OSD RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY
RDT&E/ Defense Wide BA# 4

PE NUMBER AND TITLE
0603709D8Z - Joint Robotics Program

	Cost ($ in Millions)	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
	Total Program Element (PE) Cost	20.826	27.264	12.210	12.219	12.300	12.547	12.820
P709	Joint Services Explosive Ordnance Disposal (EOD)	7.412	12.072	3.340	3.352	3.365	3.366	3.357
P715	Tech Transfer	0.500	1.000	1.000	1.000	1.000	1.000	1.000
P716	JAUS	1.810	1.000	0.400	0.400	0.400	0.400	0.400
P717	Gladiator	0.900	1.700	0.000	0.000	0.000	0.000	0.000
P718	Robot Combat Support System (RCSS)	0.000	2.000	1.500	1.250	0.000	0.000	0.000
P719	National Unmanned Systems Experimentation Environment (NUSE 2)	3.064	1.065	0.000	0.000	0.000	0.000	0.000
P720	Intelligent Mobility Program	4.516	2.120	1.500	1.500	1.500	1.500	1.500
P721	Robotics for Agile Combat Support (RACS)	1.800	5.861	1.200	1.200	1.200	1.200	1.200
P722	Robotic Technology Enhancement	0.000	0.000	3.270	3.517	4.835	5.081	5.363
P723	Commercial Off The Shelf (COTS)	0.500	0.200	0.000	0.000	0.000	0.000	0.000
P724	ADCR	0.324	0.246	0.000	0.000	0.000	0.000	0.000

A. Mission Description and Budget Item Justification: (U) This Program Element (PE) was established in response to Congressional guidance to consolidate DoD robotic programs on unmanned ground systems and related robotic technologies in order to increase focus of the Services' robotic programs on operational requirements. The program ensures coordination between the Services and provides for interoperability and commonality among unmanned ground systems. The Joint Robotics Program (JRP) will develop and field a family of affordable and effective mobile ground robotic systems; develop and transition technologies necessary to meet evolving user requirements, and serve as a catalyst for insertion of robotic systems and technologies into the force structure. Unmanned Ground Systems are now realizing the often foreseen potential to provide our service men and women with the leap-ahead warfighting capability they need to reduce risk levels to our personnel. The war on terrorism has created urgent and compelling requirements for UGVs. The JRP has responded by deploying unmanned countermine and reconnaissance systems to Bosnia and Kosovo and in support of Operation Enduring Freedom and Operation Iraqi Freedom. The JRP continues to support UGV deployments around the globe providing the Services with unmanned force protection and countermine capabilities. Increasing Service UGV demand and positive feedback from users in the field have validated the JRP mission.

Automatically Deployable Communications Relays (ADCR) (0.282 million)

The purpose of the Automatically Deployable Communications Relays (ADCR) project is to develop a practical method of extending range of high-bandwidth wireless digital communications and to overcome line-of-sight (LOS) problems for unmanned ground vehicles (UGV). The proposed method provides a universal relay-deploying module that connects to a UGV through a standard Ethernet. The deployer contains several radio "bricks" that are dropped off automatically (transparent to the operator) in order to form a chain of communication relay nodes, thereby extending the effective range between the base station and the UGV. This project is a follow-on to a DARPA-funded research project into autonomous wireless ad

OSD RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**

hoc network maintenance, and heavily leverages the prior effort. Four systems will be developed in response to requests from other military users, including NAVEODTECHDIV and TARDEC.

B. Program Change Summary	FY 2005	FY 2006	FY 2007
Previous President's Budget (FY 2006)	21.314	11.755	12.020
Current BES/President's Budget (FY 2007)	20.826	27.264	12.210
Total Adjustments	-0.488	15.509	0.190
Congressional Program Reductions			
Congressional Rescissions			
Congressional Increases		15.950	
Reprogrammings	-0.488		
SBIR/STTR Transfer			
Other		-0.441	0.190

C. Other Program Funding Summary: Not Applicable.

D. Acquisition Strategy This program's acquisition strategy continues to maintain two tracks: (1) to develop and field first generation UGVs with current technologies, and (2) pursue advanced technologies critical to semi-autonomous mobility that can be inserted into first generation systems in an evolutionary manner.

E. Performance Metrics:

FY	Strategic Goals Supported	Existing Baseline	Planned Performance Improvement / Requirement Goal	Actual Performance Improvement	Planned Performance Metric / Methods of Measurement	Actual Performance Metric / Methods of Measurement
06						

Comment: The Joint Robotics Program (JRP) prepares and publishes its JRP Master Plan annually. The Plan contains detailed descriptions of the approximately 10 individual projects

OSD RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**

under this funding line. Each project description includes a task schedule with associated milestones, whereby progress against end goals can be measured. The cost, schedule and technical progress against these milestones is reviewed by DoD participants at semi-annual JRP Working Group meetings.

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P709**

Cost ($ in Millions)		FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
P709	Joint Services Explosive Ordnance Disposal (EOD)	7.412	12.072	3.340	3.352	3.365	3.366	3.357

A. Mission Description and Project Justification: (U) This project supports the lifecycle management of Explosive Ordnance Disposal (EOD) equipment for all four military Services. This project will conduct Concept and Technology Development efforts to determine maturity of existing technology and exploration of new concepts to meet EOD requirements. The Joint Service EOD community needs increased autonomy in its robotic platforms, and cooperative control of the different classes of robots, and these technology needs are addressed in this project.

B. Accomplishments/Planned Program:

Accomplishment/Planned Program Title	FY 2005	FY 2006	FY 2007
(U) FY 2005 Accomplishments	7.412	0.000	0.000

- Next Generation EOD RCV (NGEODRCV) Neo-Mover Pre-Production Development continued.
- EOD Operational Analysis initiated.
- Extension of the Technical Support Working Group (TSWG) Common Architecture accomplished.

