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Exhibit R-2, RDT&E Budget Item Justification: PB 2016 Air Force **Date:** February 2015

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 1: Basic Research</i>					R-1 Program Element (Number/Name) PE 0601102F / <i>Defense Research Sciences</i>							
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	-	364.195	389.979	329.721	-	329.721	337.648	341.342	346.931	355.983	Continuing	Continuing
613001: <i>Physics and Electronics</i>	-	104.602	115.599	95.932	-	95.932	96.765	98.242	99.871	102.440	Continuing	Continuing
613002: <i>Aerospace, Chemical and Material Sciences</i>	-	113.812	128.624	107.833	-	107.833	111.063	112.016	113.791	116.930	Continuing	Continuing
613003: <i>Mathematics, Information and Life Sciences</i>	-	116.996	122.915	101.914	-	101.914	104.477	105.533	107.293	110.046	Continuing	Continuing
613004: <i>Education and Outreach</i>	-	28.785	22.841	24.042	-	24.042	25.343	25.551	25.976	26.567	Continuing	Continuing

A. Mission Description and Budget Item Justification

Defense Research Sciences consists of extramural research activities in academia and industry along with in-house investigations performed in the Air Force Research Laboratory. This program funds fundamental broad-based scientific and engineering research in areas critical to Air Force weapon, sensor, and support systems. All research areas are subject to long-range planning and technical review by both Air Force and tri-Service scientific planning groups. Efforts in this program have been coordinated through the Department of Defense (DoD) Science and Technology (S&T) Executive Committee process to harmonize efforts and eliminate duplication.

This program is in Budget Activity 1, Basic Research, because this budget activity includes scientific study and experimentation directed toward increasing fundamental knowledge and understanding in those fields of the physical, engineering, environmental, and life sciences related to long-term national security needs.

B. Program Change Summary (\$ in Millions)	FY 2014	FY 2015	FY 2016 Base	FY 2016 OCO	FY 2016 Total
Previous President's Budget	373.151	314.482	341.535	-	341.535
Current President's Budget	364.195	389.979	329.721	-	329.721
Total Adjustments	-8.956	75.497	-11.814	-	-11.814
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	75.497			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-8.956	-			
• Other Adjustments	-	-	-11.814	-	-11.814

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 613001: *Physics and Electronics*

FY 2014	FY 2015

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<u>Congressional Add Details (\$ in Millions, and Includes General Reductions)</u>		FY 2014	FY 2015
Congressional Add: <i>Program Increase</i>		-	23.782
Congressional Add Subtotals for Project: 613001		-	23.782
Project: 613002: <i>Aerospace, Chemical and Material Sciences</i>			
Congressional Add: <i>Program Increase</i>		-	26.424
Congressional Add Subtotals for Project: 613002		-	26.424
Project: 613003: <i>Mathematics, Information and Life Sciences</i>			
Congressional Add: <i>Program Increase</i>		-	25.291
Congressional Add Subtotals for Project: 613003		-	25.291
Congressional Add Totals for all Projects		-	75.497
<u>Change Summary Explanation</u>			
In FY15 congressional add of \$75.497 was spread across three projects in this program.			
Decrease in FY16 is due to higher DoD priorities.			

