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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2013 Air Force	<b>DATE:</b> February 2012
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APPROPRIATION/BUDGET ACTIVITY				R-1 ITEM NOMENCLATURE							
3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> BA 4: <i>Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>				PE 0603790F: <i>NATO Cooperative R&amp;D</i>							
COST (\$ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
Total Program Element	4.265	4.424	4.507	-	4.507	4.568	4.661	4.791	4.854	Continuing	Continuing
64NATO: <i>Nato Coop R&amp;D</i>	4.265	4.424	4.507	-	4.507	4.568	4.661	4.791	4.854	Continuing	Continuing
Quantity of RDT&E Articles	0	0	0	0	0	0	0	0	0		

**A. Mission Description and Budget Item Justification**

These funds will be used to initiate international cooperative research, and development (ICR&D) agreements with North Atlantic Treaty Organization (NATO) member states, major non-NATO allies and friendly foreign countries. Each of the selected programs and projects are required to have a concluded IA, prior to funds being released, that implements the provisions of Title 10 U.S. Code, Section 2350a. The legislation (Title 10 U.S. Code, Section 2350) authorizes funds to significantly improve U.S. and allied conventional defense capabilities by leveraging the best defense technologies, eliminating costly duplication of R&D efforts, accelerating the availability of defense systems, and promoting US and allied interoperability or commonality. These funds will not be used for government civilian salaries, permanent construction, or spent overseas. This program element funds the implementation of Air Force ICR&D agreements in (1) Basic Research (2) Applied Research (3) Advanced Technology Development (4) Advanced Component Development and Prototypes (5) System Development and Demonstration and (6) RDT&E Management Support.

This PE is designated in Budget Activity 4 because most of the ICR&D projects support specific systems, include all efforts necessary to evaluate integrated technologies in as realistic an operating environment as possible to assess the performance or cost reduction potential of advanced technology, and help expedite technology transition from the laboratory to operational use.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2011</b>	<b>FY 2012</b>	<b>FY 2013 Base</b>	<b>FY 2013 OCO</b>	<b>FY 2013 Total</b>
Previous President's Budget	4.372	4.424	4.499	-	4.499
Current President's Budget	4.265	4.424	4.507	-	4.507
Total Adjustments	-0.107	-	0.008	-	0.008
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.085	-			
• Other Adjustments	-0.022	-	0.008	-	0.008

**Change Summary Explanation**

FY11: Congressional General Reductions (-)\$0.022, are reflected in Other Adjustment Row.

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APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 4: Advanced Component Development & Prototypes (ACD&P)		R-1 ITEM NOMENCLATURE PE 0603790F: NATO Cooperative R&D				
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
<p><b>Title:</b> Image Gyro (AFRL and Japan)</p> <p><b>Description:</b> Image Gyro (AFRL and Japan). Cooperative project to develop a new image-based motion sensor known as the "Image Gyro".</p> <p><b>FY 2011 Accomplishments:</b> Continue the Image Gyro will be a low-cost, lightweight and highly accurate device that will achieve equivalent or higher precision drift free capabilities than that of today's accurate and more expensive inertial navigation systems. In addition to GPS free precision navigation, the Image Gyro will provide capabilities such as: passive moving target indication (MTI), 3D scene reconstruction (3D structure from motion), obstacle/collision avoidance, and automatic target recognition.</p> <p><b>FY 2012 Plans:</b> N/A</p>		0.300	-	-	-	-
<p><b>Title:</b> Durability Assessment and Probabilistic Life Prediction of Titanium Alloys (AFRL and India)</p> <p><b>Description:</b> Durability Assessment and Probabilistic Life Prediction of Titanium Alloys (AFRL and India).</p> <p><b>FY 2011 Accomplishments:</b> Continue cooperative project to research technical areas as related to titanium alloys: (1) Fundamental information on the microstructure of titanium alloys as affected by the conditions of their fabrication and their composition to include simulation and modeling to allow prediction of their properties. (2) Methods for life prediction of titanium alloys in service as a function of exposure conditions and fatigue, fracture and damage models in order to fully utilize those alloys for aeronautical structures and components.</p> <p><b>FY 2012 Plans:</b> N/A</p>		0.100	-	-	-	-
<p><b>Title:</b> Aging Systems Materials and Process Technologies (AFRL and Australia)</p> <p><b>Description:</b> Aging Systems Materials and Process Technologies (AFRL and Australia).</p> <p><b>FY 2011 Accomplishments:</b> Continue cooperative project to develop and/or optimize techniques aimed at improving aircraft structural and electrical integrity. When implemented, these techniques will reduce life-cycle costs associated with legacy,</p>		0.050	-	-	-	-

