

UNCLASSIFIED

PE NUMBER: 0603790F
PE TITLE: NATO Cooperative R&D

Exhibit R-2, RDT&E Budget Item Justification								DATE May 2009		
BUDGET ACTIVITY 04 Advanced Component Development and Prototypes (ACD&P)					PE NUMBER AND TITLE 0603790F NATO Cooperative R&D					
Cost (\$ in Millions)	FY 2008 Actual	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost to Complete	Total
Total Program Element (PE) Cost	4.173	4.322	4.351	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
NATO Nato Coop R&D	4.173	4.322	4.351	0.000	0.000	0.000	0.000	0.000	Continuing	TBD

(U) **A. Mission Description and Budget Item Justification**

These funds will be used to help implement international cooperative research, development, and acquisition (ICRD&A) agreements with North Atlantic Treaty Organization (NATO) member states, major non-NATO allies and friendly foreign countries. The program implements the provisions of Title 10 U.S. Code, Section 2350a on NATO Cooperative Research and Development (R&D). The program was established to improve cooperation among NATO nations, and later major non-NATO allies, in research, development, and acquisition. The legislation authorized funds to significantly improve United States (US) 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. The program will be reported as required by Title 10 U.S. Code, Section 2350a(f). This program element funds the implementation of Air Force ICRD&A 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 ICRD&A 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.

(U) **B. Program Change Summary (\$ in Millions)**

	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>
(U) Previous President's Budget	4.173	4.322	4.426
(U) Current PBR/President's Budget	4.173	4.322	4.351
(U) Total Adjustments	0.000	0.000	
(U) Congressional Program Reductions			
Congressional Rescissions			
Congressional Increases			
Reprogrammings			
SBIR/STTR Transfer			
(U) <u>Significant Program Changes:</u>			

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BUDGET ACTIVITY 04 Advanced Component Development and Prototypes (ACD&P)					PE NUMBER AND TITLE 0603790F NATO Cooperative R&D			PROJECT NUMBER AND TITLE NATO Nato Coop R&D		
Cost (\$ in Millions)	FY 2008 Actual	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost to Complete	Total
NATO Nato Coop R&D	4.173	4.322	4.351	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0	0		

(U) **A. Mission Description and Budget Item Justification**

These funds will be used to help implement international cooperative research, development, and acquisition (ICRD&A) agreements with North Atlantic Treaty Organization (NATO) member states, major non-NATO allies and friendly foreign countries. The program implements the provisions of Title 10 U.S. Code, Section 2350a on NATO Cooperative Research and Development (R&D). The program was established to improve cooperation among NATO nations, and later major non-NATO allies, in research, development, and acquisition. The legislation authorized funds to significantly improve United States (US) 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. The program will be reported as required by Title 10 U.S. Code, Section 2350a(f). This program element funds the implementation of Air Force ICRD&A 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 ICRD&A 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.

(U) **B. Accomplishments/Planned Program (\$ in Millions)**

	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>
(U) Network-Centric Strike Controller (AFRL and UK) - Cooperative project designing and developing interface technologies to extend the effectiveness and capabilities of Air Battle Managers (ABMs) working within a network-centric framework. Using simulated AWACS and MC2A work environments, it will make use of networked data, advance data visualization tools, knowledge and contract management systems, decision-aiding and automation algorithms, and advance collaboration interface technologies.	0.150	0.000	0.000
(U) Resilient Structural and Blast Suppression Systems for Blast Protection Research Program (AFRL and UK) - Cooperative project conducting technical research on blast mitigating to develop resilient structural systems for implementation into new construction and for retrofitting existing conventional facilities to increase the level of protection to national and coalition force troops in military facilities worldwide in the event of a terrorist bombing.	0.400	0.000	0.000
(U) Multi-modal Situational Awareness Displays for Maneuvering Aircraft (AFRL and The Netherlands) - Cooperative project developing audio, visual, and tactile display symbology to increase situational awareness, decrease pilot workload, and reduce the risk of spatial disorientation in fast jet aircraft.	0.200	0.000	0.000
(U) 3-Dimensional Laser Radar Technology and Phenomenology (AFRL and Sweden) - Cooperative project developing FLASH a 3-Dimensional laser radar receiver technology and a sensor that captures the entire image with a single laser pulse .	0.200	0.000	0.000
(U) Policy Enabled Coalition Communication Environment (PECC) (AFRL and Australia, Canada, United Kingdom) -	0.100	0.000	0.000