Accomplishment/Planned Program Title	FY 2005	FY 2006	FY 2007
(U) FY 2006 - fy2007 Plans	0.000	12.072	3.340

- NGEODRCV System Level Development
- Transition Technologies from the NGEODRCV Project
- Final Demonstrations and Approvals of Remote Ordnance Neutralization System (RONS) Continuous Improvement Program (CIP) Projects.
- Initiate EOD Cooperative Robotics Project

C. Other Program Funding Summary: Not Applicable.

D. Acquisition Strategy: Not Applicable.

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P709**

E. Major Performers Not Applicable.

OSD RDT&E COST ANALYSIS (R3)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY
RDT&E/ Defense Wide BA# 4

PE NUMBER AND TITLE
0603709D8Z - Joint Robotics Program

PROJECT
P709

I. Product Development	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2005 Cost	FY 2005 Award Date	FY 2006 Cost	FY 2006 Award Date	FY 2007 Cost	FY 2007 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development			1000	6612		11500		2890		0	0	0
Systems Engineering			200	800		572		450		0	0	0
Subtotal:			1200	7412		12072		3340		0	0	0

II. Support Costs	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2005 Cost	FY 2005 Award Date	FY 2006 Cost	FY 2006 Award Date	FY 2007 Cost	FY 2007 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Subtotal:			0									

III. Test And Evaluation	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2005 Cost	FY 2005 Award Date	FY 2006 Cost	FY 2006 Award Date	FY 2007 Cost	FY 2007 Award Date	Cost To Complete	Total Cost	Target Value of Contract
DT			500	0		0		0		0	0	0
IOT&E			0	0		0		0		0	0	0
Subtotal:			500	0		0		0		0	0	0

IV. Management Services	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2005 Cost	FY 2005 Award Date	FY 2006 Cost	FY 2006 Award Date	FY 2007 Cost	FY 2007 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Subtotal:			0									

OSD RDT&E COST ANALYSIS (R3)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P709**

Project Total Cost:	**1700**	**7412**		**12072**		**3340**		**0**	**0**	**0**

Schedule Profile (R4 Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P709**

Event Name	FY 05				FY 06				FY 07				FY 08				FY 09				FY 10				FY 11			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
MTRS PSVM T&E	[redacted]																											
MTRS PRM T&E																												
(1) MTRS AAP PROD DEC																												
RONS CIP																												
EOD Cooperative Robotics																												

Schedule Detail (R4a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P709**

Schedule Detail	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
MTRS PSVM T&E							
MTRS PRM T&E	1Q						
MTRS AAP PROD DEC	1Q						
RONS CIP	1-4Q	1-4Q	1-3Q				
Next Gen EOD RCV		1-4Q	1-4Q	1-4Q	1-4Q		
EOD Cooperative Robotics		1-4Q	1-4Q	1-4Q	1-4Q		

Comment:

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P715**

Cost ($ in Millions)		FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
P715	Tech Transfer	0.500	1.000	1.000	1.000	1.000	1.000	1.000

A. Mission Description and Project Justification: (U) Technology Transfer (TechTXFR) employs a spiral development process to enhance the functionality and autonomy of mobile robot systems, such as those currently being used in theatre to address Improvised Explosive Device (IED) threats, by assessing the maturity level of robotic technologies developed in the research environment and advance their Technology Readiness Level (TRL) for prototype testing and demonstration in an operational environment. The technical approach is to harvest prior and on-going technology developments from disparate players that address the technology needs identified by emergent in-theatre requirements and the users of the JRP Robotic Systems Pool. The component technologies are tested and evaluated on transition platforms to identify the best features of the different approaches, which are then integrated and optimized to work in harmony in a complete solution. TechTXFR has already produced phenomenal results with tremendous savings to the government. TechTXFR does not develop new technologies from scratch; it instead brings in pre-developed proven technologies from the research environment and offers them a transition opportunity as opposed to the technologies stagnating as unutilized laboratory prototypes. techtxfr has leveraged resources from a wide variety of disparate players, including other government agencies and academia, and equally important has also been leveraged by other government programs. techtxfr has also teamed with a number of organizations with similar ambitions to synergistically pursue robotic technologies in a spiral development process, such as the Idaho National Laboratory (INL) Department of Energy (DoE). INL has a direct interest to transition autonomous technologies for use in a variety of DoE missions, including homeland defense and critical infrastructure protection. The collaborative work maximizes efficiency by bringing in additional resources (money and personnel) that result in leveraging of even more technologies.

(U) The end result is a centralized JRP mechanism that continuously capitalizes on state-of-the-art technologies from the research environment to create a standardized solution that can be easily transitioned to ongoing development programs service-wide.

B. Accomplishments/Planned Program:

Accomplishment/Planned Program Title	FY 2005	FY 2006	FY 2007
(U) FY 2005 Accomplishments	0.500	0.000	0.000

- Further enhanced SRI's SLAM algorithm to use particle-filters to maximize computation efficiency.
- Developed gradient-based path planning algorithm based on SRI's SLAM occupancy maps to allow generation of motion trajectories from a specified starting position to a goal position while avoiding obstacles in the environment.
- Further developed SRI's SLAM algorithm for ladar-based intruder detection-on-the-move.
- Integrated manipulation technologies from University of Texas, Austin (UTA) and NASA onto a mobile robot, focusing on articulated robotics arms and hands.
- Integrated GPS Waypoint Navigation.
- Fused global and local coordinate system for seamless transition between outdoor and indoor navigation.
- Integrated University Southern California's (USC) Player/Stage Device Server with INL's ARCA to evaluate capability to allow multiple control algorithms to access robot devices (i.e., sensors, actuators) in a standard way in order to adapt and standardize on a reconfigurable software framework that can be easily ported from one robotic system to another.
- Integrated JAUS messaging with INL's ARCA.

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P715**

Accomplishment/Planned Program Title	FY 2005	FY 2006	FY 2007
(U) FY 2006 - FY 2007 Plans	0.000	1.000	1.000

- Integrate/evaluate University of Michigan's gyro-enhanced dead reckoning system with SRI's SLAM algorithms for precise (error<1.0%) identification of current location and mapping of surrounding area.
- Further optimize SLAM capabilities for outdoor applications in GPS-denied areas.
- Integrate/evaluate thermal vision tracking with ladar-based intruder detection algorithm for enhanced human presence detection.
- Integrate UCSD's object detection/recognition research for license plate/car recognition and evaluate for generalized classes of objects (i.e., weapons).
- Fuse object detection/recognition techniques to augment the SLAM map for an augmented virtuality interface.
- Apply object detection/recognition techniques for automated manipulation control and complex sign interpretation.
- Investigate/evaluate University of Washington's ladar-based motion detection-on-the-move.
- Investigate/evaluate University of Washington's exploration algorithm with SRI's SLAM algorithm.
- Investigate/evaluate SRI's multi-robot mapping technology.

Investigate/evluate voice recognition and natural language understanding for advanced operator control.

C. Other Program Funding Summary: Not Applicable.

D. Acquisition Strategy (U) Results of our technology harvesting and optimization will be transitioned to other government programs or to industry as they become available or are requested. Example programs of past transition are DoE Remote Sensing Laboratory and US Army Maneuver Support Center (MANSCEN). Example programs for future transition are Army"s Future Combat Systems (FCS) and the Mobile Detection Assessment and Response System (MDARS). Candidates for transition to industry include iRobot, Foster-Miller Inc. and Mesa Robotics.

