Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Office of the Secretary Of Defense	Date: February 2016
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 1: *Basic Research*	**R-1 Program Element (Number/Name)** PE 0601110D8Z / *Basic Research Initiatives*

COST ($ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
Total Program Element	-	41.054	71.940	36.654	-	36.654	40.649	42.988	45.607	46.500	Continuing	Continuing
P010: *Basic Research Initiatives*	-	12.180	33.446	13.548	-	13.548	12.455	12.552	12.804	13.061	Continuing	Continuing
P060: *National Security Science and Engineering Faculty Fellowship (NSSEFF)*	-	28.874	38.494	23.106	-	23.106	28.194	30.436	32.803	33.439	Continuing	Continuing

A. Mission Description and Budget Item Justification

Supporting basic research provides the Department of Defense (DoD) with a deep and broad awareness of current directions in areas of research important to U.S. military capabilities – including physics and the physical sciences, materials science, chemistry and chemical engineering, electrical engineering, mathematics, computer science, mechanical and aerodynamic engineering, ocean sciences, biological sciences, and the social sciences, among others. Basic research sustains scientific and engineering communities as it generates the critical technical underpinnings of DoD capabilities. Basic research allows exploration and discovery, yielding disruptive non-incremental advances that can improve or radically change military capabilities, strategy, and operations.

The Basic Research Initiatives program element (PE) supports the defense basic research enterprise in three critical areas: Strategic Support for Basic Research (SSBR), the Minerva Research Initiative, and the National Security Science and Engineering Faculty Fellowship (NSSEFF) program.

SSBR supports initiatives to implement the Assistant Secretary of Defense for Research and Engineering's (ASD(R&E)) strategic plan for defense basic research. This plan defines specific and quantifiable actions to help create conditions for defense basic research investments capable of producing high-payoff, transformative scientific breakthroughs for DoD. SSBR initiatives support the five aims of: (1) providing scientific leadership; (2) attracting the Nation's best Scientists and Engineers (S&Es); (3) ensuring the coherence and balance of the Basic Research portfolio; (4) fostering connections between DoD performers and DoD; and (5) improving the efficiency of the defense research business environment.

The Minerva Research Initiative, a department-wide basic research program in the social sciences directed by the Office of the Secretary of Defense (OSD) and executed by the Services, seeks to build fundamental understanding of the sources of present and future conflict. It is one of the Nation's only social science basic research programs in support of national security (especially funding field research). Deeper understanding of the social and cultural environments, where threats such as radicalization and regional instabilities develop, supports more effective strategic and operational policy decisions. Minerva program priorities are consistent with the goals set forth in the 2014 Quadrennial Defense Review (QDR), informing DoD efforts to effectively build security globally, and are updated annually according to inputs from across the defense enterprise.

The NSSEFF program supports world-class researchers in scientific areas of critical importance to DoD and ensures the cultivation of exceptional talent. Fellows' work spans a broad set of emerging scientific areas with transformative potential. The NSSEFF program is a key resource to the entire department that fosters close

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connections between academia and the entire DoD science and engineering enterprise, a primary goal of SSBR efforts. Fellows provide DoD the deep scientific expertise from today's leading research universities and collaborate with DoD scientists and engineers.

B. Program Change Summary ($ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Previous President's Budget	44.500	42.022	39.011	-	39.011
Current President's Budget	41.054	71.940	36.654	-	36.654
Total Adjustments	-3.446	29.918	-2.357	-	-2.357
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	30.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.429	-			
• Realignment for Higher Priority Programs	-	-	-2.073	-	-2.073
• FY15 Reprog. for Cancelled Account	-0.017	-	-	-	-
• Other Reprogrammings	-2.000	-	-	-	-
• FFRDC Reduction	-	-0.082	-	-	-
• Economic Assumptions	-	-	-0.284	-	-0.284

Change Summary Explanation

FY 2017 internal realignment reflects funding for higher Departmental priorities and requirements.

Exhibit R-2A, RDT&E Project Justification: PB 2017 Office of the Secretary Of Defense			Date: February 2016
Appropriation/Budget Activity 0400 / 1	R-1 Program Element (Number/Name) PE 0601110D8Z / *Basic Research Initiatives*	Project (Number/Name) P010 / *Basic Research Initiatives*	

COST ($ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
P010: *Basic Research Initiatives*	-	12.180	33.446	13.548	-	13.548	12.455	12.552	12.804	13.061	Continuing	Continuing

A. Mission Description and Budget Item Justification

Supporting basic research provides the Department of Defense (DoD) with a deep and broad awareness of current directions in areas of research important to U.S. military capabilities – including physics and the physical sciences, materials science, chemistry and chemical engineering, electrical engineering, mathematics, computer science, mechanical and aerodynamic engineering, ocean sciences, biological sciences, and the social sciences, among others. Basic research sustains scientific and engineering communities as it generates the critical technical underpinnings of DoD capabilities. Basic research allows exploration and discovery, yielding disruptive non-incremental advances that can improve or radically change military capabilities, strategies, and operations.

