Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603000D8Z / *Joint Munitions Advanced Technology*

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
Total Program Element	76.684	25.452	23.902	25.627	-	25.627	25.779	26.001	26.421	26.977	Continuing	Continuing
P002: *Insensitive Munitions Advanced Technology*	63.267	18.867	17.756	19.039	-	19.039	19.152	19.323	19.640	20.028	Continuing	Continuing
P301: *Enabling Fuze Advanced Technology*	13.417	6.585	6.146	6.588	-	6.588	6.627	6.678	6.781	6.949	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program addresses advanced technology development associated with improving the lethality, reliability, safety, and survivability of munitions and weapon systems. The goal is to develop and demonstrate joint enabling technologies that can be used by the Program Executive Offices (PEO) as they develop their specific weapon programs. The program invests in and demonstrates technologies from a Joint Service perspective, thus maximizing efficiencies, ensuring the development of technology with the broadest applicability while avoiding duplication of efforts.

Munition Area Technology Groups (MATGs) and Fuze Area Technology Groups (FATGs) have been established for each munition and capability area and are tasked with: 1) coordinating, establishing, and maintaining 2018 and 2023 year technology development plans and roadmaps, 2) coordinating biannual meetings to review technical and programmatic details of each funded and proposed effort, 3) developing and submitting Technology Transition Agreements in coordination with appropriate PEO for insertion in their Insensitive Munition (IM) Strategic Plans / Fuze Technology Development Plan, and 4) interfacing with other MATGs / FATGs and IM / fuze science and technology projects as appropriate. The Joint Insensitive Munitions Technical Program (JIMTP) and Joint Fuze Technical Program (JFTP) will utilize a Technical Advisory Committee (TAC) (consisting of senior Department of Defense (DoD) and Department of Energy (DOE) laboratory representatives and senior Munitions PEO representatives) to provide program oversight, policy, direction, and priorities during its annual meeting.

The IM effort will demonstrate enabling technologies needed to develop weapons in compliance with IM requirements established in United States Code, Title 10, Chapter 141, Section 2389 and DoD Instruction 5000.1. This effort will take promising technologies demonstrated at the laboratory scale and transition them into demonstration programs utilizing generic hardware based on priority munitions identified in the PEO IM Strategic Plans. Mature and demonstrated IM technology can be transitioned, thereby decreasing their program costs and schedule risk and facilitating spin-offs to other non-compliant munitions within their portfolios.

The JIMTP investments focus on five Munition Areas: 1) High Performance Rocket Propulsion, 2) Minimum Signature Rocket Propulsion, 3) Blast and Fragmentation Warheads, 4) Anti-Armor Warheads, and 5) Gun Propulsion. MATGs, under tri-service leadership, have developed technology roadmaps for each Munition Area which are used to guide investments based on goals consistent with the PEO IM Strategic Plans. These IM technologies, alone or in combination, will be incorporated in hardware, simulating real-world munitions, to demonstrate their utility and feasibility as part of Technology Transition Agreements with PEOs.

The Enabling Fuze Advanced Technology effort will also demonstrate fuze enabling technologies needed to develop weapons that address priority capability areas identified in the Guidance for Development (GDF) of the Force, the Secretary of Defense Memorandum, DoD Policy on Cluster Munitions and Unintended Harm

Exhibit R-2, RDT&E Budget Item Justification: FY 2018 Office of the Secretary Of Defense	Date: May 2017
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603000D8Z *I Joint Munitions Advanced Technology*

to Civilians, and shortfalls in current weapon systems. This effort will take promising technologies demonstrated at the laboratory scale and transition them into demonstration weapons and programs based on priority capabilities and technology needs identified and validated by the PEOs and the Heads of the Service Science and Technology (S&T) communities. In this way, promising multi-point initiation architectures, high reliability fuze architectures, survivable components, modular fuze packaging, and components produced based on ease of manufacturing can be integrated into munitions applications and its ability to address required capability needs will be validated. Mature fuze technologies will be transitioned to Weapon PEO's and/or Industry, thereby decreasing program costs and schedule risk while facilitating technology into potentially broader range of munitions applications.