E. Major Performers

Category	Name	Location	Type of Work and Description	Award Date
Labs				
	SPAWARSYSCEN	San Diego, CA	Program Management	

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P716**

Cost ($ in Millions)		FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
P716	JAUS	1.810	1.000	0.400	0.400	0.400	0.400	0.400

A. Mission Description and Project Justification: (U) The intent of this program is to develop common open software architecture to ensure unmanned systems' interoperability and evolution with resultant cost savings. JAUS will specify the logical interfaces between computing modules to allow for rapid technology transfer. Continue to develop JAUS such that it attains clear objectives and maintains a consistent philosophy while promoting jaus as the domain architecture for Unmanned Systems. The Unmanned Systems community will be educated on jaus to support acquiring, developing, testing, and manufacturing organizations' incorporation of jaus into their products and services. jaus has started the transition to a commercial standards body through the petitioning of the Society of Automotive Engineers (SAE), Aerospace Council Avionics Standards Development group. jaus will migrate to the Committee AS-4, Unmanned Systems. jaus is stated as a requirement within the Army's Future Combat Systems (FCS) and the Navy's unmanned systems, presently minus unmanned aerial vehicles (PEO-Littoral and Mine Warfare).

B. Accomplishments/Planned Program:

Accomplishment/Planned Program Title	FY 2005	FY 2006	FY 2007
(U) FY 2005 Accomplishments	1.810	0.000	0.000

- Conducted two JAUS Working Group meetings.
- Validated JAUS for Unmanned Ground Systems control.
- Continued the validation of JAUS support for mission packages/payloads.
- Developed support mechanism for Ad-Hoc networking of Unmanned Systems.
- Conduct two SAE AS-4 (Unmanned System) committee meetings

Accomplishment/Planned Program Title	FY 2005	FY 2006	FY 2007
(U) FY 2006-FY 2007 Plans	0.000	1.000	0.400

- Demonstrate and validate support for network-based systems.
- Demonstrate and validate support for all unmanned system types.
- Integrate JAUS into Simulation Systems for experimentation/validation.
- Develop interface for Net-Centric systems for mission level data.
- Complete first version of the compliance tool suite.
- Maintain JAUS Documents.
- Maintain JAUS Compliance Tools Suite.

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P716**

C. Other Program Funding Summary: Not Applicable.

D. Acquisition Strategy JAUS will transition to industry stadards in SAE. JAUS is currently a requirement in a number of unmanned systems acquisitions including Future Combat Systems and supported as arequirement for the Navy (Littoral and Mine Warfare).

E. Major Performers

Category	Name	Location	Type of Work and Description	Award Date
Labs				
	Air Force Research Laboratory (AFRL)	Panama City, FL	Program Management	

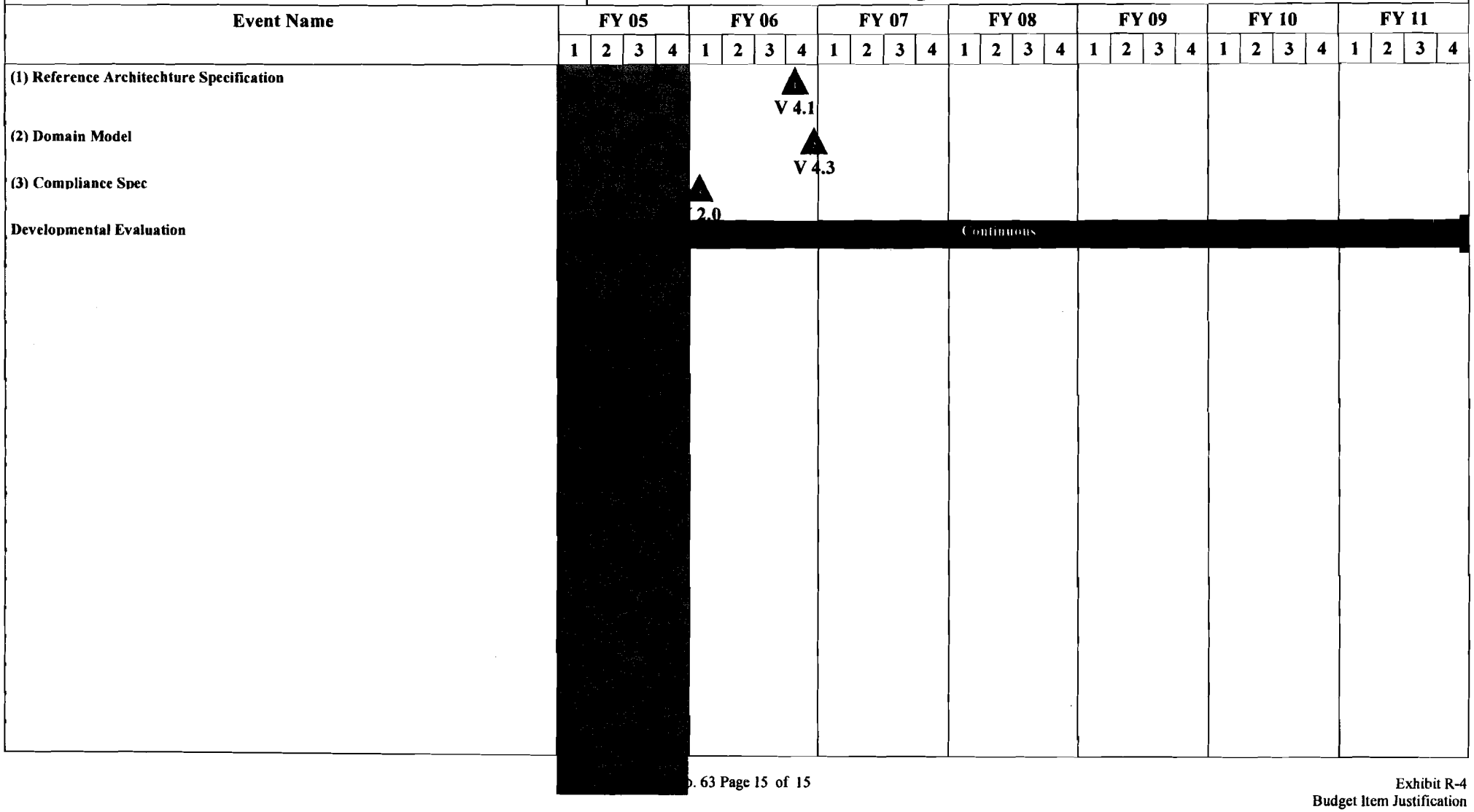
Schedule Profile (R4 Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY
RDT&E/ Defense Wide BA# 4

