and Department of Defense (DOD) nonproliferation objectives. The project addresses weapons of mass destruction (WMD) monitoring requirements validated by the Office of the Under Secretary of Defense, Acquisition, Technology, and Logistics. This project conforms to the administration's research and development priorities as related to WMD arms control and disablement. Technical assessments are made against CTBT implementation requirements and U.S. objectives to provide the basis for sound project development, evaluate existing programs, and provide the data required to inform compliance assessments, and support U.S. monitoring policy and decision-makers, and negotiation teams. NOTE: As this program and its requirements mature and legacy contract vehicles expire, the composition of the performer base under DTRA program management will be dynamic.

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Exhibit R-4, **RDT&E Schedule Profile:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605000BR / *WMD Defeat Capabilities*	**Project (Number/Name)** RF / *Forensics Technologies*

	FY 2014				FY 2015				FY 2016				FY 2017				FY 2018				FY 2019				FY 2020			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Nuclear Arms Control Technology (NACT)																												
Waveform and radionuclide monitoring capability enhancements																												
System reliability and availability enhancements																												
System operations and efficiency improvements																												

Exhibit R-4A, **RDT&E Schedule Details:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
Appropriation/Budget Activity 0400 *I* 5	**R-1 Program Element (Number/Name)** PE 0605000BR *I WMD Defeat Capabilities*	**Project (Number/Name)** RF *I Forensics Technologies*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Nuclear Arms Control Technology (NACT)				
Waveform and radionuclide monitoring capability enhancements	2	2014	4	2020
System reliability and availability enhancements	2	2014	4	2020
System operations and efficiency improvements	2	2014	4	2020

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Exhibit R-2A, RDT&E Project Justification: PB 2016 Defense Threat Reduction Agency											Date: February 2015	
Appropriation/Budget Activity 0400 / 5					R-1 Program Element (Number/Name) PE 0605000BR / WMD Defeat Capabilities				Project (Number/Name) RL / Nuclear & Radiological Effects			
COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
RL: *Nuclear & Radiological Effects*	58.555	5.644	-	-	-	-	-	-	-	-	-	64.199
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Efforts in this Project were completed in FY 2014. Under Project RL, the Net-Centric Architecture program integrated legacy capabilities and facilitated data sharing through a net-centric framework. It provided near-real time collaborative analysis capabilities between the Department of Defense (DoD) and key interagency and international partners through a globally accessible net-centric framework known as the Integrated Weapons of Mass Destruction Toolset. This toolset migrated the Defense Threat Reduction Agency's (DTRA's) chemical, biological, radiological, and nuclear modeling and simulation codes to provide an integrated suite of Combating WMD decision support capabilities. The framework was the only operational chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) framework in the world that provided capabilities through web applications, net-centric web services, and stand-alone mobile deployments which are validated and accredited for operational use by international, National, state, and local authorities.

The decrease in FY 2015 is due to the completion of Integrated Weapons of Mass Destruction Toolset investments.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
Title: RL: Nuclear & Radiological Effects *Description:* Project RL develops and provides a real-time globally accessible net-centric framework which migrates the DTRA CBRNE modeling and simulation codes to provide an integrated suite of Combating WMD decision support capabilities. *FY 2014 Accomplishments:* - Installed Integrated Weapons of Mass Destruction Toolset version 3.32 (Joint Collaborative Analysis Model specific components only) at Ministry of National Defense, Republic of China for joint operational training and planning collaboration between U.S. forces and the Republic of China forces. - Fielded Integrated Weapons of Mass Destruction Toolset version 3.32 to United States Strategic Command, United Kingdom, Supreme Headquarters Allied Powers Europe, Office of the Secretary of Defense, U.S. Army Nuclear and Combating WMD Agency, and DTRA's Technical Reachback. - Broadly deployed Integrated Weapons of Mass Destruction Toolset First Responder Tool (FiRST) iOS and Android application to Department of Homeland Security and DTRA users with consequence assessment mission requirements.	5.644	-	-
Accomplishments/Planned Programs Subtotals	5.644	-	-

Exhibit R-2A, **RDT&E Project Justification:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
Appropriation/Budget Activity 0400 *I* 5	**R-1 Program Element (Number/Name)** PE 0605000BR *I WMD Defeat Capabilities*	**Project (Number/Name)** RL *I Nuclear & Radiological Effects*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• 23/0602718BR: *WMD Defeat Technologies*	31.754	32.352	23.053	-	23.053	23.769	23.899	24.308	24.794	Continuing	Continuing

Remarks

D. Acquisition Strategy

The program for Integrated Weapons of Mass Destruction Toolset is executed through a competed cost plus fixed-fee contract. This contract is a 3-year effort for software development, test, and integration.