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APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 4: Advanced Component Development & Prototypes (ACD&P)		R-1 ITEM NOMENCLATURE PE 0603790F: NATO Cooperative R&D				
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
emerging, and future aircraft as well as improve aircraft availability and safety. Project focus will be on bonded joints and aircraft wiring. <b>FY 2012 Plans:</b> N/A						
<b>Title:</b> Military Aircraft Survivability Through Improved Composite Structures (USAF 46th Test Wing and Germany) <b>Description:</b> Military Aircraft Survivability Through Improved Composite Structures (USAF 46th Test Wing and Germany). <b>FY 2011 Accomplishments:</b> N/A <b>FY 2012 Plans:</b> N/A		-	-	-	-	-
<b>Title:</b> Flapping Wing Micro Air Vehicle Collaborative Development (AFRL and Korea) <b>Description:</b> Flapping Wing Micro Air Vehicle Collaborative Development (AFRL and Korea). <b>FY 2011 Accomplishments:</b> Continue cooperative project to design, develop and test a prototype micro air vehicle. <b>FY 2012 Plans:</b> N/A		0.100	-	-	-	-
<b>Title:</b> Ultrahigh Temperature Ceramics (AFRL and UK) <b>Description:</b> Ultrahigh Temperature Ceramics (AFRL and UK). <b>FY 2011 Accomplishments:</b> Continue cooperative project to accelerate understanding and development of ultrahigh temperature ceramic materials for system transition. <b>FY 2012 Plans:</b> N/A		0.250	-	-	-	-
<b>Title:</b> Compact Penetrating Weapons for the Defeat of Hardened Targets (AFRL - UK)		0.376	-	-	-	-

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
Description: Compact Penetrating Weapons for the Defeat of Hardened Targets (AFRL - UK).  FY 2011 Accomplishments: Cooperative project to improve maximum penetration and lethal effectiveness capability in weapons for use with advanced fighter aircraft and other aircraft.  FY 2012 Plans: N/A						
Title: Dynamic Network Visualization Techniques for Cyberspace (AFRL - Singapore) Description: Dynamic Network Visualization Techniques for Cyberspace (AFRL - Singapore).  FY 2011 Accomplishments: Cooperative project to develop visualization and interaction techniques for showing dynamic network information for cyberspace operations.  FY 2012 Plans: N/A		0.400	-	-	-	-
Title: Assessment of Military Operations in Urban Terrain (AFRL - Germany) Description: Assessment of Military Operations in Urban Terrain (AFRL - Germany).  FY 2011 Accomplishments: Cooperative project to investigate the lethality of an array of munitions against military operations against urban terrain targets.  FY 2012 Plans: N/A		0.300	-	-	-	-
Title: Thermal Barrier Coating Health and Turbine Temperature Sensing (AFRL and UK). Description: Thermal Barrier Coating Health and Turbine Temperature Sensing (AFRL and UK).  FY 2011 Accomplishments:		0.350	-	-	-	-

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
Cooperative project to test thermal barrier coating in suitable environments where common nomenclature, test specification, data format, standardization, and interoperability can be established. <b>FY 2012 Plans:</b> N/A						
<b>Title:</b> Efficacy of Vibrotactile Stimulation in Simulated Operational Conditions (AFRL and The Netherlands) <b>Description:</b> Efficacy of Vibrotactile Stimulation in Simulated Operational Conditions (AFRL and The Netherlands).  <b>FY 2011 Accomplishments:</b> N/A <b>FY 2012 Plans:</b> N/A		-	-	-	-	-
<b>Title:</b> Next Generation Advanced Composite Processing Science (AFRL and Canada) <b>Description:</b> Next Generation Advanced Composite Processing Science (AFRL and Canada).  <b>FY 2011 Accomplishments:</b> Cooperative project to develop and validate the next generation process models to aid in the manufacturing of advanced polymer matrix composite and hybrid materials in an effort to maximize their affordable and efficient use for aerospace applications.  <b>FY 2012 Plans:</b> N/A		0.050	-	-	-	-
<b>Title:</b> Command and Control Interoperability Program (AFRL and UK) <b>Description:</b> Command and Control Interoperability Program (AFRL and UK).  <b>FY 2011 Accomplishments:</b> Cooperative project to develop, experiment, demonstrate and provide a report into a capability to effectively, efficiently and seamlessly exchange space planning, replanning and information products between and amongst coalition warfighters.  <b>FY 2012 Plans:</b>		0.300	-	-	-	-