PE NUMBER AND TITLE
0603709D8Z - Joint Robotics Program

PROJECT
P716



Schedule Detail (R4a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P716**

Schedule Detail	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Reference Architecture Specification Versions 3.1; 3.2; 4.0; 4.1	1-4Q	1-3Q					
Domain Model Versions 3.0; 3.1; 3.2; 3.3; 4.0; 4.1; 4.2; 4.3	1-4Q	1-4Q					
Compliance Spec Versions 1.0; 2.0	2-3Q	1Q					
Developmental Evaluation	1-4Q	1-4Q	1-4Q	1-4Q	1-4Q	1-4Q	1-4Q

Comment:

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P717**

Cost ($ in Millions)		FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
P717	Gladiator	0.900	1.700	0.000	0.000	0.000	0.000	0.000

A. Mission Description and Project Justification: (U) The Gladiator Program is a USMC initiative based on the Gladiator Tactical Unmanned Ground Vehicle (TUGV) Operational Requirements Document (ORD). Mission Need Statement (MNS) INT 12.1.1 (dated 17 Apr 2004) validated the need for a tactical unmanned ground vehicle system, and the ORD was approved in July 2004. The Gladiator will support the dismounted infantry of the Marine Ground Combat Element (GCE) with the organic unmanned capability to remote combat tasks including scout/surveillance. The system will reduce risk and neutralize threats to Marines across the full spectrum of conflict and military operations. The Gladiator is a teleoperated/semi-autonomous, small-to-medium sized, highly mobile UGV with, initially, the basic capability to conduct armed scout/surveillance missions and to carry various mission payloads for specific tasks. It will be inherently simple, durable, multi-functional, and easily transported. In the conduct of Operational Maneuver From The Sea (OMFTS), Ship To Objective Maneuver (STOM), Sustained Operations Ashore (SOA), and Operations Other Than War (OOTW), the Gladiator will enhance the ability to accomplish assigned missions. Operating just forward of the GCE units, Gladiator will perform basic scouting/surveillance, obstacle breaching, direct fire (both lethal and non-lethal), anti-armor, and NBC reconnaissance tasks while permitting the operator to remain covered or concealed. The basic Marine Corps system will consist of a mobile base unit (MBU), an OCU, and specific mission payload modules (MPMs). Initial MPMs will include Shoulder-launched Multi-purpose Assault Weapon (SMAW), Anti-Personnel Obstacle Breaching System (APOBS), Light Vehicle Obscurrant Smoke System (LVOSS), M240 and M249 Machine Guns, and current NBC detectors.

B. Accomplishments/Planned Program:

Accomplishment/Planned Program Title	FY 2005	FY 2006	FY 2007
(U) FY 2005 Accomplishments	0.900	0.000	0.000

- Program moved into System Design and Development (SDD). Obtained MS B approval. Awarded SDD contract.
- Completed PDR
- Completed detailed design of Gladiator.
- Completed Future Naval Capability demonstrations.

Accomplishment/Planned Program Title	FY 2005	FY 2006	FY 2007
(U) FY 2006 Plans	0.000	1.700	0.000

- Program moved into SDD with funding from PE 06047098DZ.

C. Other Program Funding Summary: Not Applicable.

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D. Acquisition Strategy Down select competition for Gladiator SDD. Two contractors selected: Lockheed Martin, Dallas, TX and Carnegie Mellon, Pittsburgh, PA. The Carnegie Mellon team was selected for SDD.

E. Major Performers Not Applicable.

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PROJECT
P717

I. Product Development	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2005 Cost	FY 2005 Award Date	FY 2006 Cost	FY 2006 Award Date	FY 2007 Cost	FY 2007 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development			2335	805		1400		0		0	0	0
Systems Engineering			148	95		300		0		0	0	0
Subtotal:			2483	900		1700		0		0	0	0

II. Support Costs	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2005 Cost	FY 2005 Award Date	FY 2006 Cost	FY 2006 Award Date	FY 2007 Cost	FY 2007 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Subtotal:			0									

III. Test And Evaluation	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2005 Cost	FY 2005 Award Date	FY 2006 Cost	FY 2006 Award Date	FY 2007 Cost	FY 2007 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Subtotal:			0									

IV. Management Services	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2005 Cost	FY 2005 Award Date	FY 2006 Cost	FY 2006 Award Date	FY 2007 Cost	FY 2007 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Subtotal:			0									

Project Total Cost:			**2483**	**900**		**1700**		**0**		**0**	**0**	**0**

Schedule Profile (R4 Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY
RDT&E/ Defense Wide BA# 4