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04 Advanced Component Development and Prototypes (ACD&P)		0603790F NATO Cooperative R&D		NATO Nato Coop R&D		
(U)	B. Accomplishments/Planned Program (\$ in Millions)			<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>
	Cooperative project developing mission objectives to be translated into a set of rules/policies (and machine executable code) which dictate the control level of resources at any level. Initially, policies capable of altering the network posture will be implemented for each INFOCON level (Normal, Alpha, Bravo, Charlie, Delta).					
(U)	Material and Technologies for Laser Protection (AFRL and Sweden) - Cooperative project to research, develop, and test passive and active laser protection materials. This will be accomplished by exchanging research expertise and novel nonlinear and electro-optic materials.			0.103	0.000	0.000
(U)	Strike Information Displays (AFRL and UK) - Cooperative project focusing on 1) the exploitation of emerging display technologies that will enhance collaborative information sharing, and 2) the evaluation and implementation of common display symbologies that will foster increased warfighter effectiveness and achieve greater interoperability within the coalition.			0.200	0.000	0.000
(U)	Theater Battle Management Core Systems (TBMCS) and NATO Air Command and Control System Interoperability Analysis and Demonstration (ESC and NATO) - Cooperative project to proactively design interoperability into the operational and technical architectures of the US Air Operations Center (AOC) and NATO's parallel Combined Air Operations Center (CAOC) construct, and to then develop, test and field middleware software that will support the successful prosecution of a combined/joint air operation.			0.140	0.150	0.000
(U)	Coalition/Joint Force Air Component Commander (C/JFACC) Battle Board (AFRL and Australia) - Cooperative project to provide the capability for the Coalition/Joint Force Air Component Commander (C/JFACC) and senior staff to develop and continuously assess the progress and contribution of air operations to the coalition's air campaign in order to attain agile and stable control of distributed coalition military operations conducted in an uncertain and rapidly changing environment.			0.090	0.100	0.000
(U)	Development of Electro-Optic and Infrared Countermeasures and Protection Measures (AFRL and UK) - Cooperative project increasing capabilities in the area of Electro-Optic and Infrared (EO/IR) countermeasures and protection measures for enhancing survivability and force protection.			0.290	0.300	0.000
(U)	Engagement-level Modeling for HPM Weapons Applications (AFRL and UK) - Cooperative project developing useful engagement modeling "modules" that could be used with little or no modification in USAF battlefield modeling and simulation (M&S) exercises.			0.190	0.200	0.000
(U)	Hypersonic Flight Research and Development (AFRL and Australia) - Cooperative project researching: (1) conduct hypersonic flight research experiments to mature select critical technologies required to develop future prompt global strike and operationally responsive space access systems; and, (2) develop on-board vehicle and propulsion instrumentation to significantly enrich the technology value of flight experiments.			0.600	0.600	0.000
(U)	Study of Insensitive Explosives for High Speed Penetrators (AFRL and Germany) - Cooperative project to understanding the changes in the high explosive (HE) and the effects of those changes due to forces acting on the			0.365	0.375	0.000