The JFTP investments focus on four specific capability areas that have been identified by the Department's strategic guidance and current shortfalls in weapon systems and as validated by the PEOs and the Service S&T communities. The capability areas are: 1) Hard Target Survivable Fuzing, 2) Tailorable Effects Weapon Fuzing, 3) High Reliability Fuzing, and 4) Enabling Fuze Technologies and Common Architecture. The Fuzing technologies will be incorporated in weapon applications to demonstrate their maturity and utility as part of Technology Transition Agreements with PEOs.

B. Program Change Summary ($ in Millions)	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total
Previous President's Budget	25.864	23.902	25.650	-	25.650
Current President's Budget	25.452	23.902	25.627	-	25.627
Total Adjustments	-0.412	0.000	-0.023	-	-0.023
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.412	-			
• Other Adjustments	-	-	-0.023	-	-0.023

Change Summary Explanation

FY 2018 internal realignment reflects funding for higher Departmental priorities and requirements.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603000D8Z / *Joint Munitions Advanced Technology*	Project (Number/Name) P002 / *Insensitive Munitions Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P002: *Insensitive Munitions Advanced Technology*	63.267	18.867	17.756	19.039	-	19.039	19.152	19.323	19.640	20.028	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Insensitive Munitions (IM) effort addresses advanced technology development associated with improving the lethality, reliability, safety, and survivability of munitions and weapon systems. The goal is to develop and demonstrate joint enabling technologies that can be used by program managers as they develop their specific weapon programs. The program invests in and demonstrates technologies from a Joint Service perspective, thus ensuring the development of technology with the broadest applicability while avoiding duplication of efforts – providing efficiencies and cost savings for the Department.

This effort will demonstrate enabling technologies needed to develop weapons in compliance with IM requirements established in United States Code, Title 10, Chapter 141, Section 2389 and DoD Instruction 5000.1 and 5000.02. This effort will take promising technologies demonstrated at the laboratory scale and transition them into demonstration programs utilizing generic hardware based on priority munitions identified in the Program Executive Office (PEO) IM Strategic Plans. Mature demonstrated IM technology can be transitioned, thereby decreasing their program costs and schedule risk and facilitating spin-offs to other non-compliant munitions within their portfolios.