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Exhibit R-2A, RDT&E Project Justification: PB 2016 Air Force									Date: February 2015			
Appropriation/Budget Activity 3600 / 1					R-1 Program Element (Number/Name) PE 0601102F / Defense Research Sciences				Project (Number/Name) 613001 / Physics and Electronics			
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
613001: Physics and Electronics	-	104.602	115.599	95.932	-	95.932	96.765	98.242	99.871	102.440	Continuing	Continuing
A. Mission Description and Budget Item Justification												
Basic research in the Physics and Electronics Project seeks to enable revolutionary advances and expand the fundamental knowledge supporting technologies critical to the future of the Air Force. Research stresses high-risk, far-term, game-changing capability breakthroughs essential for future leaps in warfighter system performance, functionality, reliability, and survivability while simultaneously reducing component and system power, size, mass, and life cycle costs. Major thrust areas being investigated in this project are complex electronics and fundamental quantum processes; plasma physics and high energy density non-equilibrium processes; and lasers and optics, electromagnetics, communication, and signal processing. Although the major thrust descriptions that follow are specific sub-areas of focus within this project, there is interest in exploring novel ideas that may bridge these major thrusts as well as those in the other projects within this program.												
B. Accomplishments/Planned Programs (\$ in Millions)									FY 2014	FY 2015	FY 2016	
Title: Complex Electronics and Fundamental Quantum Processes									48.028	42.154	44.043	
Description: Scientific focus areas are atomic and molecular physics, photonics, quantum electronic solids, adaptive multi-mode sensing and ultra-high speed electronics, semiconductor and electromagnetic materials, and optoelectronics.												
FY 2014 Accomplishments: Demonstrated 51 percent higher efficiency in a solar cell made of gallium arsenide using a unique anti-reflection coating scheme for space and terrestrial power. Explored a wide range of complex materials and devices, including non-linear optical materials, photonics, optoelectronics, meta-materials, cathodes, dielectric and magnetic materials, semiconductor lasers, memristive systems, new classes of high-temperature superconductors, quantum dots, quantum wells and graphene. Included generating and controlling quantum states, such as superposition and entanglement, in photons and ultracold atoms and molecules.												
FY 2015 Plans: Explore a wide range of complex materials and devices, including non-linear optical materials, photonics, optoelectronics, meta-materials, cathodes, dielectric and magnetic materials, semiconductor lasers, memristive systems, new classes of high-temperature superconductors, quantum dots, quantum wells and graphene. Includes generating and controlling quantum states, such as superposition and entanglement, in photons and ultracold atoms and molecules.												
FY 2016 Plans: Continue to explore a wide range of complex materials and devices, including non-linear optical materials, photonics, optoelectronics, meta-materials, cathodes, dielectric and magnetic materials, memristive systems, new classes of high-temperature superconductors, quantum dots, quantum wells and graphene. Includes generating and controlling quantum states, such as superposition and entanglement, in photons and ultracold atoms and molecules.												
Title: Plasma Physics and High Energy Density Non-Equilibrium Processes									21.060	18.492	19.321	

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Appropriation/Budget Activity 3600 / 1		R-1 Program Element (Number/Name) PE 0601102F / Defense Research Sciences	Project (Number/Name) 613001 / Physics and Electronics		
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2014	FY 2015	FY 2016
<p>Description: Scientific focus areas are plasma, electro-energetic physics and space sciences.</p> <p>FY 2014 Accomplishments: Created new research initiative to determine the internal magnetic topology of interplanetary coronal mass ejections, providing insight into impact to space weather around Air Force assets. Explored a wide range of activities characterized by processes sufficiently energetic to require the understanding and managing of plasma phenomenology and the non-linear response of materials to high electric and magnetic fields. Included space weather, plasma control of boundary layers in turbulent flow, plasma discharges, Radio Frequency (RF) propagation, RF-plasma interaction, and high-power, beam-driven microwave devices.</p> <p>FY 2015 Plans: Explore a wide range of activities characterized by processes sufficiently energetic to require understanding and managing plasma phenomenology and the non-linear response of materials to high electric and magnetic fields. Includes space weather, plasma control of boundary layers in turbulent flow, plasma discharges, RF propagation, RF-plasma interaction, and high-power, beam-driven microwave devices.</p> <p>FY 2016 Plans: Continue to explore a wide range of activities characterized by processes sufficiently energetic to require understanding and managing plasma phenomenology and the non-linear response of materials to high electric and magnetic fields. Includes space weather, plasma discharges, RF propagation, RF-plasma interaction, and high-power, beam-driven microwave devices.</p>					
<p>Title: Lasers and Optics, Electromagnetics, Communication and Signal Processing</p> <p>Description: Scientific focus areas are physical mathematics and applied analysis, novel computational methods, dynamics sensing capability, electromagnetics, remote sensing and imaging physics, and surveillance and navigation.</p> <p>FY 2014 Accomplishments: Developed a nonreciprocal acoustic circulator that can transmit acoustic waves in one direction and block them in the other via acoustic metamaterials, with application to advanced sensors and communication systems. Explored all aspects of producing and receiving electromagnetic and electro-optical signals, as well as their propagation through complex media, including adaptive optics and optical imaging. Investigated aspects of the phenomenology of lasers including high energy lasers, non-linear optics, and ultra-short pulse laser science. Included the development of sophisticated mathematics and algorithm development for extracting information from complex and/or sparse signals.</p> <p>FY 2015 Plans: Explore all aspects of producing and receiving electromagnetic and electro-optical signals, as well as their propagation through complex media, including adaptive optics and optical imaging. Investigate aspects of the phenomenology of lasers including high</p>			35.514	31.171	32.568