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BUDGET ACTIVITY		PE NUMBER AND TITLE		PROJECT NUMBER AND TITLE		
04 Advanced Component Development and Prototypes (ACD&P)		0603790F NATO Cooperative R&D		NATO Nato Coop R&D		
(U)	<u>B. Accomplishments/Planned Program (\$ in Millions)</u>			<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>
	explosive during hard impact.					
(U)	Integrally Bladed Rotor Repair Validation (AFRL and UK) - Cooperative project to demonstrate to TRL-6 UK & US developed integrally bladed rotor repair (IBR) in US Provided spin pits and demonstrator engines.			0.050	0.200	0.000
(U)	Coalition Airspace Information Sharing (CAIS) (AFRL and NATO) - Cooperative project to demonstrate coalition collaborative airspace management by developing and demonstrating a machine-to-machine connection between the US Joint Airspace Management And Deconfliction (JASMAD) Net-centric Information Service and NATO's Airspace Manager (ASMAN) module with the Integrated Command and Control (ICC) system.			0.390	0.400	0.000
(U)	Distributed Collaboration for Network-Centric Command and Control (AFRL and Australia) - Cooperative project to develop network-centric warfare that a dense networking of sensor and shooter nodes to promote enhanced situation awareness (SA) and self-synchronization of forces.			0.140	0.200	0.000
(U)	Toxicity of Engineered Nanomaterials and Their Interaction with Biological systems (AFRL and India) - Cooperative project to develop nanotoxicoinformatics tools to support nanomaterials research and development across a wide range of applications.			0.050	0.100	0.000
(U)	Mission Planning and NATO Tasking Interoperability (MPNTI) (ESC and UK) - Cooperative project to develop a mission planning system that can read NATO message formats. US aircraft mission planning systems do not read nor parse NATO Air Tasking Order (ATO) and NATO Airspace Coordinations Order (ACO) message formats. US air combat tasking is published in the US Message Test Format (USMTF), while NATO uses the Allied Data Publication 3 (AdatP3) message format.			0.365	0.375	0.000
(U)	US Theater Battle Management Core Systems (TBMCS) (ESC and NATO) - Cooperative project to implement a process/system which will enable multiple C2 systems, each loaded on separate, multiple security networks/domains, to exchange air C2 mission data amongst each of the systems in near-real-time.			0.150	0.300	0.000
(U)	Development of Animal Models to Assess the Inhalation Exposure of Engineered Nanomaterials (AFRL and Australia) - Cooperative project to research in vivo animal research in Australia with in vitro nanotoxicology research at AFRL to address the critical lack of existing knowledge concerning potential adverse biologic/toxic effects of nanomaterials.			0.000	0.100	0.100
(U)	Modulation of Immune Response by Inhaled Engineered Nanoparticles (AFRL and Sweden) - Cooperative project to research in vivo animal research in Sweden with in vitro nanotoxicology research at AFRL addressing the critical lack of existing knowledge concerning potential adverse biologic/toxic effects of nanomaterials.			0.000	0.100	0.100
(U)	Image Gyro (AFRL and Japan) - Cooperative project to develop a new image-based motion sensor known as the "Image Gyro". 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:			0.000	0.300	0.350

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04 Advanced Component Development and Prototypes (ACD&P)		0603790F NATO Cooperative R&D		NATO Nato Coop R&D		
(U) B. Accomplishments/Planned Program (\$ in Millions)				<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>
passive moving target indication (MTI), 3D scene reconstruction (3D structure from motion), obstacle/collision avoidance, and automatic target recognition.						
(U) Durability Assessment and Probabilistic Life Prediction of Titanium Alloys (AFRL and India) - 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.				0.000	0.200	0.200
(U) Aging Systems Materials and Process Technologies (AFRL and Australia) - 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, emerging, and future aircraft as well as improve aircraft availability and safety. Project focus will be on bonded joints and aircraft wiring.				0.000	0.075	0.100
(U) Military Aircraft Survivability Through Improved Composite Structures (USAF 46th Test Wing and Germany) - Cooperative project will assess: the degradation of composite mechanical properties caused by brief fuel fires (e.g., aircraft dry-bay fires sustained during combat that are extinguished within seconds of initiation) and the damage resistance of aircraft skin-spar joints when subjected to high strain rate loading conditions.				0.000	0.247	0.376
(U) Flapping Wing Micro Air Vehicle Collaborative Development (AFRL and Korea) - Cooperative project to design, develop and test a prototype micro air vehicle.				0.000	0.000	0.400
(U) Ultrahigh Temperature Ceramics (AFRL and UK) - Cooperative project to accelerate understanding and development of ultrahigh temperature ceramic materials for system transition.				0.000	0.000	0.400
(U) Compact Penetrating Weapons for the Defeat of Hardened Targets (AFRL - UK) - Cooperative project to improve maximum penetration and lethal effectiveness capability in weapons for use with advanced fighter aircraft and other aircraft.				0.000	0.000	0.400
(U) Dynamic Network Visualization Techniques for Cyberspace (AFRL - Singapore) - Cooperative project to develop visualization and interaction techniques for showing dynamic network information for cyberspace operations.				0.000	0.000	0.400
(U) Assessment of Military Operations in Urban Terrain (AFRL - Germany) - Cooperative project to investigate the lethality of an array of munitions against military operations against urban terrain targets.				0.000	0.000	0.400
(U) Thermal Barrier Coating Health and Turbine Temperature Sensing (AFRL and UK) - Cooperative project to test thermal barrier coating in suitable environments where common nomenclature, test specification, data format, standardization, and interoperability can be established.				0.000	0.000	0.400
(U) Efficacy of Vibrotactile Stimulation in Simulated Operational Conditions (AFRL and The Netherlands) - Cooperative project to validate the efficacy of a vibrotactile landing aid for helicopter pilots under simulated				0.000	0.000	0.400