PE NUMBER AND TITLE
0603709D8Z - Joint Robotics Program

PROJECT
P717

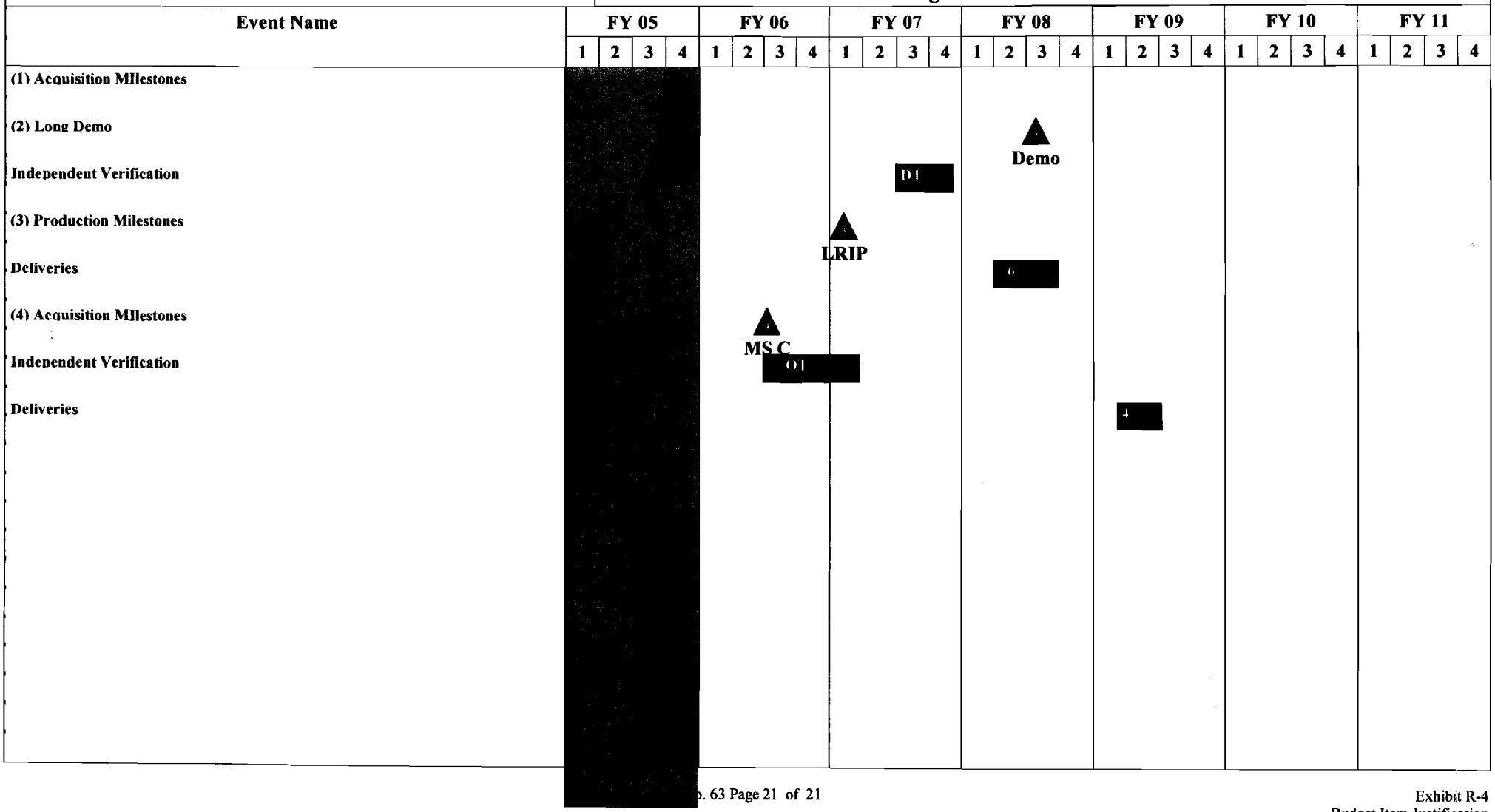


Exhibit R-4
Budget Item Justification

Schedule Detail (R4a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P717**

Schedule Detail	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Milestone B							
Contract Preparation							
SDD Contract Award	1Q						
SDD	1-4Q	1-4Q	1-4Q				
Developmental Test		3-4Q					
Log Demo				3Q			
Operational Test				2-4Q			
Milestone C			2Q				
Low Rate Initial Production			3-4Q	1-4Q			
IOT&E				2-4Q			
Full Rate Production					2Q		
First Unit Equipped					3Q		

Comment:

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P718**

Cost ($ in Millions)		FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
P718	Robot Combat Support System (RCSS)	0.000	2.000	1.500	1.250	0.000	0.000	0.000

A. Mission Description and Project Justification: (U) The Robotic Combat Support System (RCSS) Program is an upgrade approach from the Product Improved Mini-Flail (PIMF). The PIMF has proven effective in Bosnia and Kosovo, as well as in current operation in Afghanistan, as a contingency asset. RCSS threshold requirements include anti-personnel mine clearing and neutralization, improved reliability and human-machine interface, Anti-Personnel wire obstacle breaching, remotely deployed smoke and obscurants, and the capability to carry soldier loads. Initial RCSS deployment to Afghanistan occurred during FY 2004 and continues through FY 2006 to deployed forces. P3I requirements include advanced controls, remotely delivered special munitions to support dismounted operations, hands-free control using dismounted soldier leader-follower technology, and mechanical devices that will be used to emplace demolitions and special breeching systems. A Mission Need Statement (MNS) and Operational Requirements Document (ORD) have been approved by Army Training and Doctrine Command (TRADOC). Procurement continues through FY 2006, while system engineering to develop full ORD required capability will be developed and integrated into the operational fleet.

B. Accomplishments/Planned Program:

Accomplishment/Planned Program Title	FY 2005	FY 2006	FY 2007
(U) FY 2005 Accomplishments	0.000	0.000	0.000

- Obtain Type Classification.
- Determine and identify Mission Essential Modules to improve COTS system multi-mission capability.
- Initiate Mission Essential Modules Integration program.

Accomplishment/Planned Program Title	FY 2005	FY 2006	FY 2007
(U) FY 2006/2007 Plans	0.000	2.000	1.500

- Accomplish Type Classification testing.
- Continue fielding and support of RCSS COTS systems to War on Terrorism forces.
- Complete system engineering modifications to fielded systems.
- Obtain Type Classification.
- Determine and identify Mission Essential Modules to improve COTS system multi-mission capability.
- Initiate Mission Essential Modules Integration program

C. Other Program Funding Summary: Not Applicable.

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)		Date: February 2006
APPROPRIATION/ BUDGET ACTIVITY RDT&E/ Defense Wide BA# 4	PE NUMBER AND TITLE **0603709D8Z - Joint Robotics Program**	PROJECT **P718**

D. Acquisition Strategy: Not Applicable.

E. Major Performers Not Applicable.

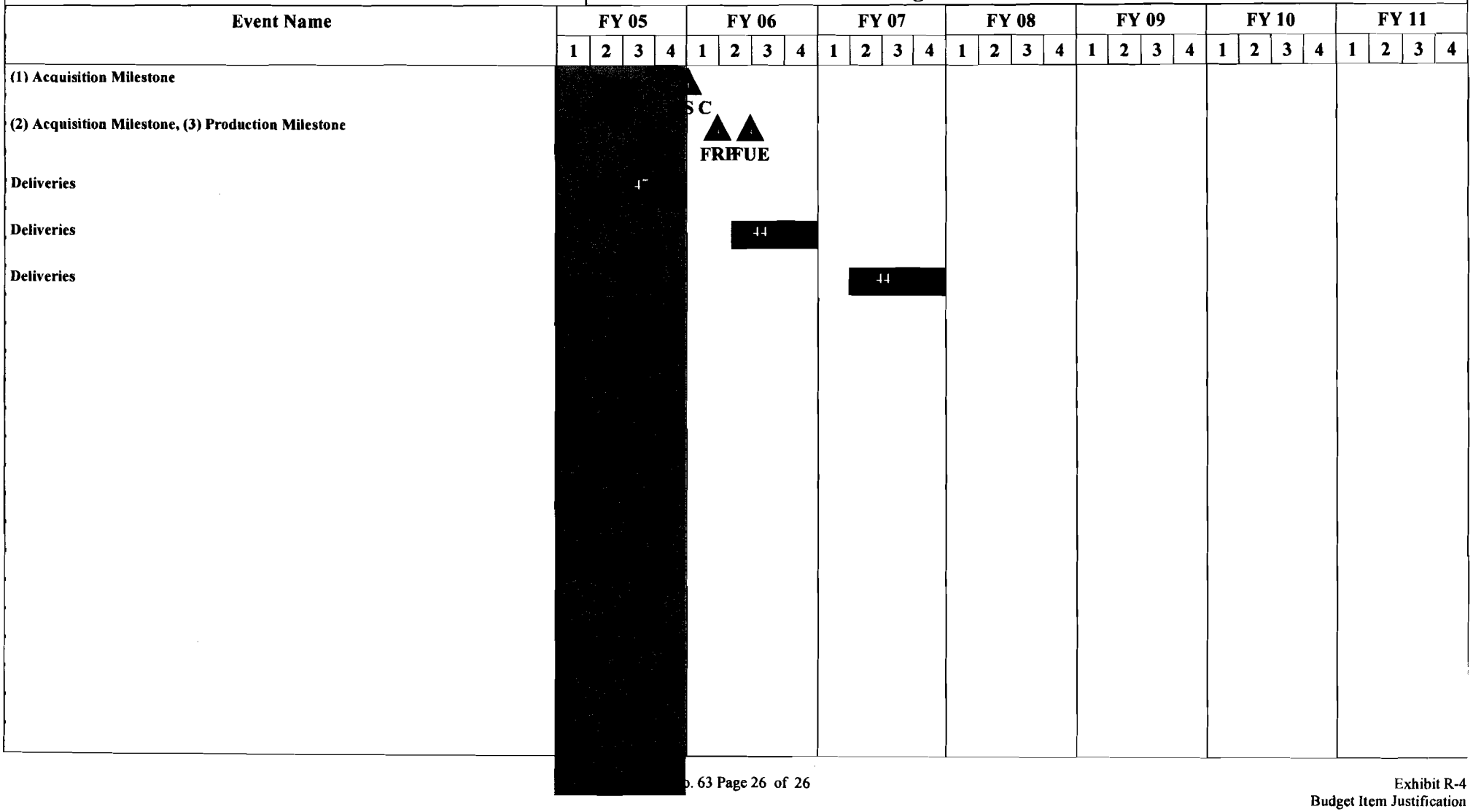
Schedule Profile (R4 Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY
RDT&E/ Defense Wide BA# 4