Strategic Support for Basic Research (SSBR) supports initiatives to implement the Assistant Secretary of Defense for Research and Engineering's (ASD(R&E)) strategic plan for defense basic research. This plan defines specific and quantifiable actions to help create conditions for defense basic research investments capable of producing high-payoff, transformative scientific breakthroughs for DoD. SSBR initiatives support the five aims of: (1) providing scientific leadership; (2) attracting the Nation's best Scientists and Engineers (S&Es); (3) ensuring the coherence and balance of the Basic Research portfolio; (4) fostering connections between DoD performers and DoD; and (5) improving the efficiency of the defense research business environment.

The Minerva Research Initiative, a department-wide basic research program in the social sciences directed by the Office of the Secretary of Defense (OSD) and executed by the Services, seeks to build fundamental understanding of the sources of present and future conflict. It is one of the Nation's only social science basic research programs in support of national security (especially funding field research). Deeper understanding of the social and cultural environments, where threats such as radicalization and regional instabilities develop, supports more effective strategic and operational policy decisions. Minerva program priorities are consistent with the goals set forth in the 2014 Quadrennial Defense Review (QDR), informing DoD efforts to effectively build security globally, and are updated annually according to inputs from across the defense enterprise.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Title: Strategic Support for Basic Research (SSBR)	2.000	11.918	2.000
Description: The SSBR program funds actively creates conditions for defense basic research investments capable of producing high-payoff, transformative scientific breakthroughs for DoD. The SSBR initiatives support the five aims of: (1) providing scientific leadership; (2) attracting the Nation's best scientists and engineers; (3) ensuring the coherence and balance of the Basic Research portfolio; (4) fostering connections between DoD performers and DoD; and (5) improving the efficiency of the defense research business environment. ***FY 2015 Accomplishments:*** Used the input developed from the FY 2014 Request for Information (RFI) to inform topic selection. Selected topics for four workshops to provide the status of rapid research progress and evolving world leadership in these fields. The four topics selected were Machine Intelligence, Visual Common Sense, Compressive Sensing, and Power and Energy. Two of the four workshops			

Exhibit R-2A, RDT&E Project Justification: PB 2017 Office of the Secretary Of Defense		Date: February 2016
Appropriation/Budget Activity 0400 / 1	**R-1 Program Element (Number/Name)** PE 0601110D8Z / *Basic Research Initiatives*	**Project (Number/Name)** P010 / *Basic Research Initiatives*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
were conducted in early FY 2016. Initiated studies of how past DoD investments and high priority basic research have led to advances in new technologies and new capabilities for the Nation. Continued to analyze university-related business practices for improvement and efficiency. Continued support for scientific expertise to oversee science and engineering initiatives. ***FY 2016 Plans:*** Continue the series of workshops for scientific situational awareness that were planned in FY 2014 and FY 2015. Convene National research leaders to provide expert perspectives on potential breakthroughs and barriers of advancement in rapidly evolving fields of basic research. Initiate another series of workshops by sponsoring a Request for Information (RFI) to inform topic selection for the next set of workshops. Continue external portfolio review and studies of how past DoD investments and high priority basic research has led to advances in new technologies and new capabilities for the Nation. Analyze basic research portfolio investment. Continue to analyze university-related business practices for improvement and efficiency. Continue support for scientific expertise to oversee science and engineering initiatives. New in FY 2016 are two SSBR pilot programs to strengthen defense basic research both institutionally and internationally. The first pilot will enhance collaboration with the international scientific community –- as recommended by the Defense Science Board in its 2011 study –- by supporting international exchanges for laboratory-based scientists and their allied nation counterparts. With the goals of reinvigorating DoD laboratories as facilities of basic research and enhancing connectivity between the academic and defense laboratory communities, DoD will launch a second “Laboratory University Collaboration Initiative” (LUCI) pilot augmenting the flagship Multidisciplinary University Research Initiative (MURI) program (already overseen by ASD(R&E)). Much like the LUCI pilot planned for the NSSEFF program, the MURI LUCI pilot will support collaborative MURI projects between DoD and university researchers in areas of scientific or technological importance to DoD, while also expanding the research capabilities of DoD laboratories. ***FY 2017 Plans:*** Continue the series of workshops for scientific situational awareness that were planned in previous Fiscal Years. Convene National research leaders to provide expert perspectives on potential breakthroughs and barriers of advancement in rapidly evolving fields of basic research. Continue studies of how past DoD investments and high priority basic research has led to advances in new technologies and new capabilities for the Nation. Continue to analyze university-related business practices for improvement and efficiency. Continue support for scientific expertise to oversee science and engineering initiatives.			
Title: Minerva Research Initiative ***Description:*** The Minerva Research Initiative includes two primary components: (1) a university-based social science basic research grant program; and (2) Research for Defense Education Faculty (R-DEF) at the professional military education (PME) institutions. Both components contribute to Minerva goals of revitalizing connections between DoD and academic social science communities, and building critical cultural and foreign area knowledge and insights in topics ranging from the mechanisms of	10.180	21.528	11.548