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Appropriation/Budget Activity 3600 / 1	R-1 Program Element (Number/Name) PE 0601102F / <i>Defense Research Sciences</i>	Project (Number/Name) 613001 / <i>Physics and Electronics</i>	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2014	FY 2015
energy lasers, non-linear optics, and ultra-short pulse laser science. Includes the development of sophisticated mathematics and algorithm development for extracting information from complex and/or sparse signals.			
FY 2016 Plans: Continue to explore all aspects of producing and receiving electromagnetic and electro-optical signals, as well as their propagation through complex media, including adaptive optics and optical imaging. Continue to investigate aspects of the phenomenology of lasers including high energy lasers, non-linear optics, and ultra-short pulse laser science. Includes the development of sophisticated mathematics and algorithm development for extracting information from complex and/or sparse signals.			
Accomplishments/Planned Programs Subtotals		104.602	91.817
	FY 2014	FY 2015	
Congressional Add: Program Increase	-	23.782	
FY 2014 Accomplishments: NA			
FY 2015 Plans: Conduct congressionally directed effort			
Congressional Adds Subtotals	-	23.782	
C. Other Program Funding Summary (\$ in Millions)			
N/A			
Remarks			
D. Acquisition Strategy			
N/A			
E. Performance Metrics			
Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.			

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Appropriation/Budget Activity 3600 / 1					R-1 Program Element (Number/Name) PE 0601102F / Defense Research Sciences				Project (Number/Name) 613002 / Aerospace, Chemical and Material Sciences			
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
613002: Aerospace, Chemical and Material Sciences	-	113.812	128.624	107.833	-	107.833	111.063	112.016	113.791	116.930	Continuing	Continuing

A. Mission Description and Budget Item Justification

Basic research in the Aerospace, Chemical, and Materials Sciences Project seeks to enable revolutionary advances and expand the fundamental knowledge supporting technologies critical to the future of the Air Force. Research stresses high-risk, far-term, game-changing capability breakthroughs essential for future leaps in warfighter system performance, functionality, reliability, and survivability while simultaneously reducing component and system power, size, mass, and life cycle costs. Major thrust areas being investigated in this project are aero-structure interactions and control; energy, power, and propulsion; and complex materials and structures. Although the major thrust descriptions that follow are specific sub-areas of focus within this project, there is interest in exploring novel ideas that may bridge these major thrusts as well as those in the other projects within this program.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2014	FY 2015	FY 2016
Title: Aero Structure Interactions and Control	32.761	29.419	31.041
Description: Scientific focus areas are high temperature aerospace materials, hypersonics, aerothermodynamics and turbulence, and flow interactions and control.			
FY 2014 Accomplishments: Developed new algorithm for building reliable molecular models for understanding turbulent flow that is critical to next generation airframes. Investigated the characterization, modeling, and exploitation of interactions between the unsteady aerodynamic flow field and the dynamic air vehicle structure to enable enhanced performance in next generation Air Force systems. Explored the synergy gained from an interdisciplinary look at multiple technologies and the integration of core disciplines of fluid mechanics, material properties, high-performance structures, and thermodynamics.			
FY 2015 Plans: Investigate the characterization, modeling, and exploitation of interactions between the unsteady aerodynamic flow field and the dynamic air vehicle structure to enable enhanced performance in next generation Air Force systems. Explore the synergy gained from an interdisciplinary look at multiple technologies and the integration of core disciplines of fluid mechanics, material properties, high-performance structures, and thermodynamics.			
FY 2016 Plans: Continue to investigate the characterization, modeling, and exploitation of interactions between the unsteady aerodynamic flow field and the dynamic air vehicle structure to enable enhanced performance in next generation Air Force systems. Explore the			