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
N/A						
<b>Title:</b> Machine Translation for International Security Assistance Force (711 HPW/RHX). <b>Description:</b> Machine Translation for International Security Assistance Force (711 HPW/RHX).  <b>FY 2011 Accomplishments:</b> Cooperative project to build prototype machine translation system for English and German to Dari to support coalition operations in Afghanistan.  <b>FY 2012 Plans:</b> Continuation of cooperative project to build prototype machine translation system for English and German to Dari to support coalition operations in Afghanistan.		0.100	0.100	-	-	-
N/A						
<b>Title:</b> Live, Virtual and Constructive Immersive Decision Making Environments (711 HPW/RHA and Canada) <b>Description:</b> Live, Virtual and Constructive Immersive Decision Making Environments (711 HPW/RHA and Canada).  <b>FY 2011 Accomplishments:</b> Cooperative project to significantly improve cost and effectiveness of LVC technology, focusing on UAV, Homeland Defense and Electronic Warfare training, rehearsal and advanced threat modeling.  <b>FY 2012 Plans:</b> Continuation of cooperative project to significantly improve cost and effectiveness of LVC technology, focusing on UAV, Homeland Defense and Electronic Warfare training, rehearsal and advanced threat modeling.		0.300	0.300	-	-	-
N/A						
<b>Title:</b> Robust Solid State Materials for Optical Sensors Protection (AFRL and Sweden) <b>Description:</b> Robust Solid State Materials for Optical Sensors Protection (AFRL and Sweden).  <b>FY 2011 Accomplishments:</b>		0.200	0.200	-	-	-

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
Cooperative project will develop solid state glassy solids for sensor protection against threat pulsed laser radiation. Will measure limiting performance by a battery of characterization techniques and deliver a series of solids to be placed in optical system platforms.  <b>FY 2012 Plans:</b> Continuation of cooperative project will develop solid state glassy solids for sensor protection against threat pulsed laser radiation. Will measure limiting performance by a battery of characterization techniques and deliver a series of solids to be placed in optical system platforms.  N/A						
<b>Title:</b> Common Coalition Airborne Access Portal (551 ELSW and NATO). <b>Description:</b> Common Coalition Airborne Access Portal (551 ELSW and NATO).  <b>FY 2011 Accomplishments:</b> Cooperative project will connect US/European lab sites and airborne IP networks via a common access portal that provides interoperability and mulitnational security.  <b>FY 2012 Plans:</b> Continuation of cooperative project will connect US/European lab sites and airborne IP networks via a common access portal that provides interoperability and mulitnational security.  N/A		0.295	0.400	-	-	-
<b>Title:</b> Radio Frequency (RF) Modeling and Simulation Experimentation for Distributed Electronic Warfare, Situational Awareness and Response (DEWSAR) Project (AFRL/RV and Australia) <b>Description:</b> Radio Frequency (RF) Modeling and Simulation Experimentation for Distributed Electronic Warfare, Situational Awareness and Response (DEWSAR) Project (AFRL/RV and Australia).  <b>FY 2011 Accomplishments:</b> Cooperative project will evaluate distributed electronic support and electronic attack architectures.  <b>FY 2012 Plans:</b> Continuation of cooperative project will evaluate distributed electronic support and electronic attack architectures.		0.294	0.400	-	-	-

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
N/A						
<p><b>Title:</b> Advanced Ladar Imaging Analysis System (AFRL and France)</p> <p><b>Description:</b> Advanced Ladar Imaging Analysis System (AFRL and France).</p> <p><b>FY 2011 Accomplishments:</b> Cooperative project will develop techniques for enhanced imaging for combat identification. The effort will focus on the development, test and evaluation of algorithms for 3-D laser, advanced ladar modes and coherent aperture synthesis.</p> <p><b>FY 2012 Plans:</b> Continuation of cooperative project will develop techniques for enhanced imaging for combat identification. The effort will focus on the development, test and evaluation of algorithms for 3-D laser, advanced ladar modes and coherent aperture synthesis.</p> <p>N/A</p>		0.150	0.150	-	-	-
<p><b>Title:</b> Molecular Basis of Stress Responses Using In Vitro Neuronal Models (AFRL and India)</p> <p><b>Description:</b> Molecular Basis of Stress Responses Using In Vitro Neuronal Models (AFRL and India).</p> <p><b>FY 2011 Accomplishments:</b> Cooperative project will enhance warfighter performance optimization through the controlling and monitoring of molecular analytes corresponding to cognitive function and its stressors.</p> <p><b>FY 2012 Plans:</b> Continuation of cooperative project will enhance warfighter performance optimization through the controlling and monitoring of molecular analytes corresponding to cognitive function and its stressors.</p> <p>N/A</p>		0.050	0.050	-	-	-
<p><b>Title:</b> Synthesis, Formulation and Characterization of Structural Nano-Energetics (AFRL and Singapore)</p> <p><b>Description:</b> Synthesis, Formulation and Characterization of Structural Nano-Energetics (AFRL and Singapore).</p> <p><b>FY 2011 Accomplishments:</b></p>		0.300	0.400	-	-	-