The Joint Insensitive Munitions Technology Program (JIMTP) investments focus on five Munition Areas: 1) High Performance Rocket Propulsion, 2) Minimum Signature Rocket Propulsion, 3) Blast and Fragmentation Warheads, 4) Anti-Armor Warheads, and 5) Gun Propulsion. Munition Area Technology Groups (MATG), under tri-service leadership, have developed technology roadmaps for each Munition Area which is used to guide investments based on goals consistent with the DoD IM Strategic Plan. These IM technologies, alone or in combination, will be incorporated in hardware, simulating real-world munitions, to demonstrate their utility and feasibility as part of Technology Transition Agreements with PEOs.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: High Performance Rocket Propulsion (HPP)	3.896	3.684	3.761
Description: HPP focus on the development and demonstration of technologies to improve the IM response of HPP systems, rocket motors with Ammonium Perchlorate and with or without a metal fuel, for rockets and missiles launched from air, ground, and sea platforms. These technologies, when applied to rocket motors, improve IM response to one or more threats, while not degrading the response to other IM threats and, at minimum, maintaining munition performance. Technologies include, but are not limited to, rocket propellant ingredients, including synthesis, characterization and scale-up; reduced smoke or smoky propellants, including formulation, characterization and scale-up; rocket motor case design; materials for active and passive thermal mitigation; shock mitigation materials and techniques; passive and active coatings; active and passive venting techniques for motor cases or containers; ignition systems; sensors; and thrust mitigation techniques. Operating conditions may be controlled or widely varying in both temperature and vibration. The 2018 and 2023 year goals of the HPP MATG are concentrated on			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603000D8Z / *Joint Munitions Advanced Technology*	**Project (Number/Name)** P002 / *Insensitive Munitions Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
solving the IM response of missile propulsions systems due to Fragment Impacts and Slow Cook Off for the majority of High Performance Propulsion rocket motors, and solving the Fast Cook Off response of very large High Performance Propulsion motors. ***FY 2016 Accomplishments:*** - Conducted slow and fast cook-off demonstration tests of 50 to 70 pound motors containing an extinguishable rocket propellant. - Demonstrated fast cook-off sensor mitigation performance and transition to programs of record. - Conducted tests of slow cook-off mitigation device components for HPP rocket motor. - Conducted full scale test of slow cook-off mitigation sensor and IM tests with integrated sensor in various motor configurations. - Produced prototype hardware and prepare to integrate several IM technologies into a rocket motor. - Conducted proof of concept testing on three IM mitigation techniques for HPP motors. Scaled up formulation to 5 gallon mixes for initial testing. ***FY 2017 Plans:*** - Conduct full scale testing to ensure that mitigation design and integration is technically sound. - Scale up HPP motor propellant to 50 gallon batches to conduct full scale motor IM testing. Verify the rocket motor meets the specified ballistic and IM performance requirements. - Demonstrate an integrated solution for a 7” rocket motor using plateau burning propellant as well as cased venting solutions for Slow Cook Off (SCO) mitigation. ***FY 2018 Plans:*** - Solving the IM response of missile propulsions systems due to Fragment Impacts and Slow Cook Off for the majority of High Performance Propulsion rocket motors. - Solving the Fast Cook Off response of very large High Performance Propulsion motors.			
Title: Minimum Signature Rocket Propulsion (MSP) ***Description:*** MSP focuses on the development and demonstration of technologies to improve the IM response of MSP systems. The development and demonstration of minimum signature (MS) rocket technologies, when applied to munition systems, will improve munition IM response to one or more threats, while not degrading the response to other IM threats and, at minimum, maintaining munition performance. Technologies include, but are not limited to, MS rocket propellant formulations; ingredients for MS propellant formulations, including synthesis, characterization and scale-up; case and packaging design; active and passive venting techniques; rocket motor case design; ignition systems; and thrust mitigation techniques. Of particular interest are technologies toward higher burning rate MS propellants with state-of-the-art energy and reduced shock sensitivity. The 2018 and 2023 year goals of the MSP MATG are concentrated on solving the IM response of missile propulsion systems due to Fragment Impact, Slow Cook Off, and Shaped Charge Jet (SCJ) threats.	2.271	2.055	2.431