E. Performance Metrics

Demonstrate and provide over 80% of the customer-required CBRN modeling and simulation capabilities over networks, e.g., DoD Global Information Grid. Integrate mission-required legacy DTRA CBRNE codes into a net-centric architecture through a process-controlled verification, validation, and accreditation standards-based method necessary to promote the National Strategy for Countering Biological Threats.

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Exhibit R-3, **RDT&E Project Cost Analysis:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
Appropriation/Budget Activity 0400 / 5	**R-1 Program Element (Number/Name)** PE 0605000BR / *WMD Defeat Capabilities*	**Project (Number/Name)** RL / *Nuclear & Radiological Effects*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
System Development - IWMDT	C/CPAF	Leidos : San Diego, CA	20.209	1.071	May 2014	-	-	-	-	-	-	-	-	21.280	21.280
System Development - NuCS	C/CPFF	Applied Research Associates : Raleigh, NC	4.930	0.950	Jun 2014	-	-	-	-	-	-	-	-	5.880	5.880
System Development - COE	C/CPFF	Titan : Kingstowne, VA	5.533	-	-	-	-	-	-	-	-	-	-	5.533	5.533
System Development - Component Contracts	C/Various	Various : Various	5.073	-	-	-	-	-	-	-	-	-	-	5.073	5.073
		Subtotal	35.745	2.021		-		-		-		-	-	37.766	37.766

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Configuration Management	C/CPAF	Leidos : San Diego, CA	0.401	0.540	May 2014	-	-	-	-	-	-	-	-	0.941	0.941
Software Integration	C/CPAF	Leidos : San Diego, CA	6.810	0.740	May 2014	-	-	-	-	-	-	-	-	7.550	7.550
Technical Data	C/CPAF	Leidos : San Diego, CA	0.674	0.065	May 2014	-	-	-	-	-	-	-	-	0.739	0.739
Engineering Services	C/CPAF	Leidos : San Diego, CA	2.372	0.229	May 2014	-	-	-	-	-	-	-	-	2.601	2.601
Accreditation & Certification	C/CPAF	Leidos : San Diego, CA	1.075	0.312	May 2014	-	-	-	-	-	-	-	-	1.387	1.387
		Subtotal	11.332	1.886		-		-		-		-	-	13.218	13.218

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2016 Defense Threat Reduction Agency			Date: February 2015

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Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	C/CPAF	Leidos : San Diego, CA	2.410	0.574	May 2014	-	-	-	-	-	-	-	-	2.984	2.984
Operational Test & Evaluation	C/FFPLOE	Leidos : San Diego, CA	2.023	0.398	May 2014	-	-	-	-	-	-	-	-	2.421	2.421
Subtotal			4.433	0.972		-		-		-		-	-	5.405	5.405

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2014 Cost	FY 2014 Award Date	FY 2015 Cost	FY 2015 Award Date	FY 2016 Base Cost	FY 2016 Base Award Date	FY 2016 OCO Cost	FY 2016 OCO Award Date	FY 2016 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	C/Various	TASC, Inc. : Lorton, VA	2.662	0.727	Apr 2014	-	-	-	-	-	-	-	-	3.389	3.389
Travel	C/Various	Various : Various	1.580	0.038	Dec 2013	-	-	-	-	-	-	-	-	1.618	1.618
Overhead	C/Various	Various : Various	2.803	-		-		-		-		-	-	2.803	2.803
Subtotal			7.045	0.765		-		-		-		-	-	7.810	7.810

	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	58.555	5.644	-	-	-	-	-	64.199	64.199

Remarks

All prior year costs and activities for Integrated Weapons of Mass Destruction Toolset (IWMDT), Nuclear Capability Server (NuCS), and Consequence of Execution (COE) were assigned under Project BD of PE 0602716BR. IWMDT was funded in 2004 by a competitive Cost Plus Award Fee (CPAF) contract for $12.425M over a 3-year period. At end of FY 2006, its follow-on contract was awarded with an initial $0.300M increment. IWMDT efforts continued into FY 2013 with $58.555M applied. The Joint Collaborative Analysis Model, a subcomponent within IWMDT will be openly competed under one of the new DTRA Indefinite Delivery/Indefinite Quantity contracts for approximately $2.500M for FY 2014.