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2014	FY 2015	FY 2016
synergy gained from an interdisciplinary look at multiple technologies and the integration of core disciplines of fluid mechanics, high-performance structures, and thermodynamics.				
Title: Energy, Power, and Propulsion Description: Scientific focus areas are thermal control, theoretical chemistry, molecular dynamics, space power and propulsion, and combustion and diagnostics. FY 2014 Accomplishments: Collaborated with multiple government agencies in support of research to explore turbulent flame property, diagnostic, and modeling foundations. These turbulent flames are critical to next generation energy and combustion propulsion systems. Exploited technological innovations and developed potentially revolutionary technologies by integrating core disciplines of combustion, plasma dynamics, chemistry, hybrid simulation, structures, and materials. Investigated processes associated with the generation, storage, and utilization of energy, specifically for Air Force systems. Included developing novel energetic materials as well as understanding and optimizing combustion processes. FY 2015 Plans: Exploit technological innovations and develop potentially revolutionary technologies by integrating core disciplines of combustion, plasma dynamics, chemistry, hybrid simulation, structures, and materials. Investigate processes associated with the generation, storage, and utilization of energy, specifically for Air Force systems. This includes developing novel energetic materials as well as understanding and optimizing combustion processes. FY 2016 Plans: Continue to exploit technological innovations and develop potentially revolutionary technologies by integrating core disciplines of combustion, plasma dynamics, chemistry, hybrid simulation, and structures. Investigate processes associated with the generation, storage, and utilization of energy, specifically for Air Force systems. This includes developing novel energetic materials as well as understanding and optimizing combustion processes.		40.018	35.935	37.916
Title: Complex Materials and Structures Description: Scientific focus areas are mechanics of multifunctional materials and microsystems, multi-scale mechanics and prognosis, low density materials, and polymer chemistry. FY 2014 Accomplishments: Demonstrated that common materials, such as polymer fishing line and sewing thread, can be cheaply converted to artificial muscles for systems that enhance and augment human physical performance. Investigated multifunctional materials and structures composed of different classes of materials that may be able to change functionality or performance characteristics to enhance the mission versatility of future air and space systems, with a key goal of increasing functionality while decreasing weight		41.033	36.846	38.876

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2014	FY 2015
and volume. Explored complex materials, microsystems, and structures that incorporate hierarchical design and functionality from the nano-scale through the meso-scale, ultimately leading to controlled, well-understood material or structural behavior capable of dynamic functionality and/or performance characteristics to enhance mission versatility.			
FY 2015 Plans: Investigate multifunctional materials and structures composed of different classes of materials, both organic and inorganic, that may be able to change functionality or performance characteristics to enhance the mission versatility of future air and space systems, with a key goal of increasing functionality while decreasing weight and volume. Explore complex materials, microsystems, and structures that incorporate hierarchical design and functionality from the nano-scale through the meso-scale, ultimately leading to controlled, well-understood material or structural behavior capable of dynamic functionality and/or performance characteristics to enhance mission versatility.			
FY 2016 Plans: Continue to investigate multifunctional materials and structures composed of inorganic materials that may be able to change functionality or performance characteristics to enhance the mission versatility of future air and space systems, with a key goal of increasing functionality while decreasing weight and volume. Explore materials, microsystems, and structures that incorporate hierarchical design and functionality from the nano-scale through the meso-scale, ultimately leading to controlled, well-understood material or structural behavior capable of dynamic functionality and/or performance characteristics to enhance mission versatility.			
Accomplishments/Planned Programs Subtotals		113.812	102.200
		FY 2014	FY 2015
Congressional Add: Program Increase		-	26.424
FY 2014 Accomplishments: NA			
FY 2015 Plans: Conduct congressionally directed effort			
Congressional Adds Subtotals		-	26.424
C. Other Program Funding Summary (\$ in Millions)			
N/A			
Remarks			
D. Acquisition Strategy			
N/A			

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Exhibit R-2A, RDT&E Project Justification: PB 2016 Air Force		Date: February 2015
Appropriation/Budget Activity 3600 / 1	R-1 Program Element (Number/Name) PE 0601102F / <i>Defense Research Sciences</i>	Project (Number/Name) 613002 / <i>Aerospace, Chemical and Material Sciences</i>

E. Performance Metrics

Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.