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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
Cooperative project will develop structural nano-energetic material to transition for replacement of current structural components on micro-munitions and UAVs and enhanced blast effects.  <b>FY 2012 Plans:</b> Continuation of cooperative project will develop structural nano-energetic material to transition for replacement of current structural components on micro-munitions and UAVs and enhanced blast effects.  N/A						
<b>Title:</b> Monitoring and Controlling Multiple Assets Within Complex Environments (AFRL, Australia and UK)  <b>Description:</b> Cooperative project to design, develop, and evaluate new methods of visualizing the operational environment and controlling sensor inputs leveraging automation where best applicable.  <b>FY 2012 Plans:</b> Cooperative project to design, develop, and evaluate new methods of visualizing the operational environment and controlling sensor inputs leveraging automation where best applicable.  N/A  <b>FY 2013 Base Plans:</b> Continuation of cooperative project to design, develop, and evaluate new methods of visualizing the operational environment and controlling sensor inputs leveraging automation where best applicable.  <b>FY 2013 OCO Plans:</b> N/A		-	0.200	0.200	-	0.200
<b>Title:</b> Closed Loop Alternative Navigation Demonstration (AFRL and Australia)  <b>Description:</b> Cooperative project to develop an integrated estimation and control vision based navigation system and integrate the closed-loop vision-based navigation system into an unmanned aerial vehicle (UAV).  <b>FY 2012 Plans:</b> Cooperative project to develop an integrated estimation and control vision based navigation system and integrate the closed-loop vision-based navigation system into an unmanned aerial vehicle (UAV).		-	0.200	0.300	-	0.300

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
N/A						
<b>FY 2013 Base Plans:</b> Continuation of cooperative project to develop an integrated estimation and control vision based navigation system and integrate the closed-loop vision-based navigation system into an unmanned aerial vehicle (UAV).						
<b>FY 2013 OCO Plans:</b> N/A						
<b>Title:</b> Joint and Coalition Training, Rehearsal, and Exercise Research (AFRL and Australia, Canada, New Zealand, and UK)  <b>Description:</b> Cooperative project to enhance technologies, processes, and strategies for routing, persistent, and seamless Live, Virtual, and Constructive (LVC) simulations, and distributed, collaborative methods for joint and coalition training  <b>FY 2012 Plans:</b> Cooperative project to enhance technologies, processes, and strategies for routing, persistent, and seamless Live, Virtual, and Constructive (LVC) simulations, and distributed, collaborative methods for joint and coalition training  N/A  <b>FY 2013 Base Plans:</b> Continuation of cooperative project to enhance technologies, processes, and strategies for routing, persistent, and seamless Live, Virtual, and Constructive (LVC) simulations, and distributed, collaborative methods for joint and coalition training  <b>FY 2013 OCO Plans:</b> N/A		-	0.250	0.250	-	0.250
<b>Title:</b> Life Prediction for Metallic Aircraft Structure (AFRL and France)  <b>Description:</b> Cooperative project to develop and demonstrate state-of-the-art life prediction approaches suitable for use in aging aircraft applications allowing for more effective system sustainment leading to improved asset availability, reduced maintenance and manpower requirements, and the elimination of technical surprise driven by unanticipated structural deficiencies.		-	0.300	0.325	-	0.325

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
<b>FY 2012 Plans:</b> Cooperative project to develop and demonstrate state-of-the-art life prediction approaches suitable for use in aging aircraft applications allowing for more effective system sustainment leading to improved asset availability, reduced maintenance and manpower requirements, and the elimination of technical surprise driven by unanticipated structural deficiencies.  N/A						
<b>FY 2013 Base Plans:</b> Continuation of cooperative project to develop and demonstrate state-of-the-art life prediction approaches suitable for use in aging aircraft applications allowing for more effective system sustainment leading to improved asset availability, reduced maintenance and manpower requirements, and the elimination of technical surprise driven by unanticipated structural deficiencies.  <b>FY 2013 OCO Plans:</b> N/A						
<b>Title:</b> Aero Advisory and NOTAMS tools (AMC and Canada)  <b>Description:</b> Cooperative project to provide the ability to visualize airspace advisories in tabular or graphic format relevant to route of flight for mission planning purposes.  <b>FY 2012 Plans:</b> Cooperative project to provide the ability to visualize airspace advisories in tabular or graphic format relevant to route of flight for mission planning purposes.  N/A		-	0.250	0.250	-	0.250
<b>FY 2013 Base Plans:</b> Continuation of cooperative project to provide the ability to visualize airspace advisories in tabular or graphic format relevant to route of flight for mission planning purposes.  <b>FY 2013 OCO Plans:</b> N/A						
<b>Title:</b> Cultural Radar for Human Terrain Effects (AFRL and Canada)		-	0.100	0.125	-	0.125