PE NUMBER AND TITLE
0603709D8Z - Joint Robotics Program

PROJECT
P718



Schedule Detail (R4a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P718**

Schedule Detail	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Milestone B							
COTS Contract Preparation							
COTS Contract Award							
Safety Testing							
Safety Certification	1-4Q	1-4Q	1-4Q				
Spiral Fielding initiated	1-4Q	1-2Q					
Type Classification Testing	3-4Q	1-4Q					

Comment:

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P719**

Cost ($ in Millions)		FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
P719	National Unmanned Systems Experimentation Environment (NUSE 2)	3.064	1.065	0.000	0.000	0.000	0.000	0.000

A. Mission Description and Project Justification: The National Unmanned Systems Experimentation Environment (NUSE2) is a new Department of Defense/Private sector teaming initiative. This will be a collaborative effort to provide infrastructure and assets for experimenting with all types of Unmanned Systems - air, ground, surface and underwater - that is national in scope. NUSE2 will provide developers/acquirers of Unmanned Systems with dedicated experimentation facilities, ranges, and airspace that would otherwise be hard to schedule and are often expensive. The initiative will begin in FY 2004, starting with some limited objective experiments using Unmanned Ground Vehicles.
NUSE2 will be a consortium of organizations agreeing to form and provide the experimentation capability. The Nation is the true beneficiary of this effort and conveys the coast-to-coast and Alaska and Hawaii, scope of NUSE2. NUSE2 is intended to provide an experimentation base for Unmanned System acquirers over the life cycle. This will include live as well as virtual experiments. NUSE2 will be a valuable asset in the coming years, providing accessible, affordable, RDTE capabilities.
The objectives of NUSE2 are:

- Assist users in refining capabilities (formerly operational requirements)
- Support acquirers in conducting experiments to reduce technical risk.
- Participate in the evaluation of evolutionary upgrades to Unmanned Systems
- Support experiments associated with Advanced Concept Technology Demonstrations
- Facilitate the evaluation of new technologies and aid the tech transfer process of new capabilities for Unmanned Systems
- Support the developmental, operational, and live fire testing requirements of acquirers
- Aid in the development of advanced integrated architectures as they apply to Unmanned Systems
- Be dual capable, i.e., able to support experimentation and testing in both live and virtual venues

B. Accomplishments/Planned Program:

Accomplishment/Planned Program Title	FY 2005	FY 2006	FY 2007
(U) FY 2005 Accomplishments	3.064	0.000	0.000

Experimentation: The following are experiments designed to further the national robotics program:
* OPC#3 - further the standization of JAUS/AS4, Virginia
* Collaborative Engagement - exercise the REDCAR platform at F.E Warren, Wyoming
* Under-vehicle inspection system, Alaska

Technology: The following Technology requirements are being filled by the applicable institution
* Lightweight, Low Power, Robust means of removing image jitter, University of Wyoming

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P719**

* Biometric Vision Sensor, University of Wyoming
* Ultra Wideband Communication and Positioning Systems, University of Alaska
* Autonomous data exchange in Multi-Robot Collectives, University of Wyoming
* JAUS Compatible Mission Planning, University of Florida
* Integrated Mobile Manipulation Systems, University of Texas - Austin

Infrastructure: NUSE2 has awarded infrastructure improvements to all sites.
* High Speed test track, Florida
* JUTTC improvements, Wyoming
* Test track upgrade, Alaska
* Wireless Wide Area Network, Mississippi

* Site Upgrades , Texas
* Improved Integration facility, California

• Formalize NUSE2 strategy, campaign plan, and organize team.
• Formalize technology requirement and fulfillment process.
• Develop statements of work for NUSE2 site infrastructure improvements
• Operate the IPT's (M-IPT, E-IPT, T-IPT).
• Identify and refine standards and metrics for experiments.
• Let contracts to fulfill requirements.
• Verification of technology fulfillment
• Identify and begin planning for follow-on experimentation.

Accomplishment/Planned Program Title	FY 2005	FY 2006	FY 2007
(U) FY 2006 Plans	0.000	1.065	0.000

• Continue to identify and acquire infrastructure requirements.
• Continue IPT oversight.
• Continue to identify and refine standards and metrics for experiments.
• Execute FY05 multi-year contracts.
• Expand NUSE2 as required.
• Expand NUSE2 capabilities to include unmanned air, surface, and subsurface systems.