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04 Advanced Component Development and Prototypes (ACD&P)

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PROJECT NUMBER AND TITLE

NATO Nato Coop R&D

(U) **B. Accomplishments/Planned Program (\$ in Millions)**

FY 2008

FY 2009

FY 2010

operational conditions, i.e. after prolonged time-on-task and wearing full garment in a warm environment.

- (U) Next Generation Advanced Composite Processing Science (AFRL and Canada) - 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.

0.000

0.000

0.325

- (U) Management and administrative support and travel

0.000

0.000

0.000

- (U) Total Cost

4.173

4.322

4.351

(U) **C. Other Program Funding Summary (\$ in Millions)**

FY 2008

FY 2009

FY 2010

FY 2011

FY 2012

FY 2013

FY 2014

FY 2015

Cost to

Total Cost

ActualEstimateEstimateEstimateEstimateEstimateEstimateEstimateComplete

- (U) Not Applicable.

(U) **D. Acquisition Strategy**

A principal goal of the NATO Cooperative R&D program is to effectively utilize the aggregate resources invested by the US and our allies in conventional defense R&D. This program element provides the critical funding incentive needed to pursue ICRD&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&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&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.

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Exhibit R-3, RDT&E Project Cost Analysis										DATE May 2009			
BUDGET ACTIVITY					PE NUMBER AND TITLE					PROJECT NUMBER AND TITLE			
04 Advanced Component Development and Prototypes (ACD&P)					0603790F NATO Cooperative R&D					NATO Nato Coop R&D			
(U) Cost Categories (Tailor to WBS, or System/Item Requirements) (\$ in Millions)	Contract Method & Type	Performing Activity & Location	Total Prior to FY 2008 Cost	FY 2008 Cost	FY 2008 Award Date	FY 2009 Cost	FY 2009 Award Date	FY 2010 Cost	FY 2010 Award Date	Cost to Complete	Total Cost	Target Value of Contract	
(U) Product Development													
None											0.000		
Subtotal Product Development			0.000	0.000		0.000		0.000		0.000	0.000	0.000	
Remarks:													
(U) Support													
AFRL Hanscom AFB, MA	BA			0.500		0.600		0.100		Continuing	TBD	TBD	
AFRL Eglin AFB, FL	BA			0.300		0.200		0.400		Continuing	TBD	TBD	
ESC Hanscom, MA	BA							0.400		Continuing	TBD	TBD	
AFRL Edwards AFB, CA	BA					0.134		0.400		Continuing	TBD	TBD	
46th Test Wing Eglin AFB, FL	BA			0.400		0.300		0.300		Continuing	TBD	TBD	
AFRL Tyndal AFB, FL	BA							0.400		Continuing	TBD	TBD	
AFRL Meza, AZ	BA			0.600		0.300		0.400		Continuing	TBD	TBD	
AFRL Rome, NY	BA			0.500		0.200		0.400		Continuing	TBD	TBD	
AFRL WPAFB, OH	BA			1.525		2.000		1.000		Continuing	TBD	TBD	
Subtotal Support			0.000	3.825		3.734		3.800		Continuing	TBD	TBD	
Remarks:													
(U) Test & Evaluation													
Air Armaments Center, FL	BA			0.300		0.300		0.400		Continuing	TBD	TBD	
Arnold Engineering Development Center, TN	BA			0.048		0.288		0.151		Continuing	TBD	TBD	
Subtotal Test & Evaluation			0.000	0.348		0.588		0.551		Continuing	TBD	TBD	
Remarks:													
(U) Management													
None											0.000		
Subtotal Management			0.000	0.000		0.000		0.000		0.000	0.000	0.000	
Remarks:													
(U) Total Cost			0.000	4.173		4.322		4.351		Continuing	TBD	TBD	
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Exhibit R-4, RDT&E Schedule Profile