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
<p><b>Description:</b> Cooperative project to develop mathematical/computational models of information diffusion to characterize how information flows through a population with various types of connectivity, communication patterns, and population characteristics.</p> <p><b>FY 2012 Plans:</b> Cooperative project to develop mathematical/computational models of information diffusion to characterize how information flows through a population with various types of connectivity, communication patterns, and population characteristics.</p> <p>N/A</p> <p><b>FY 2013 Base Plans:</b> Continuation of cooperative project to develop mathematical/computational models of information diffusion to characterize how information flows through a population with various types of connectivity, communication patterns, and population characteristics.</p> <p><b>FY 2013 OCO Plans:</b> N/A</p>						
<p><b>Title:</b> Computational Multi-Scale Modeling of Explosives (AFRL and Germany)</p> <p><b>Description:</b> Cooperative project to develop techniques to incorporate grain level damage mechanisms into modeling the thermo-mechanical behavior of explosive composites.</p> <p><b>FY 2012 Plans:</b> Cooperative project to develop techniques to incorporate grain level damage mechanisms into modeling the thermo-mechanical behavior of explosive composites.</p> <p>N/A</p> <p><b>FY 2013 Base Plans:</b> Continuation of cooperative project to develop techniques to incorporate grain level damage mechanisms into modeling the thermo-mechanical behavior of explosive composites.</p> <p><b>FY 2013 OCO Plans:</b></p>		-	0.390	0.200	-	0.200

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
N/A						
<p><b>Title:</b> High Speed Penetrator Cases (AFRL and Germany)</p> <p><b>Description:</b> Cooperative project to investigate High Speed Penetrators to determine the best means to defeat Hard and Deeply Buried Targets (HDBTs), develop and/or validate modeling and simulation tools for the analysis of weapons concepts and issues appropriate for HDBTs, and conduct research to address new warhead technologies to yield performance enhancements to warheads for penetration and survivability.</p> <p><b>FY 2012 Plans:</b> Cooperative project to investigate High Speed Penetrators to determine the best means to defeat Hard and Deeply Buried Targets (HDBTs), develop and/or validate modeling and simulation tools for the analysis of weapons concepts and issues appropriate for HDBTs, and conduct research to address new warhead technologies to yield performance enhancements to warheads for penetration and survivability.</p> <p>N/A</p> <p><b>FY 2013 Base Plans:</b> Continuation of cooperative project to investigate High Speed Penetrators to determine the best means to defeat Hard and Deeply Buried Targets (HDBTs), develop and/or validate modeling and simulation tools for the analysis of weapons concepts and issues appropriate for HDBTs, and conduct research to address new warhead technologies to yield performance enhancements to warheads for penetration and survivability.</p> <p><b>FY 2013 OCO Plans:</b> N/A</p>		-	0.435	0.200	-	0.200
<p><b>Title:</b> Team Based Metric Development in Distributed Net-Centric Operations (AFRL and UK)</p> <p><b>Description:</b> Cooperative project to develop conceptual software applications which would allow the monitoring, management, and mitigation of distributed team workload and situational awareness.</p> <p><b>FY 2012 Plans:</b> Cooperative project to develop conceptual software applications which would allow the monitoring, management, and mitigation of distributed team workload and situational awareness.</p>		-	0.299	0.189	-	0.189

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C. Accomplishments/Planned Programs (\$ in Millions)		FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
N/A						
<b>FY 2013 Base Plans:</b> Cooperative project to develop conceptual software applications which would allow the monitoring, management, and mitigation of distributed team workload and situational awareness.						
<b>FY 2013 OCO Plans:</b> N/A						
<b>Title:</b> Surveillance by Thermal Hyperspectral Imaging (HSI) Exploitation and Validation of Technology (AFRL and Canada, UK, Australia, New Zealand) <b>Description:</b> Cooperative effort utilizing all sources of LWIR (Long-wave Infrared) HSI data to evaluate the range of products which can be derived from exploitation of the data and of this day-night surveillance capability		-	-	0.400	-	0.400
<b>FY 2013 Base Plans:</b> Cooperative effort utilizing all sources of LWIR (Long-wave Infrared) HSI data to evaluate the range of products which can be derived from exploitation of the data and of this day-night surveillance capability						
<b>FY 2013 OCO Plans:</b> N/A						
<b>Title:</b> Unmanned Aircraft Systems (UAS) Heavy Fuel Operations (AFRL and UK) <b>Description:</b> Cooperative effort to develop and demonstrate use of low octane heavy fuel (i.e.JP-8) in small Unmanned Aircraft Systems (UAS) engines as an alternative to the high octane AVGAS the currently require, but which is not logistically supported in the field.		-	-	0.310	-	0.310
<b>FY 2013 Base Plans:</b> Cooperative effort to develop and demonstrate use of low octane heavy fuel (i.e.JP-8) in small Unmanned Aircraft Systems (UAS) engines as an alternative to the high octane AVGAS the currently require, but which is not logistically supported in the field.						
<b>FY 2013 OCO Plans:</b> N/A						
<b>Title:</b> Background Oriented Schlieren Comparison (BOSComp) (AEDC and Australia)		-	-	0.100	-	0.100