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603000D8Z / *Joint Munitions Advanced Technology*	**Project (Number/Name)** P002 / *Insensitive Munitions Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
FY 2016 Accomplishments: - Manufactured motor cases and complete propellant formulation down-select. Conducted case characterization testing, load motors and conduct static firing of motors with mitigation devices. - Completed detailed motor design and manufacture motors. Conducted static motor tests, and fragment impact and slow cook-off tests on representative composite motor cases. - Defined shipping container requirements and designed, manufactured, and demonstrated ballistic protection panel in representative container for air launched rocket motor. Conducted characterization tests for new IM rocket motor propellant. - Designed rocket motor case for hand held rocket motor incorporating IM features. ***FY 2017 Plans:*** - Conduct IM tests on full scale rocket motors with down-selected propellant formulation and mitigation devices. - Conduct full scale fragment impact and slow cook-off tests on composite case motors for low-cost anti-artillery rounds. - Demonstrate a new, less sensitive rocket motor for the Shoulder-launched Multipurpose Assault Weapon (SMAW) system. - Use modeling to predict response of motor to IM threat, conduct preliminary testing with new container, and with baseline and new propellant. - Fabricate shoulder launched rocket motor cases from down selected designs, conduct safety testing, and assemble motors for testing. ***FY 2018 Plans:*** - Solving the IM response of missile propulsion systems due to Fragment Impact, Slow Cook Off, and Shaped Charge Jet (SCJ) threats.			
Title: Blast and Fragmentation Warheads (BFW)	7.325	7.063	7.558
Description: BFW focus on the development and demonstration of technologies to improve the IM response of BFW munitions. The development and demonstration of explosive ingredients, explosives, and warhead and fuze technologies, when applied to munitions, improve IM response to one or more threats, while not degrading the response to other IM threats and, at minimum, maintaining munition performance. Technologies include, but are not limited to, new ingredient synthesis and characterization, initial formulation development, scale-up, warhead/charge configuration, venting techniques for both munitions and their containers, protection / packaging materials and systems, shock mitigation liners, initiation devices, techniques, and technologies. Applications vary but include high performance warhead fills, booster explosives, bulk demolition charges, and bulk fills for blast and/or fragmentation charges. Munition operating conditions may be controlled or have widely varying environmental conditions, such as temperature and vibration, and other factors such as cost, availability, and reliability may be critically important depending on the intended munition application. The 2018 and 2023 year goals of the BFW MATG are concentrated on solving the IM response of blast fragment warheads to the Sympathetic Detonation, Fast Cook Off, and Shaped Charge Jet (SCJ) threats.			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603000D8Z / *Joint Munitions Advanced Technology*	**Project (Number/Name)** P002 / *Insensitive Munitions Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
FY 2016 Accomplishments: - Scaled up novel bomb formulation to 150 gallon mix quantity, and filled full-scale assets for sympathetic reaction testing to validate performance. - Conducted SCJ and fragment impact testing on unique munition fill material in representative hardware. - Validated cook-off mitigation technologies in components, manufactured proven components, integrated components in final warhead for environmental and performance testing. - Conducted studies on vent areas, designed and fabricated hardware, and conducted component testing on warhead. - Conducted evaluation study and began IM testing of main fill replacement explosive formulation. - Designed and conducted small scale tests to support modeling of unique venting mechanism for large scale warheads. ***FY 2017 Plans:*** - Produce engineering drawings for final component designs that have been evaluated and optimized for the warhead for full scale slow cook-off testing. - Conduct lethality and effectiveness testing on main fill replacement explosive in preparation for IM tests in the pre formed fragment Artillery round. - Integrate and conduct cook off testing on the CAT torpedo that could improve the slow cook off response of the MK54 as well. ***FY 2018 Plans:*** - Solving the IM response of blast fragment warheads to the Sympathetic Detonation, Fast Cook Off, and Shaped Charge Jet (SCJ) threats.			
Title: Anti-Armor Warheads (AAW)	3.518	3.301	3.515
Description: AAW focuses on the development and demonstration of explosive ingredients, explosives, and warhead and fuze technologies for improving Insensitive Munitions (IM) of AAW munitions. The development of explosive ingredients, explosives, and warhead and fuze technologies, when applied to munitions, improve IM response to one or more threats, while not degrading the response to other IM threats and, at minimum, maintaining munition performance. Technologies include, but are not limited to, new ingredient synthesis and characterization, initial formulation development, scale-up, warhead/charge configuration, venting techniques for both munitions and their containers, protection/packaging materials and systems, shock mitigation liners, and initiation devices, techniques, and technologies. Applications vary, but include high performance warhead fills, booster explosives, and all other technology to mitigate the violent response of AAW munitions to IM threats. Munition operating conditions may be controlled or have widely varying environmental conditions, such as temperature and vibration, and other factors such as cost, availability, and reliability may be critically important depending on the intended munition application. The 2018 and 2023 year goals of the AAW MATG are concentrated on solving the IM response of anti-armor warheads to the			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603000D8Z / *Joint Munitions Advanced Technology*	**Project (Number/Name)** P002 / *Insensitive Munitions Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Fragment Impact, Sympathetic Reaction, and Shaped Charge Jet threats for larger munitions and the Fragment Impact, Slow Cook-off, and Sympathetic Reaction / Shaped Charge Jet threats for Medium Caliber Munitions. ***FY 2016 Accomplishments:*** - Performed modeling and simulation of venting and other mitigation technologies for unique munition system. Conducted propellant formulation, development, and down-select, and begin IM testing. - Used live fire testing and modeling to establish baseline performance data for a multi-munition warhead. Use modeling and simulation to predict the likelihood of sympathetic detonation beginning with individual warheads, then combining them in representative configurations. - Conducted baseline warhead fast and slow cook-off testing and venting characterization studies on small warhead. ***FY 2017 Plans:*** - Improve the sensitivity of the XM-25 medium caliber warhead that can transition to other 30mm and 40mm rounds. - Optimize unique shield design and conduct validation testing; optimize venting feature designs and test; and conduct cook-off testing which validates component level SCO mitigation technologies. - Improve the shock response of the 120mm direct fire tank round with the integration of PIMS liners, melt out fuzes and novel explosives materials. ***FY 2018 Plans:*** - Solving the IM response of anti-armor warheads to the Fragment Impact, Sympathetic Reaction, and Shaped Charge Jet threats for larger munitions and the Fragment Impact, Slow Cook-off, and Sympathetic Reaction / Shaped Charge Jet threats for Medium Caliber Munitions.			
Title: Gun Propulsion (GP) ***Description:*** GP focuses on the development and demonstration of technologies in the area of GP systems. The development and demonstration of gun propulsion technologies, when applied to munition systems, will improve munition Insensitive Munitions (IM) response to one or more threats, while not degrading the response to other IM threats and, at minimum, maintaining munition performance. Technologies include, but are not limited to, gun propellant formulations, ingredients for gun propellant formulations (including synthesis, characterization and scale-up), cartridge case and packaging design, active and passive venting techniques, reduced sensitivity primer propellant and primer systems, and robust primers for insensitive propellants. Applications vary, but include both large and medium caliber munitions, as well as propelling charges for mortars and shoulder launched munitions. Operating requirements vary, and other factors such as barrel life and operation over varying environmental conditions may be critically important depending on the intended munition application. The 2018 and 2023 year goals of the GP MATG are concentrated on solving the IM response of gun propulsion munitions to Fragment Impact and Slow Cook Off threats.	1.857	1.653	1.774