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BUDGET ACTIVITY

04 Advanced Component Development and Prototypes (ACD&P)

PE NUMBER AND TITLE

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PROJECT NUMBER AND TITLE

NATO Nato Coop R&D

ICR&D Project	Fiscal Year	Start Date	End IA	PE
Network-Centric Strike Controller	FY06	2007	2012	63790F
Resilient Structural and Blast Suppression Systems for Blast Protection Research Program	FY06	2005	2010	63790F
Multi-model Situational Awareness Displays for Maneuvering Aircraft	FY06	2007	2015	63790F
3-Dimensional Laser Radar Technology and Phenomenology	FY06	2007	2011	63790F
Policy Enables Coalition Communication Environment	FY06	2008	2011	63790F
Material and Technologies for Laser Protection	FY06	2007	2011	63790F
Strike Information Displays	FY06	2007	2013	63790F
Theater Battle Management Core Systems and NATO Air Command and Control System Interoperability Analysis and Demonstration	FY07	2007	2014	63790F
Coalition/Joint Force Air Component Commander	FY07	2007	2015	63790F
Development of Electro-Optic and Infrared Countermeasures and Protection Measures	FY07	2007	2013	63790F
Engagement-level Modeling for HPM Weapons Applications	FY07	2008	2015	63790F
Hypersonic Flight Research and Development	FY07	2006	2013	63790F
Study of Insensitive Explosives for High Sped Penetrators	FY08	2008	2012	63790F
Integrally Bladed Rotor Repair Validation	FY08	2007	2011	63790F
Coalition Airspace Information Sharing	FY08	2007	2012	63790F
Distributed Collaboration for Network-Centric Command and Control	FY08	2008	2012	63790F
Toxicity of Engineered Nanomaterials and their Interaction with Biological systems	FY08	2008	2012	63790F
Mission Planning and NATO Tasking Interoperability	FY08	2007	2014	63790F
US Theater Battle Management Core Systems	FY08	2007	2014	63790F

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PROJECT NUMBER AND TITLE

NATO Nato Coop R&D

ICR&D Project	Fiscal Year	Start Date	End IA	PE
Development of Animal Models to Assess the Inhalation Exposure of Engineered Nanomaterials	FY09	2009	2013	63790F
Modulation of Immune Response by Inhaled Engineered Nanoparticles	FY09	2009	2013	63790F
Image Gyro	FY09	2009	2013	63790F
Durability Assessment and Probabilistic Life Prediction of Titanium Alloys	FY09	2009	2013	63790F
Aging Systems Materials and Process Technologies	FY09	2009	2013	63790F
Military Aircraft Survivability through Improved Composite Structures	FY09	2009	2013	63790F
Flapping Wing Micro Air Vehicle Collaboration Development	FY10	2010	2014	63790F
Ultrahigh Temperature Ceramics	FY10	2010	2014	63790F
Compact Penetrating Weapons for the Defeat of Hardened Targets	FY10	2010	2014	63790F
Dynamic Network Visualization Techniques for Cyberspace	FY10	2010	2014	63790F
Assessment of Military Operations in Urban terrain	FY10	2010	2014	63790F
Thermal Barrier Coating Health and Turbine Temperature Sensing	FY10	2010	2014	63790F
Efficacy of Vibrotactile Stimulation in Simulated Operational Conditions	FY10	2010	2014	63790F
Next Generation Advanced Composite Processing Science	FY10	2010	2014	63790F

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Exhibit R-4 (PE 0603790F)

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Exhibit R-4a, RDT&E Schedule Detail