Exhibit R-4, RDT&E Schedule Profile: PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
Appropriation/Budget Activity 0400 **/** 5	**R-1 Program Element (Number/Name)** PE 0605000BR **/** *WMD Defeat Capabilities*	**Project (Number/Name)** RL **/** *Nuclear & Radiological Effects*

	FY 2014				FY 2015				FY 2016				FY 2017				FY 2018				FY 2019				FY 2020			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Integrated Weapons of Mass Destruction Toolset (IWMDT)																												
IWMDT-System Development, Test, and Integration-Phase III	███████																											

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Exhibit R-4A, **RDT&E Schedule Details:** PB 2016 Defense Threat Reduction Agency			**Date:** February 2015		
Appropriation/Budget Activity 0400 / 5		**R-1 Program Element (Number/Name)** PE 0605000BR / *WMD Defeat Capabilities*		**Project (Number/Name)** RL / *Nuclear & Radiological Effects*	

Schedule Details

Events by Sub Project	Start		End	
	Quarter	**Year**	**Quarter**	**Year**
Integrated Weapons of Mass Destruction Toolset (IWMDT)				
IWMDT-System Development, Test, and Integration-Phase III	1	2014	3	2014

Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Defense Threat Reduction Agency											Date: February 2015	

Appropriation/Budget Activity	R-1 Program Element (Number/Name)
0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 6: *RDT&E Management Support*	PE 0605502BR *I Small Business Innovation Research*

COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
Total Program Element	19.306	9.700	-	-	-	-	-	-	-	-	Continuing	Continuing
RA: *Information Sciences and Applications*	19.306	9.700	-	-	-	-	-	-	-	-	Continuing	Continuing

Note

*Funding is not allocated until the year of execution. Program Element 0605502BR "Small Business Innovative Research (SBIR)" is used in reporting year-end actual expenses only.

A. Mission Description and Budget Item Justification

The Small Business Innovative Research (SBIR) and the Small Business Technology Transfer (STTR) programs provide the means for stimulating technological innovation in the private sector, strengthens the role of small business in meeting the Department of Defense (DoD) research and development needs; fosters and encourages participation of minority and disadvantaged businesses in technological innovation; and increases the commercial application of the DoD supported research and development results. These efforts are responsive to Public Law 106-554.

B. Program Change Summary ($ in Millions)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Previous President's Budget	-	-	-	-	-
Current President's Budget	9.700	-	-	-	-
Total Adjustments	9.700	-	-	-	-
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	9.700	-			

Change Summary Explanation

Funding for the SBIR Program is consolidated in this program element during the year of execution.

PE 0605502BR: *Small Business Innovation Research*
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Exhibit R-2A, RDT&E Project Justification: PB 2016 Defense Threat Reduction Agency		Date: February 2015	

Appropriation/Budget Activity 0400 / 6	R-1 Program Element (Number/Name) PE 0605502BR / *Small Business Innovation Research*	Project (Number/Name) RA / *Information Sciences and Applications*

COST ($ in Millions)	Prior Years	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
RA: *Information Sciences and Applications*	19.306	9.700	-	-	-	-	-	-	-	-	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

 *Funding is not allocated until the year of execution. Program Element 0605502BR "Small Business Innovative Research (SBIR)" is used in reporting year-end actual expenses only.

A. Mission Description and Budget Item Justification

 This project provides the means for stimulating technological innovation in the private sector, strengthens the role of small business in meeting the Department of Defense (DoD) research and development needs; fosters and encourages participation of minority and disadvantaged businesses in technological innovation; and increases the commercial application of the DoD supported research and development results. These efforts are responsive to Public Law 106-554.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2014	FY 2015	FY 2016
Title: RA: Information Sciences and Applications	9.700	-	-
Description: This project provides the means for stimulating technological innovation in the private sector, strengthens the role of small business in meeting the DoD research and development needs; fosters and encourages participation of minority and disadvantaged businesses in technological innovation; and increases the commercial application of the DoD supported research and development results. These efforts are responsive to Public Law 106-554. *FY 2014 Accomplishments:* Phase I contract awards from qualified proposals and availability of funds: - SBIR 13.3 Solicitation: Four Phase I contracts were awarded. Phase II awards resulting from Phase I efforts and availability of fun.ds: - SBIR 12.2 Solicitation: Seven Phase II effort are in process to award. - STTR – Program established at DTRA/SCC-WMD in FY 2014.			
Accomplishments/Planned Programs Subtotals	9.700	-	-

PE 0605502BR: *Small Business Innovation Research*
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Exhibit R-2A, **RDT&E Project Justification:** PB 2016 Defense Threat Reduction Agency		**Date:** February 2015
Appropriation/Budget Activity 0400 / 6	**R-1 Program Element (Number/Name)** PE 0605502BR / *Small Business Innovation Research*	**Project (Number/Name)** RA / *Information Sciences and Applications*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total	FY 2017	FY 2018	FY 2019	FY 2020	Cost To Complete	Total Cost
• 21/0602718BR: *WMD Defeat Technologies*	21.879	28.785	29.949	-	29.949	32.901	32.365	32.780	33.433	Continuing	Continuing
• 28/0603160BR: *Proliferation, Prevention, and Defeat*	0.107	-	12.244	-	12.244	11.501	11.397	12.839	13.085	Continuing	Continuing

Remarks

D. Acquisition Strategy

 N/A

E. Performance Metrics

 N/A

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