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603000D8Z / *Joint Munitions Advanced Technology*	**Project (Number/Name)** P002 / *Insensitive Munitions Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
FY 2016 Accomplishments: - Conducted performance, environmental, and IM testing on propulsion system for use in shoulder fired weapon systems. - Conducted static pressure, environmental, and small scale fragment impact testing of new large caliber munition item. ***FY 2017 Plans:*** - Integrate propulsion and warhead IM solutions into single system for IM testing for use in shoulder fired weapon systems for new enclosure fire capability. - Conduct full scale IM testing on the 120mm rifled mortar cartridge to improve the cook off response and impact threats into the propelling charge. ***FY 2018 Plans:*** - Solving the IM response of gun propulsion munitions to Fragment Impact and Slow Cook Off threats.			
Accomplishments/Planned Programs Subtotals	18.867	17.756	19.039

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0602000D8Z P000: *BA2 Insensitive Munitions*	12.828	11.993	12.910	-	12.910	13.048	13.156	13.367	13.658	Continuing	Continuing

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

1) Transition of technologies developed by the program are tracked and documented by technology maturity.
2) MATG Technology Roadmaps are prepared, evaluated, and analyzed by JIMTP management and technical staff.
3) Chairman's Annual Assessments for each MATG are critically reviewed by the Technical Advisory Committee (TAC) to determine progress, transition plans, and relevance of each project.
4) Project progress toward goals and milestones is assessed at each MATG meeting.
5) Annual technical reports and papers are tracked and documented for the Program.
6) External Peer Reviews of Projects are conducted as part of Joint Army/Navy/NASA/Air Force meetings.
7) Technology Transition Agreements are in place with Munition programs.

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense			Date: May 2017
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603000D8Z / *Joint Munitions Advanced Technology*	Project (Number/Name) P301 / *Enabling Fuze Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
P301: *Enabling Fuze Advanced Technology*	13.417	6.585	6.146	6.588	-	6.588	6.627	6.678	6.781	6.949	Continuing	Continuing