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Exhibit R-2A, RDT&E Project Justification: PB 2016 Air Force										Date: February 2015		
Appropriation/Budget Activity 3600 / 1					R-1 Program Element (Number/Name) PE 0601102F / Defense Research Sciences				Project (Number/Name) 613003 / Mathematics, Information and Life Sciences			
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
613003: Mathematics, Information and Life Sciences	-	116.996	122.915	101.914	-	101.914	104.477	105.533	107.293	110.046	Continuing	Continuing

A. Mission Description and Budget Item Justification

Basic research in the Mathematics, Information, and Life Sciences Project seeks to enable revolutionary advances and expand the fundamental knowledge supporting technologies critical to the future of the Air Force. Research stresses high-risk, far-term, game-changing capability breakthroughs essential for future leaps in warfighter system performance, functionality, reliability, and survivability while simultaneously reducing component and system power, size, mass, and life cycle costs. Major thrust areas being investigated in this project are information and complex networks, decision making, dynamical systems, optimization and control, and natural materials and systems. Although the major thrust descriptions that follow are specific sub-areas of focus within this project, there is interest in exploring novel ideas that may bridge these major thrusts as well as those in the other projects within this program.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2014	FY 2015	FY 2016
<div><div>Title: Information and Complex Networks</div><div>Description: Scientific focus areas are systems and software, information operations and security, information fusion, and complex networks.</div><div>FY 2014 Accomplishments: Collaborated with multiple government agencies in support of research in spectrum analytics, software verification, and future internet architectures, critical for next-generation communications and computer networks. Designed and analyzed techniques to enable reliable and secure exchange of information and predictable operation of networks and systems. This included traditional aspects of information assurance, software engineering, and reliable systems, but the emphasis was on the underlying mathematics of secure-by-design architectures of networked communications and neural information processing. Sub-areas included system and network performance prediction, design and analysis, and modeling of human-machine systems.</div><div>FY 2015 Plans: Design and analyze techniques to enable reliable and secure exchange of information and predictable operation of networks and systems, including hardware and software interactions. This includes traditional aspects of information assurance, software engineering, and reliable systems, but the emphasis is on the underlying mathematics of secure-by-design architectures of networked communications and neural information processing. Sub-areas include system and network performance prediction, design and analysis, and modeling of human-machine systems.</div><div>FY 2016 Plans: Continue to design and analyze techniques to enable reliable and secure exchange of information and predictable operation of networks and systems. This includes traditional aspects of information assurance, software engineering, and reliable systems,</div></div>	31.816	26.548	27.715

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Appropriation/Budget Activity 3600 / 1	R-1 Program Element (Number/Name) PE 0601102F / Defense Research Sciences	Project (Number/Name) 613003 / Mathematics, Information and Life Sciences		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2014	FY 2015	FY 2016
but the emphasis is on the underlying mathematics of secure-by-design architectures of networked communications and neural information processing. Sub-areas include system and network performance prediction, design and analysis, and modeling of human-machine systems.				
<p>Title: Decision Making</p> <p>Description: Scientific focus areas are mathematical modeling of cognition and decision making, and collective behavior and socio-cultural modeling.</p> <p>FY 2014 Accomplishments: Started new research initiative to analyze and develop the perceptual and social cues that drive trust perceptions and performance within human-robot interactions, which is critical to enhancing the effectiveness of warfighter and drone operations. Investigated new mathematical laws, scientific principles, and robust algorithms that underlie intelligent, mixed human-machine decision making to achieve accurate real-time projection of expertise and knowledge into and out of the battlespace. This included efforts to advance the critical knowledge base in information sciences and information fusion, and to model individual and group cognitive processing and decision making.</p> <p>FY 2015 Plans: Investigate new mathematical laws, scientific principles, and robust algorithms that underlie intelligent, mixed human-machine decision making to achieve accurate real-time projection of expertise and knowledge into and out of the battlespace. This includes efforts to advance the critical knowledge base in information sciences and information fusion, and to model individual and group cognitive processing and decision making.</p> <p>FY 2016 Plans: Continue to investigate new mathematical laws, scientific principles, and robust algorithms that underlie intelligent, mixed human-machine decision making to achieve accurate real-time projection of expertise and knowledge into and out of the battlespace. This includes efforts to advance the critical knowledge base in information sciences, and to model individual and group cognitive processing and decision making.</p>		22.866	19.080	19.918
<p>Title: Dynamical Systems, Optimization, and Control</p> <p>Description: Scientific focus areas are computational mathematics, dynamics and control, and optimization and discrete mathematics.</p> <p>FY 2014 Accomplishments: Developed computer system that detects and corrects faulty airspeed readings using mathematical relationships among three data streams, there by enhancing the control and autonomy of advanced air platforms. Developed new scientific concepts supported by rigorous analysis for advancing the science of autonomy and promoting the understanding necessary to analyze and</p>		33.224	27.722	28.941