C. Other Program Funding Summary: Not Applicable.

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P719**

D. Acquisition Strategy: Not Applicable.

E. Major Performers

Category	Name	Location	Type of Work and Description	Award Date
Labs				
	Air Force Research Laboratory	Panama City, Fl	Program Management	
Universities				
	University of Florida	Gainsville, Fl	Research	
Contractors				
	Applied Research Associates	Scientific & Engineering Services	Panama City, FL	
	Wintec Inc.	Scientific & Engineering Services	Panama City, FL	
	Titan	Scientific & Engineering Services	Panama City, FL	
Others				
	Kachemak Research Development Inc (KRD)	Engineering Services	Homer, Alaska	

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P720**

Cost ($ in Millions)		FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
P720	Intelligent Mobility Program	4.516	2.120	1.500	1.500	1.500	1.500	1.500

A. Mission Description and Project Justification: (U) The Intelligent Mobility program is an effort under the U.S. Army Research and Development Command Engineering Center (RDECOM-TARDEC) Intelligent Mobility (IM) Program. Mobility Enhancement through the utilization of novel running gear such as reconfigurable shape, Omni-directional drive systems, and improved mobility sensor integration will improve the mobility of small unmanned ground vehicles (UGVs) to operate on both improved surfaces and off-road terrain in support of urban warfare, physical security and force protection missions for military police and engineering operations. Of particular and immediate interest is the Omni-Directional Inspection System, which is a man packable size robot capable of omni-directional locomotion on structured surfaces and in the next spiral development on off road areas as well for the purpose of inspecting vehicles and other hard to access areas in a force protection role and in an EOD role as an IED disruptor delivery device. There is a current validated urgent need generated by CENTCOM to utilize UGVs for EOD and force protection missions. Twenty seven prototype ODIS UGVs are currently deployed to Iraq and Afghanistan in order to collect data, prove out the current prototype system, and simultaneously provide needed UGV functionality to the user in hostile environments. Other government agencies are also evaluating the systems within CONUS for use in areas requiring higher security or security screening. TRML is also working to develop a draft Mission Needs Statement for the ODIS robot with Military Police/Force Protection agencies. We are working with soldiers in Iraq to fulfill requirements delivered in an official needs statement. The next spiral development iteration will produce approximately 40 upgraded ODIS units for deployment. These units will have enhanced mobility, allowing them to operate in rough terrain such as, rutted roads, over curbs, rocks, puddles up to 5 inches deep, etc. They will also have the capability to easily accept manipulator arms, masts, chemical detectors, and other sensors as needed by the user.

B. Accomplishments/Planned Program:

Accomplishment/Planned Program Title	FY 2005	FY 2006	FY 2007
(U) FY 2005 Accomplishments	4.516	0.000	0.000

- Completed acquisition of over 30 ODIS-T2 production prototype units currently deployed in SWA and CONUS for experimentation and deployment.
- Deployed 4 units to Iraq (Baghdad area) for use by Force Protection Units.
- Deployed 3 units to Afghanistan for use by Force Protection units.
- Completed first revision and product improvement of ODIS for functional prototype testing.
- Began next spiral of ODIS development which will yield upgraded systems in 2nd quarter FY 2006.

Accomplishment/Planned Program Title	FY 2005	FY 2006	FY 2007
(U) FY 2006/2007 Plans	0.000	2.120	1.500

- Revise the ODIS platform design to include changes suggested from testing and user input in theater.
- Further testing of ODIS at the Port of Los Angeles and Long Beach for data realtive to force protection in a Homeand defense application
- Continue to deploy ODIS robots and support personnel for ODIS in SWA theater
- Track data from deployment and integrate lessons learned for ODIS and other small robots.

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P720**

- Continue to develop prototype ODIS platform variants based on user requests and inputs.
- Investigate utility and need for ODIS platform variants.
- Further improve robot control based on Iraq deployment data
- Improve methods for integrating mission packages
- Investigate other intelligent mobility mechanical concepts for improved functionality

C. Other Program Funding Summary: Not Applicable.

D. Acquisition Strategy: Not Applicable.

E. Major Performers Not Applicable.

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P721**

Cost ($ in Millions)		FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
P721	Robotics for Agile Combat Support (RACS)	1.800	5.861	1.200	1.200	1.200	1.200	1.200

A. Mission Description and Project Justification: (U) The Robotics for Agile Combat Support (RACS) is a USAF effort to advance the robotic state-of-the-art capability for counter-terrorism and force protection technologies. RACS programs include the following: Mine Area Clearance Vehicle, Robotics for forensic A/C recovery functions, Autonomous Range Clearance, Joint Architecture for Unmanned Systems (JAUS), Automated Perimeter Security (APS), Joint Laser Ordnance Neutralization System (JLONS), Advanced Robotic Technologies Development, and UxV Cooperation. This project specifically meets the requirement to safely remove warfighters from multiple or specific hazards associated with their particular mission. For example, EOD operators are removed from the hazards associated with UXO & IED using the JLONS and Engineers are removed from the UXO hazard associated with clearing areas for beddown of forces. Requirements documents that support this work include the RONS ORD, ARTS ORD (CAF (USN) 014-93-I_II-A), MNS for Explosive Ordnance Disposal (EOD) (#M043-85-93) and draft version of CDD for J-LONS.

B. Accomplishments/Planned Program:

Accomplishment/Planned Program Title	FY 2005	FY 2006	FY 2007
(U) FY 2005 Accomplishments	1.800	0.000	0.000

- Mine Area Clearance Vehicle (MACV)
  - Completed design and development of initial prototype with basic low-level control systems.
  - Conducted familiarization with end-users.
  - Initiated technology transition effort.
- Robotics for forensic A/C recovery functions
  - Conducted initial requirements assessment and program management activities.
- Enhanced Standoff Munitions Disruption System (E-SMUD)
  - Developed a low-cost laboratory demonstrator version of an AR-10, 7.62mm rifle.
  - Conducted limited user evaluation testing against live and inert ordnance.
  - Transitioned technology to Air Force System Program Office (SPO) for EMD acquisition phase.
  - Completed development of a radio controlled Tele Remote Aiming Platform (TRAP) system.
  - Transition TRAP technology to NAVEODTECHDIV.
- Robo-Trencher
  - Completed enhanced second generation Robo-Trencher.

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P721**

- Automated Ordnance Excavator (AOE)
  - Adapted initial algorithms for auto dig mission module to the AOE.

- J-LONS - (Joint Laser Ordnance Neutralization System)
  - Conducted multi-national assessment of foreign partner developed systems.
  - Established baseline plan for characterization of ordnance/laser interactions.
  - Continued support to the NAVEODTECHDIV JLONS IPT.

- Advanced Robotics System
  - Conducted initial experiment using visual techniques for UXO detection.
  - Researched high speed obstacle avoidance using microwave radar technologies.

- Joint Architecture for Unmanned Systems (JAUS)
  - Supported the JAUS working group and multiple committees.
  - Generated obstacle detection and avoidance simulation, sensor fusion for obstacle detection, and high speed assisted tele-operation algorithm.

- REDCAR (Remote Detection Challenge and Response system)
  - Integrated JAUS compliant surveillance mission payload.
  - Conducted a limited user experiment of the REDCAR system at FE Warren.

- UAV-UGV
  - Demonstrated transfer of aerial video through JAUS networked system on rotary-wing UAV.
  - Delivered Remotely Controlled Aerial Vehicle for Application of Pesticide (RCAVAP) to 757 Aerial Spraying Squadron.