Exhibit R-2A, RDT&E Project Justification: PB 2017 Office of the Secretary Of Defense		Date: February 2016
Appropriation/Budget Activity 0400 / 1	**R-1 Program Element (Number/Name)** PE 0601110D8Z / *Basic Research Initiatives*	**Project (Number/Name)** P010 / *Basic Research Initiatives*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017

radicalization to geopolitical power projection strategies in a multipolar world. This deeper understanding will provide a more informed basis to shape doctrine, analysis, and other strategic and operational decisions made by war planners and warfighters.

FY 2015 Accomplishments:

Inputs from the Service leadership, Defense Advanced Research Project Agency (DARPA), Joint Staff, Intelligence Community, and others in the defense community informed updated topics in the FY 2015 Broad Agency Announcement (BAA). A total of 297 initial submissions were received, and 11 new multi-year university-led research grants were awarded in Fall 2015.

Researchers briefed the United Nations Security Council (UNSC), Combatant Commanders, and the Vice Chairman of Joint Chiefs of Staff (VCJCS). The Minerva program supported an analysis requested by the commander of Special Operations Central Command (SOCCENT) on (1) understanding the appeal of Islamic State of Iraq and the Levant (ISIL), and (2) anticipating regional dynamics three to five years out, especially in terms of pathways toward (and key indicators of) regional fragmentation. Program staff and funded scholars have supported these and other assessments through core research activities in critical areas, contributing subject matter expertise in “Virtual Think Tanks” meant to generate rich understanding of potential futures in the Middle East; and by direct participation in unclassified simulation exercises based on scenarios developed by the Intelligence Community.

The R-DEF program expanded at participating PMEs and military service academies, further strengthening DoD-internal social science capabilities by offering new research opportunities for teaching faculty through research support, research travel funding, and course buyouts. Furthermore, RDEF support enabled academic-government exchange opportunities, new curriculum development, and research-informed tabletop exercises.

FY 2016 Plans:

Heightened challenges related to global terrorism and the Islamic State of Iraq and Syria (ISIL) indicate the need for serious intellectual investment of the sources of conflict and cooperation from the ground up. Minerva is one of the only funders of fieldwork-based security research, and plans a one-time ramp up of these investments in response to emerging national needs and in collaboration with global allies. The FY 2016 call for proposals will emphasize field-based scientific research conducted in conflict areas and other locales pertinent to national security. Technical and logistical program support will enable safe and ethical research in regions involving complex security challenges.

In addition to new investments, the Minerva program will: Continue its support of ongoing university-led research initiatives; Maintain support of R-DEF program at defense education institutions; Continue active engagement providing subject matter expertise to quick-turn studies requested by the operational community; and continue building policy and operational community

Exhibit R-2A, RDT&E Project Justification: PB 2017 Office of the Secretary Of Defense		Date: February 2016
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
connections to ongoing Minerva efforts, in order to effectively connect new social science insights and methods to current and future defense leadership, to inform tomorrow's key security decisions. ***FY 2017 Plans:*** Continue ongoing, and start new, university-led research initiatives, with priorities shaped by defense needs. Maintain support of R-DEF program at defense education institutions. Continue active engagement providing subject matter expertise to quick-turn studies requested by the operational community. Continue building policy and operational community connections to ongoing Minerva efforts, in order to effectively connect new social science insights and methods to current and future defense leadership, to inform tomorrow's key security decisions.			
Accomplishments/Planned Programs Subtotals	12.180	33.446	13.548