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2014	FY 2015	FY 2016
design complex multi-scale systems as well as provide guaranteed levels of performance. Included study of novel adaptive control strategies for coordinating heterogeneous, autonomous, or semi-autonomous aerospace vehicles in uncertain, information rich, dynamically changing, adversarial, and networked environments. FY 2015 Plans: Develop new scientific concepts supported by rigorous analysis for advancing the science of autonomy and promoting the understanding necessary to analyze and design complex multi-scale systems as well as provide guaranteed levels of performance. Develop novel adaptive control strategies for coordinating heterogeneous, autonomous, or semi-autonomous aerospace vehicles in uncertain, information rich, dynamically changing, adversarial, and networked environments. FY 2016 Plans: Continue to develop new scientific concepts supported by rigorous analysis for advancing the science of autonomy and promoting the understanding necessary to analyze and design complex multi-scale systems as well as provide guaranteed levels of performance. The includes developing novel adaptive control strategies for coordinating heterogeneous, autonomous, or semi-autonomous aerospace vehicles in uncertain, information rich, dynamically changing, adversarial, and networked environments.				
Title: Natural Materials and Systems Description: Scientific focus areas are renewable energy, natural materials and nature inspired systems. FY 2014 Accomplishments: Initiated new basic research portfolios in human performance and biophysics, linking physical principles to biological systems. For example, understanding the safety of ultra-short pulse lasers systems around the human eye. Investigated multi-disciplinary approaches for studying, using, mimicking, synthesizing and adapting to the ways natural systems accomplish their required tasks. Studied how to adapt and mimic existing natural sensory systems and add existing capabilities to these organisms with the intent to gain more precise control over their material production. FY 2015 Plans: Investigate multi-disciplinary approaches for studying, using, mimicking, synthesizing and adapting to the ways natural systems accomplish their required tasks. Study how to adapt and mimic existing natural sensory systems and add existing capabilities to these organisms with the intent to gain more precise control over their material production. FY 2016 Plans: Continue to investigate multi-disciplinary approaches for studying the ways natural systems accomplish their required tasks. Study how to adapt and mimic existing natural sensory systems and add existing capabilities to these organisms with the intent to gain more precise control over their material production.		29.090	24.274	25.340
Accomplishments/Planned Programs Subtotals		116.996	97.624	101.914

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		FY 2014	FY 2015
Congressional Add: Program Increase		-	25.291
FY 2014 Accomplishments: NA			
FY 2015 Plans: Conduct congressionally directed effort			
Congressional Adds Subtotals		-	25.291
C. Other Program Funding Summary (\$ in Millions)			
N/A			
Remarks			
D. Acquisition Strategy			
N/A			
E. Performance Metrics			
Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.			