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Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Air Force				DATE: February 2012		
APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 4: Advanced Component Development & Prototypes (ACD&P)		R-1 ITEM NOMENCLATURE PE 0603790F: NATO Cooperative R&D				
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
<b>Description:</b> Cooperative effort to characterize and improve Background Oriented Schlieren (BOS) flow visualization technique for use in transonic wind tunnels with limited optical access.  <b>FY 2013 Base Plans:</b> Cooperative effort to characterize and improve Background Oriented Schlieren (BOS) flow visualization technique for use in transonic wind tunnels with limited optical access.  <b>FY 2013 OCO Plans:</b> N/A						
<b>Title:</b> GPS / Inertial / Vision Integrated Navigation System (GIVINS) (AFRL and Singapore) <b>Description:</b> Cooperative effort to develop a unique approach to vision-aided inertial navigation that is potentially simpler than existing solutions  <b>FY 2013 Base Plans:</b> Cooperative effort to develop a unique approach to vision-aided inertial navigation that is potentially simpler than existing solutions  <b>FY 2013 OCO Plans:</b> N/A		-	-	0.225	-	0.225
<b>Title:</b> Fire and Explosion Vulnerability Assessment (FEVA) AFRL, UK and Australia) <b>Description:</b> Cooperative effort to investigate and establish a common architecture for fire M&S capabilities to reduce fires & ullage explosions, which are considered main contributors to loss of platforms.  <b>FY 2013 Base Plans:</b> Cooperative effort to investigate and establish a common architecture for fire M&S capabilities to reduce fires & ullage explosions, which are considered main contributors to loss of platforms.  <b>FY 2013 OCO Plans:</b> N/A		-	-	0.350	-	0.350
<b>Title:</b> Multi-Interoperability Experiment for Enhanced ISR Applications (MIEEIA) (AFRL and Australia)		-	-	0.508	-	0.508

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Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Air Force				DATE: February 2012		
APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 4: Advanced Component Development & Prototypes (ACD&P)		R-1 ITEM NOMENCLATURE PE 0603790F: NATO Cooperative R&D				
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
<b>Description:</b> Cooperative effort to develop/implement data sharing standards; create open architecture for application collaboration; and demonstrate enhanced ISR capabilities through live exercises to allow CENTCOM and partner nations to seamlessly share data and algorithm results across networks  <b>FY 2013 Base Plans:</b> Cooperative effort to develop/implement data sharing standards; create open architecture for application collaboration; and demonstrate enhanced ISR capabilities through live exercises to allow CENTCOM and partner nations to seamlessly share data and algorithm results across networks  <b>FY 2013 OCO Plans:</b> N/A						
<b>Title:</b> Command and Control Information Synergy for Combined Space Operations (UNITY) (AFRL, Canada, UK and Australia)  <b>Description:</b> Cooperative effort to develop, experiment, demonstrate and provide a transitionable operational capability which facilitates sharing of space C2 information and products between 4-Eyes space mission partners in accordance with the tenets of the JSpOC Mission System (JMS) and Combined Space Operations Center (CSpOC) constructs  <b>FY 2013 Base Plans:</b> Cooperative effort to develop, experiment, demonstrate and provide a transitionable operational capability which facilitates sharing of space C2 information and products between 4-Eyes space mission partners in accordance with the tenets of the JSpOC Mission System (JMS) and Combined Space Operations Center (CSpOC) constructs  <b>FY 2013 OCO Plans:</b> N/A		-	-	0.450	-	0.450
<b>Title:</b> SiC / SiC-UHTC Composites (AFRL and Italy)  <b>Description:</b> Cooperative effort to develop hybrid fiber-reinforced silicon carbide - ultra high temperature ceramic composites and evaluate performance in arc jet and other simulated hypersonic environments		-	-	0.125	-	0.125