A. Mission Description and Budget Item Justification

This effort will demonstrate fuze enabling technologies needed to develop weapons that address priority capability areas identified in the Guidance for Development of the Force, the Secretary of Defense Memorandum, DoD Policy on Cluster Munitions and Unintended Harm to Civilians, and shortfalls in current weapon systems. This effort will take promising technologies integrated and tested to technology maturity and demonstrate the technologies to technological maturity utilizing weapon hardware based on priority capabilities and technology needs identified and validated by the Program Executive Officers (PEOs) and the Heads of the Service Science and Technology (S&T) communities. Mature demonstrated fuze technology will be transitioned, thereby decreasing their program costs and schedule risk and facilitating spin-offs to other munitions within their portfolios. Under the Joint Fuze Technology Program (JFTP), investments are focused on specific capability areas that have been identified by Department strategic guidance and current shortfalls in weapon systems and validated by the PEOs and Heads of the Service S&T communities. These four capability areas are: 1) Hard Target Survivable Fuzing, 2) Tailorable Effects (TE) Weapon Fuzing, 3) High Reliability Fuzing, and 4) Enabling Fuze Technologies and Common Architecture.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
Title: Hard Target Fuzing	1.535	1.311	1.417
Description: The Hard Target Fuzing challenges are grouped into three Technology Areas. First, improved modeling and simulation capabilities provide the validated computational tools necessary for hard target applications. Second, basic phenomenology and understanding of the Fuze Environment is the science-based endeavor of providing the test equipment, instrumentation, and analysis techniques for experimentation and data gathering necessary for next generation fuzing. Third, hard target survivable fuze components are developed to increase the effectiveness of facility denial munitions by improving the prediction tools and testing methodologies to evaluate the survivability and functionality of legacy and future fuzes. Development of these technologies will enable next generation boosted and hypersonic penetrators to execute missions against hardened and deeply buried targets.			
FY 2016 Accomplishments: - Developed modeling & simulation tools to enable prediction within 10 percent of experimental results for peak acceleration and duration at the fuze level in free fall penetrating weapons.			
FY 2017 Plans:			

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603000D8Z / *Joint Munitions Advanced Technology*	**Project (Number/Name)** P301 / *Enabling Fuze Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Complete assessment of advanced DoD and DOE computational codes to accurately predict the response of the fuze that will increase the fidelity of modeling and simulating fuze survivability and function in extreme high G weapon penetrating environments. ***FY 2018 Plans:*** - Develop fully programmable miniature data recorders that can survive extreme hard target fuzing environments. - Develop improve layer discrimination and void detection hardware and algorithms to more accurately and reliably detect and classify complex hardened targets.			
Title: Tailorable Effects Fuzing ***Description:*** Develop fuzing for tailorable effects weapons that encompasses the ability to selectively vary the output of the weapon (Dial-a-Yield) and/or the ability to generate selectable effects (directed blast, fragmentation). Develop initiation and multi-point technologies; electronic safe and arm based multi-point initiators for tunable output – scalable yield warheads; MicroElectro-Mechanical Systems (MEMS) based multi-point initiators for tunable output/scalable yield warheads; and smart fuzing for tailorable effects weapons. These technologies will enable weapons that can effectively defeat a variety of targets while minimizing unintentional collateral effects. ***FY 2016 Accomplishments:*** - Conducted weapon demonstration testing of multi-mode, multipoint sequential timing fuze designs against representative target sets. ***FY 2017 Plans:*** - Complete industry collaborative development of integrated switch and trigger technologies into commercial available Exploding Foil Initiators (EFI), in a variety of package sizes for use in DoD Electronic Safe Arm Devices (ESAD). - Tailorable Command/ Arm System for Distributed Fuzing Systems technology targeted for application in Non-Disruptive Umbilical Solutions for Dual-Purpose Improved Conventional Munitions (DPICM) Replacement (USMC); Joint Multi-Effects Warhead System (Navy); Long-Range Precision Fires Program (Army). ***FY 2018 Plans:*** - Develop technologies for efficient/novel generation of firing energy for multi-point fuze systems. - Develop fuzing components precision timing between initiation of multi-points and of energetic reactions.	1.618	1.572	1.684
Title: High Reliability Fuzing ***Description:*** Develop high reliability fuzing architectures, fuzing components, and unexploded ordnance (UXO) reduction features. This program's fuzing technologies are critical to enable the next generation of cluster munitions to achieve the required greater than 99 percent reliability. Evolving DoD emphasis on increased weapon system reliability is driving the need to consider	1.794	1.702	1.814