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Appropriation/Budget Activity 3600 / 1					R-1 Program Element (Number/Name) PE 0601102F / Defense Research Sciences				Project (Number/Name) 613004 / Education and Outreach			
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
613004: Education and Outreach	-	28.785	22.841	24.042	-	24.042	25.343	25.551	25.976	26.567	Continuing	Continuing
A. Mission Description and Budget Item Justification												
The major thrust areas in the Science and Technology (S&T) Education and Outreach Project are to facilitate interactions between the international and domestic research communities and Air Force researchers, and to support and develop scientists and engineers with an awareness of Air Force basic research priorities. These professional interactions and collaborations benefit the Air Force by increasing awareness of Air Force basic research priorities in the research community as a whole, and attracting talented scientists and engineers to address Air Force needs. International interactions facilitate future interoperability of coalition systems and foster relationships with future coalition partners. This project also seeks to enhance interactions with Historically Black Colleges and Universities, Hispanic serving institutions, and other minority institutions.												
B. Accomplishments/Planned Programs (\$ in Millions)										FY 2014	FY 2015	FY 2016
Title: Outreach to International S&T Community										12.501	9.919	10.440
Description: Foster international S&T cooperation by supporting direct interchanges with a broad range of key international researchers and communities. Identify and leverage international scientific advances when appropriate.												
FY 2014 Accomplishments:												
Organized a joint technical exchange meeting with the Embassy of Italy to explore basic research collaborations between the U.S. and Italy in the areas of material science, sensors, and applied mathematics. Leveraged international expertise and support international technology liaison missions to identify and maintain awareness of foreign science and technology developments. Explored current foreign investments and influence world-class scientific research on specific topics of Air Force interest. Pursued access to technical information on foreign research capabilities within our interests. Supported international visits by scientists and high-level Department of Defense (DoD) S&T delegations, and provided primary interface to coordinate international S&T participation among DoD organizations.												
FY 2015 Plans:												
Leverage international expertise and support international technology liaison missions to identify and maintain awareness of foreign science and technology developments. Explore current foreign investments and influence world-class scientific research on specific topics of Air Force interest. Pursue access to technical information on foreign research capabilities within our interests. Support international visits by scientists and high-level DoD S&T delegations, and provide primary interface to coordinate international S&T participation among DoD organizations.												
FY 2016 Plans:												
Continue to leverage international expertise and support international technology liaison missions to identify and maintain awareness of foreign science and technology developments. Explore current foreign investments and influence world-class												

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Exhibit R-2A, RDT&E Project Justification: PB 2016 Air Force		Date: February 2015	
Appropriation/Budget Activity 3600 / 1	R-1 Program Element (Number/Name) PE 0601102F / <i>Defense Research Sciences</i>	Project (Number/Name) 613004 / <i>Education and Outreach</i>	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2014	FY 2015
scientific research on specific topics of Air Force interest. Pursue access to technical information on foreign research capabilities within our interests. Support international visits by scientists and high-level DoD S&T delegations.			
Title: Outreach to U.S. S&T Workforce Description: Strengthen science, mathematics, and engineering research and infrastructure in the U.S., thereby strengthening current and future Air Force S&T capabilities. FY 2014 Accomplishments: Increased awareness of Air Force research needs and opportunities throughout the civilian scientific community, while simultaneously identifying, recruiting, and increasing opportunities for new young investigators to participate in critical Air Force research. Supported science, mathematics, and engineering research, and educational outreach programs including Historically Black Colleges and Universities, Hispanic serving institutions, and other minority institutions. FY 2015 Plans: Increase awareness of Air Force research needs and opportunities throughout the civilian scientific community, while simultaneously identifying, recruiting, and increasing opportunities for new young investigators to participate in critical Air Force research. Support science, mathematics, and engineering research, and educational outreach programs including Historically Black Colleges and Universities, Hispanic serving institutions, and other minority institutions. FY 2016 Plans: Continue identifying, recruiting, and increasing opportunities for new young investigators to participate in critical Air Force research. Support science, mathematics, and engineering research including Historically Black Colleges and Universities, Hispanic serving institutions, and other minority institutions.		16.284	12.922
Accomplishments/Planned Programs Subtotals		28.785	22.841
C. Other Program Funding Summary (\$ in Millions)			
N/A			
Remarks			
D. Acquisition Strategy			
N/A			
E. Performance Metrics			
Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.			