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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2013 Air Force				<b>DATE:</b> February 2012	
<b>APPROPRIATION/BUDGET ACTIVITY</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> BA 4: <i>Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>			<b>R-1 ITEM NOMENCLATURE</b> PE 0603790F: <i>NATO Cooperative R&amp;D</i>		

  

<b>C. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2011</b>	<b>FY 2012</b>	<b>FY 2013 Base</b>	<b>FY 2013 OCO</b>	<b>FY 2013 Total</b>
<b><i>FY 2013 Base Plans:</i></b> Cooperative effort to develop hybrid fiber-reinforced silicon carbide - ultra high temperature ceramic composites and evaluate performance in arc jet and other simulated hypersonic environments  <b><i>FY 2013 OCO Plans:</i></b> N/A					
<b>Accomplishments/Planned Programs Subtotals</b>	4.265	4.424	4.507	-	4.507

  

<b>D. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2011</u>	<u>FY 2012</u>	<u>FY 2013 Base</u>	<u>FY 2013 OCO</u>	<u>FY 2013 Total</u>	<u>FY 2014</u>	<u>FY 2015</u>	<u>FY 2016</u>	<u>FY 2017</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• Not Applicable.: <i>N/A</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

  

<b>E. Acquisition Strategy</b> <p>A principal goal of the NATO Cooperative R&amp;D program is to effectively utilize the aggregate resources invested by the US and our allies in conventional defense R&amp;D. This program element provides the critical funding incentive needed to pursue ICRD&amp;A agreements and helps to (a) leverage USAF and allied resources through cost sharing and economies of scale; (b) exploit the best US and allied technologies for equipping coalition forces; (c) demonstrate areas of commonality or interoperability with our allies; and (d) accelerate the availability of defense technology and systems. Candidate projects are reviewed and approved by the USD(AT&amp;L). An international agreement defining project objectives, responsibilities and costs is required prior to release of funds. To obtain these funds and ensure service commitment, projects are selected from existing or new RDT&amp;E programs funded in the Future Years Defense Plan (FYDP). Project offices must show matching funds and contributions from associated program elements and equitable allied funding. As appropriate, funding responsibility for out-year requirements and follow-on efforts are transferred to the project office and associated program elements. Any new contracts are awarded after full and open competition.</p>
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<b>F. Performance Metrics</b> <p>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.</p>
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Exhibit R-4, RDT&E Schedule Profile: PB 2013 Air Force		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 ITEM NOMENCLATURE PE 0603790F: NATO Cooperative R&D	PROJECT 64NATO: Nato Coop R&D

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Exhibit R-4, RDT&E Schedule Profile: PB 2013 Air Force		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 ITEM NOMENCLATURE PE 0603790F: NATO Cooperative R&D	PROJECT 64NATO: Nato Coop R&D

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Exhibit R-4, RDT&E Schedule Profile: PB 2013 Air Force		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 ITEM NOMENCLATURE PE 0603790F: NATO Cooperative R&D	PROJECT 64NATO: Nato Coop R&D

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Exhibit R-4, RDT&E Schedule Profile: PB 2013 Air Force		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> BA 4: <i>Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	R-1 ITEM NOMENCLATURE PE 0603790F: <i>NATO Cooperative R&amp;D</i>	PROJECT 64NATO: <i>Nato Coop R&amp;D</i>

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Exhibit R-4, RDT&E Schedule Profile: PB 2013 Air Force		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 ITEM NOMENCLATURE PE 0603790F: NATO Cooperative R&D	PROJECT 64NATO: Nato Coop R&D

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Exhibit R-4, RDT&E Schedule Profile: PB 2013 Air Force		DATE: February 2012
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Exhibit R-4, RDT&E Schedule Profile: PB 2013 Air Force		DATE: February 2012
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Exhibit R-4, RDT&E Schedule Profile: PB 2013 Air Force		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 ITEM NOMENCLATURE PE 0603790F: NATO Cooperative R&D	PROJECT 64NATO: Nato Coop R&D

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Exhibit R-4, RDT&E Schedule Profile: PB 2013 Air Force		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 ITEM NOMENCLATURE PE 0603790F: NATO Cooperative R&D	PROJECT 64NATO: Nato Coop R&D

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2013 Air Force			<b>DATE:</b> February 2012
<b>APPROPRIATION/BUDGET ACTIVITY</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> BA 4: <i>Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 ITEM NOMENCLATURE</b> PE 0603790F: <i>NATO Cooperative R&amp;D</i>	<b>PROJECT</b> 64NATO: <i>Nato Coop R&amp;D</i>	