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT NUMBER AND TITLE		
04 Advanced Component Development and Prototypes (ACD&P)	0603790F NATO Cooperative R&D	NATO Nato Coop R&D		
(U) Schedule Profile		<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>
(U) Policy Enabled Coalition Communication Environment		1Q		
(U) - Final Report		4Q		
(U) Network-Centric Strike Controller		1Q		
(U) - Final Report		4Q		
(U) Resilient Structural and Blast Suppression Systems for Blast Protection Research		1Q		
(U) - Final Report		4Q		
(U) Multi-modal Situational Awareness Displays for Maneuvering Aircraft		1Q		
(U) - Final report		4Q		
(U) 3-Dimensional Laser Radar Technology and Phenomenology		1Q		
(U) - Final Report		4Q		
(U) Material and Technologies for Laser Protection		1Q		
(U) - Final Report		2Q		
(U) Strike Information Displays		1Q		
(U) - Final Report		4Q		
(U) US Theater Battle Management Core System and NATO ACCS signed		1Q		
(U) - Test and Analysis		1-4Q	1-2Q	
(U) - Final Report			3-4Q	
(U) Coalition/Joint Force Air Component Commander (C/JFACC) Battle Board		1Q		
(U) - Testing and Analysis		1-4Q	1-2Q	
(U) - Final Report			3-4Q	
(U) Development of Electro-Optic & Infrared Countermeasures and Protection Measures		1Q		
(U) - Testing and Analysis		1-4Q	1-2Q	
(U) - Final Report			3-4Q	
(U) Engagement-level Modeling for HPM Weapons Applications		1Q		
(U) - Testing and Analysis		1-4Q	1-2Q	
(U) - Final Report			4Q	
(U) Hypersonic Flight Research and Development		1Q		
(U) - Testing and Analysis		1-4Q	1-2Q	
(U) - Final Report			4Q	
(U) US Theater Battle Management Core Systems (TBMCS)		1Q		
(U) - Testing and Analysis		1-4Q	1-2Q	
(U) - Final Report			3-4Q	

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04 Advanced Component Development and Prototypes (ACD&P)	0603790F NATO Cooperative R&D	NATO Nato Coop R&D
(U) Coalition Airspace Information Sharing (CAIS)	1Q	
(U) - Testing and Analysis	1-4Q	1-2Q
(U) - Final Report		3-4Q
(U) Mission Planning and NATO Tasking Interoperability	1Q	
(U) - Testing and Analysis	1-4Q	1-2Q
(U) - Final Report		3-4Q
(U) Study of Insensitive Explosives for High-Speed Penetrators	1Q	
(U) - Testing and Analysis	1-4Q	1-2Q
(U) - Final Report		2-4Q
(U) Integrally Bladed Rotor Report Validation	1Q	
(U) - Testing and Analysis	1-4Q	1-3Q
(U) - Final Report		2-4Q
(U) Distributed Collaboration for Network-Centric Command and Control	1Q	
(U) - Testing and Analysis	1-4Q	1-2Q
(U) - Final Report		3-4Q
(U) Toxicity of Nano-Engineered Materials	1Q	
(U) - Testing and Analysis	1-4Q	1-2Q
(U) - Final Report		3-4Q
(U) Development of Animal Models to Assess the Inhalation Exposure of Engineered Nanomaterials		1Q
(U) - Signed Agreement		2Q
(U) Modulation of Immune Response by Inhaled Engineered Nanoparticles		1Q
(U) - Signed Agreement		2Q
(U) Image Gyro		1Q
(U) - Signed Agreement		2Q
(U) Durability Assessment and Probabilistic Life Prediction of Titanium Alloys		1Q
(U) - Signed Agreement		2Q
(U) Aging Systems Materials and Process Technologies		1Q
(U) - Signed Agreement		2Q
(U) Military Aircraft Survivability Through Improved Composite Structures		1Q
(U) - Signed Agreement		4Q
(U) Flapping Wing Micro Air Vehicle Collaborative Development		1Q
(U) - Signed Agreement		2Q
(U) Ultrahigh Temperature Ceramics		1Q
(U) - Signed Agreement		2Q

R-1 Line Item No. 42

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Exhibit R-4a (PE 0603790F)

Exhibit R-4a, RDT&E Schedule Detail

DATE

May 2009

BUDGET ACTIVITY

04 Advanced Component Development and Prototypes (ACD&P)

PE NUMBER AND TITLE

0603790F NATO Cooperative R&D

PROJECT NUMBER AND TITLE

NATO Nato Coop R&D

(U) Compact Penetrating Weapons for the Defeat of Hardened Targets 1Q

(U) - Signed Agreement 2Q

(U) Dynamic Network Visualization Techniques for Cyberspace 1Q

(U) - Signed Agreement 2Q

(U) Assessment of Military Operations in Urban Terrain 1Q

(U) - Signed Agreement 2Q

(U) Thermal Barrier Coating Health and Turbine Temperature Sensing 1Q

(U) - Signed Agreement 2Q

(U) Efficacy of Vibrotactile Stimulation in Simulated Operational Conditions 1Q

(U) - Signed Agreement 2Q

(U) Next Generation Advanced Composite Processing Science 1Q

(U) - Signed Agreement 2Q