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603000D8Z / *Joint Munitions Advanced Technology*	**Project (Number/Name)** P301 / *Enabling Fuze Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
new and novel approaches for achieving increased fuze reliability while maintaining or enhancing fuze design safety. DoD policy, higher weapon reliability expectations and harsher weapon system operational requirements are dictating the need for higher fuze reliability than available using current technologies. ***FY 2016 Accomplishments:*** - Applied physics based Hugh James Initiation Criteria reliability map to evaluate the performance of Navy and Army MEMS detonators though characterizing shock initiation and material properties of booster material. - Developed MEMS sure-latching micro-connectors and actuators that function reliably in 100,000-G adverse environments Increase Range Anti-Personnel (IRAP) 40mm grenade and Cluster Munition Replacement (CMR) sub-munition fuzes. ***FY 2017 Plans:*** - Conduct laboratory and projectile dispense testing of fuze communication and interface technologies High Reliability DPICM to increase reliability with minimal disruption to the dispense event. - Develop high reliability fuzing architecture and enabling component technologies for DPICM replacement cluster weapons. ***FY 2018 Plans:*** - Develop quantification margin and performance methodologies to enable accurate reliability assessment of fuzing explosive trains. - Demonstrate area-effects weapon fuzing subsystem and system-level prototypes and systems in both laboratory and field environments.			
Title: Enabling Fuze Technologies ***Description:*** Develop common/modular fuze architectures; innovative fuze component technologies; sensors; next generation fuze setting capability, tools, and modeling; and fuzing power sources. These fuzing technologies will provide smaller, more cost effective solutions while meeting or exceeding the performance of existing technologies. Development of these technologies will enable future weapon applications to be more mission adaptive and smaller along with improve target detection capabilities. ***FY 2016 Accomplishments:*** - Completed projectile testing of advanced, exploitation resistant proximity sensors against representative target sets. - Began development of free-fall bomb retard and impact sensors with decreased sensor failure/rejection rate from 30 percent for legacy g-sensors to less than five percent for MEMS sensors. ***FY 2017 Plans:*** - Develop miniaturized, low power, target detection devices to support increased precision and burst-point accuracy in Area Attack Weapons including future submunitions and enhanced unitary warhead weapons.	1.638	1.561	1.673

Exhibit R-2A, RDT&E Project Justification: FY 2018 Office of the Secretary Of Defense		Date: May 2017
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603000D8Z / *Joint Munitions Advanced Technology*	**Project (Number/Name)** P301 / *Enabling Fuze Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2016	FY 2017	FY 2018
- Develop miniaturized, low power, target detection devices for increased target discrimination and precision, target clutter rejection capability and selectable height-of-burst. Application is for area-effect and cluster weapons. ***FY 2018 Plans:*** - Demonstrate miniaturized, low power, target detection device technologies in area-effect weapon simulated target environment testing. - Develop miniature thermal battery technology to yield fast rise time and high power density required for small munitions.			
Accomplishments/Planned Programs Subtotals	6.585	6.146	6.588

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2016	FY 2017	FY 2018 Base	FY 2018 OCO	FY 2018 Total	FY 2019	FY 2020	FY 2021	FY 2022	Cost To Complete	Total Cost
• 0602000D8Z P204: *BA2 Enabling Fuze Technology*	6.270	5.752	6.248	-	6.248	6.319	6.405	6.531	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

1) Transition of technologies developed by the Program are tracked and documented by technology maturity.
2) Fuze Area Technology Groups (FATG) Technology Roadmaps are prepared, evaluated, and analyzed by Joint Fuze Technology Program (JFTP) management and technical staff.
3) Chairman's Annual Assessments for each FATG are critically reviewed by the Technical Advisory Committee (TAC) to determine progress, transition plans, and relevance of each project.
4) Project progress toward goals and milestones is assessed at each FATG meeting.
5) Annual technical reports and papers are tracked and documented for the Program.
6) Technology Transition Agreements are in place with Munition programs.