**Schedule Details**

<b>Events</b>	<b>Start</b>		<b>End</b>	
	<b>Quarter</b>	<b>Year</b>	<b>Quarter</b>	<b>Year</b>
- Testing and Analysis (3)	1	2011	2	2011
- Final Report (3)	3	2011	4	2011
- Testing and Analysis (4)	1	2011	2	2011
- Final Report (4)	3	2011	4	2011
- Testing and Analysis (5)	1	2011	2	2011
- Final Report (5)	3	2011	4	2011
- Testing and Analysis (6)	1	2011	2	2011
- Final Report (6)	3	2011	4	2011
- Testing and Analysis (7)	1	2011	2	2011
- Final Report (7)	3	2011	4	2011
- Testing and Analysis (8)	1	2011	2	2011
- Final Report (8)	3	2011	4	2011
- Testing and Analysis (9)	1	2011	2	2011
- Final Report (9)	3	2011	4	2011
- Testing and Analysis (10)	1	2011	2	2011
- Final Report (10)	3	2011	4	2011
- Testing and Analysis (11)	1	2011	2	2011
- Final Report (11)	3	2011	4	2011
Machine Translation for International Security Assistance Force	1	2011	1	2011
- Signed Agreement (12)	2	2011	2	2011
Live, Virtual and Constructive Immersive Decision Making Environments	1	2011	1	2011
- Signed Agreement (13)	2	2011	2	2011

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Exhibit R-4A, RDT&E Schedule Details: PB 2013 Air Force			DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 ITEM NOMENCLATURE PE 0603790F: NATO Cooperative R&D		PROJECT 64NATO: Nato Coop R&D	
	Start		End	
Events	Quarter	Year	Quarter	Year
- Test and Evaluation	2	2011	4	2011
Robust Solid State Materials for Optical Sensors Protection	1	2011	1	2011
- Signed Agreement (14)	2	2011	2	2011
- Testing and Evaluation	2	2011	4	2011
Common Coalition Airborne Access Portal	1	2011	1	2011
- Signed Agreement (15)	2	2011	2	2011
- Testing and Evaluation (1)	2	2011	4	2011
Rado Frequency Modeling and Simulation for Distributed Electronic Warfare, Situational Awareness and Response	1	2011	1	2011
- Signed Agreement (16)	2	2011	2	2011
- Test and Evaluation (1)	2	2011	4	2011
Advanced Ladar and Imaging Analysis System	1	2011	1	2011
- Signed Agreement (17)	2	2011	2	2011
- Testing and Evaluation (2)	2	2011	4	2011
Molecular Basis of Stress Responses Using In Vitro Neuronal Models	1	2011	1	2011
- Signed Agreement (18)	2	2011	2	2011
- Testing and Evaluation (3)	2	2011	4	2011
Synthesis, Formulation and Characterization of Structural Nano-Energetics	1	2011	1	2011
- Signed Agreement (19)	2	2011	2	2011
- Testing and Evaluation (4)	2	2011	4	2011
Monitoring and Controlling Multiple Assets Within Complex Environments	1	2012	4	2015
Closed Loop Alternative Navigation Demonstration	1	2012	4	2015
Joint and Coalition Training, Rehearsal, and Exercise Research	1	2012	4	2017
Life Prediction for Metallic Aircraft Structure	1	2012	4	2013
Aero Advisory and NOTAMS tools	1	2012	4	2014
Cultural Radar for Human Terrain Effects	1	2012	4	2016

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2013 Air Force **DATE:** February 2012

<b>APPROPRIATION/BUDGET ACTIVITY</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> BA 4: <i>Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 ITEM NOMENCLATURE</b> PE 0603790F: <i>NATO Cooperative R&amp;D</i>	<b>PROJECT</b> 64NATO: <i>Nato Coop R&amp;D</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
Computational Multi-Scale Modeling of Explosives	1	2012	4	2016
High Speed Penetrator Cases	1	2012	4	2016
Team Based Metric Development in Distributed Net-Centric Operations	1	2012	4	2016
Surveillance by Thermal Hyper-Spectral Imaging Exploitation and Validation of Technology	1	2013	4	2014
Unmanned Aircraft Systems (UAS) Heavy Fuel Operations	1	2013	4	2014
Background Oriented Schlieren Comparasin (BOSComp)	1	2013	4	2014
GPS/Inertial/Vision Integrated Navigation System (GIVINS)	1	2013	4	2016
Fire and Explosion Vulnerability Assessment (FEVA)	1	2013	1	2014
Multi-Interoperability Experiment for Enhanced ISR Applications (MIEEIA)	1	2013	1	2015
Command and Control Information Synergy for Combined Space Operations (UNITY)	1	2013	4	2014
SiC/SiC-UHTC Composites	1	2013	4	2014