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2017 Office of the Secretary Of Defense			Date: February 2016
Appropriation/Budget Activity 0400 / 1	R-1 Program Element (Number/Name) PE 0601110D8Z / *Basic Research Initiatives*	Project (Number/Name) P060 / *National Security Science and Engineering Faculty Fellowship (NSSEFF)*	

COST ($ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
P060: *National Security Science and Engineering Faculty Fellowship (NSSEFF)*	-	28.874	38.494	23.106	-	23.106	28.194	30.436	32.803	33.439	Continuing	Continuing

A. Mission Description and Budget Item Justification

The NSSEFF program supports world-class researchers in scientific areas of critical importance to DoD and ensures the cultivation of exceptional talent. Fellows' work spans a broad set of emerging scientific areas with transformative potential. The NSSEFF program is a key resource to the entire department that fosters close connections between academia and the entire DoD science and engineering enterprise, a primary goal of SSBR efforts. Fellows provide DoD the deep scientific expertise from today's leading research universities and collaborate with DoD scientists and engineers. This program actively engages and coordinates basic research across the department.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Title: National Security Science and Engineering Faculty Fellowship (NSSEFF)	28.874	38.494	23.106

Description: NSSEFF ensures that DoD has a research portfolio that supports the foremost creative, innovative, and productive university researchers. The objectives of the program are to: (1) support scientific research that may lead to extraordinary outcomes; (2) educate and train outstanding student and post-doctoral researchers for the defense and national security workforce; (3) foster long-term relationships between outstanding university researchers and the DoD; (4) familiarize select university researchers and their students with DoD's current and future challenges; and (5) increase the number of exceptionally talented technical experts that are contributing to DoD's mission.

FY 2015 Accomplishments:

Continued support for ten current NSSEFF Fellows. Reviewed and updated program topic areas (adding "Manufacturing Science"), eligibility, review process, and selection criteria based on the inputs from Service representatives on the steering committee. Solicited for two new classes of NSSEFF Fellows. Out of 165 initial responses for the 2015 Class, seven new fellows were selected in Summer 2015. For the second solicitation, 185 initial responses were received, and 30 full proposals were invited. The selection of 2016 Class (ten new fellows) will be completed in Spring 2016. Organized and conducted the first NSSEFF-DoD orientation event including DoD laboratory tours. Used this venue to identify and facilitate new connections between new Fellows and DoD scientists and engineers including the NSSEFF Steering Committee.

FY 2016 Plans:

Continue support for 27 current NSSEFF Fellows. Review and update program topic areas. Solicit for a new class of NSSEFF Fellows. Organize and conduct a NSSEFF-DoD Spring meeting at Army Research Laboratory at Adelphi including DoD laboratory tours. Use this venue to identify and facilitate new connections between new Fellows and DoD scientists and

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Appropriation/Budget Activity 0400 / 1	**R-1 Program Element (Number/Name)** PE 0601110D8Z / *Basic Research Initiatives*	**Project (Number/Name)** P060 / *National Security Science and Engineering Faculty Fellowship (NSSEFF)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
engineers, including the NSSEFF Steering Committee. Organize and conduct a program review and report on Fellows' progress. To enhance connectivity between the academic and defense laboratory communities, DoD will launch a laboratory-wide "Laboratory University Collaboration Initiative" (LUCI) pilot augmenting the NSSEFF program to, support collaborative research projects between DoD researchers and NSSEFF Fellows in areas of scientific or technological importance to DoD, and while also expanding the research capabilities of DoD Labs. Launch a pilot I-Corps competition that aims to accelerate commercialization of research insights, either into industry or into DoD programs of record, of basic research innovations of interest to DoD (Pub. L. 113–66, div. A, title XVI, §1603). ***FY 2017 Plans:*** Continue support for 40 current NSSEFF Fellows and DoD collaborative research partners. Review and update program topic areas. Solicit for a new class of NSSEFF Fellows. Organize and conduct NSSEFF-DoD Spring meeting including DoD laboratory tours. Use this venue to identify and facilitate new connections between new Fellows and DoD scientists and engineers, including the NSSEFF Steering Committee. Organize and conduct a program review and report on Fellows' progress. Organize and conduct LUCI competition and selection for collaborative research projects between DoD researchers and NSSEFF Fellows in areas of scientific or technological importance to DoD. Organize DoD I-Corps competition to select projects that will accelerate commercialization, either into industry or into DoD programs of record, of basic research innovations of interest to DoD.			
Accomplishments/Planned Programs Subtotals	28.874	38.494	23.106

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A