- Active Range Clearance
  - Redesigned system and a completed prototype magnetic UXO scrap collection system.
  - Conducted initial testing and characterization of the system.

- BomBot
  - Delivered prototype units to the Marines in Camp Lejeune, USMC in Haiti, and USAF EOD units in support of Iraqi Freedom.
  - Formed working group to prioritize requirements for a small low cost robotic system for EOD.
  - Completed transition package and delivered to NAVEODTECHDIV and EOD/LIC.

Accomplishment/Planned Program Title	FY 2005	FY 2006	FY 2007
(U) FY 2006-FY 2007Plans	0.000	5.861	1.200

- Mine Area Clearance Vehicle (MACV)
  - Develop second prototype that will include high level controls and semi-autonomous technologies.

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)	Date: February 2006
APPROPRIATION/ BUDGET ACTIVITY RDT&E/ Defense Wide BA# 4	PE NUMBER AND TITLE **0603709D8Z - Joint Robotics Program**
	PROJECT **P721**

- Robotics for forensic A/C recovery functions
  - Conduct literature search.
  - Develop baseline plan.
  - Investigate enabling technologies to meet program requirements.

- Automated Ordnance Excavator (AOE)
  - Tune and refine the auto-dig algorithms for different soil conditions.
  - Expand control to include volumetric and 3-D awareness.

- J-LONS - (Joint Laser Ordnance Neutralization System)
  - Maintain oversight of the international program.
  - Perform characterization of ordnance/laser interactions.

- Advanced Robotics System
  - Develop transport control algorithms; planning and execution algorithms; cooperation algorithms; and visual understanding algorithms.

- Joint Architecture for Unmanned Systems (JAUS)
  - Continue message set development and formalization of transition methodology to SAE AS/4.

- Automated Perimeter Security (APS)
  - Development of additional scout capabilities and perform a 30 day experiment at AF base.
  - Integrate additional JAUS-compatible sensor modules to scout platforms.

- UAV-UGV
  - Incorporation of UAV aerial video ordnance discrimination capabilities integrated into standoff munitions disruption (SMUD) capabilities.

- Active Range Clearance
  - Conduct integrated experiment of ground and aerial platforms.
  - Continue development of automated ground targeting system.
  - Continue development of image feature extraction algorithms for UXO detection.

C. Other Program Funding Summary: Not Applicable.

D. Acquisition Strategy: Not Applicable.

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P721**

E. Major Performers

Category	Name	Location	Type of Work and Description	Award Date
Labs				
	Air Force Research Laboratory	Panama City	Research and Development	
Contractors				
	Applied Research Associates	Scientific & Engineering Services	Panama City, FL	
	Wintec Inc	Scientific & Engineering Services	Panama City, FL	
	Radiance	Technical Support	Panama City, FL	
Others				
	Titan	Technical Support	Panama City, FL & Huntsville, AL	

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P722**

Cost ($ in Millions)		FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
P722	Robotic Technology Enhancement	0.000	0.000	3.270	3.517	4.835	5.081	5.363

A. Mission Description and Project Justification: Not Applicable.

B. Accomplishments/Planned Program: Not Applicable.

C. Other Program Funding Summary: Not Applicable.

D. Acquisition Strategy: Not Applicable.

E. Major Performers Not Applicable.

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P723**

Cost ($ in Millions)		FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
P723	Commercial Off The Shelf (COTS)	0.500	0.200	0.000	0.000	0.000	0.000	0.000

A. Mission Description and Project Justification: (U) The purpose of the Commercial-off-the-Shelf (COTS) program is to create and maintain a consolidated pool of small, mobile robots that are made available for loan to government agencies, laboratories and universities to assist in defining requirements, improving tactics, techniques, and procedures, and enabling more economical acquisitions of unmanned systems throughout DoD and the government. This program is also identified by organizational members as the Robotic Systems Pool (RSP). The robots that populate the pool are COTS systems available from several manufacturers. Evaluation reports from experiments conducted with the robots provide valuable feedback for future small robot developments. Loan priority goes to DoD organizations, homeland security and emergency response users, and research and academia. Where appropriate, assets are supplemented with unique developmental technologies to address emerging operational and programmatic requirements, for example, extensions to COTS systems in support of Operation Iraqi Freedom and Operation Enduring Freedom (OIF/OEF) or other urgent in-theater requirements, as well as payload development or platform modifications. The program is also a source of contingency assets for operational (war time) needs - nearly 30 small robots were supplied to Explosive Ordnance Disposal (EOD) teams deployed to Iraq and Afghanistan for the inspection and subsequent removal of Improvised Explosive Devices (IEDs) and support continues today for EOD technicians through loans, training, and technical assistance.

B. Accomplishments/Planned Program:

Accomplishment/Planned Program Title	FY 2005	FY 2006	FY 2007
(U) FY 2005 Accomplishments	0.500	0.000	0.000

- Provided training for U.S. Navy Reserve forces in support of the Robotic Systems Joint Project Office Joint Robotics Repair Facility in Baghdad, Iraq for OIF.
- Provided operator training to over 75 joint robotics users in the use of man-portable robots for IED inspection and disposal.
- Collected, organized, and posted user feedback to on-line website.
- Over 35 man-portable robot loans made to over 20 DoD, government, and local/federal agencies.
- Over 40 pool systems repaired in-house by Navy Reservists. Robotic technical support and repairs performed for multiple local EOD units.
- Supported many facets of man-portable unmanned systems research, providing countless recommendations to vendors and R&D organizations to improve current and future military robotic systems.
- Documented in-theater and stateside pre-deployment support and development in technical paper presented at SPIE conference, March 2005, "Supporting the Joint Warfighter by Development, Training, and Fielding of Man-Portable UGVs".
- Integrated 40 Vanguard platforms returned from in-theater use into the RSP. Performed initial operational assessment of these platforms.
- Fielded prototype toolbar and liftkit for in-theater use and evaluation by EOD technicians.

Accomplishment/Planned Program Title	FY 2005	FY 2006	FY 2007
(U) FY 2006 Plans	0.000	0.200	0.000

- Procure off-the-shelf small robots for loan to government agencies, laboratories, and universities for the purpose of accelerating the spiral development process, more quickly improving future robotic platforms for the joint warfighter. Several configurations will be procured. Payloads that offer additional capabilities to address emerging threats/needs will be pursued.

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)		Date: February 2006
APPROPRIATION/ BUDGET ACTIVITY RDT&E/ Defense Wide BA# 4	PE NUMBER AND TITLE **0603709D8Z - Joint Robotics Program**	PROJECT **P723**

- Support limited objective experiments, feasibility demonstrations, and concept exploration projects.
- Support requests for contingency assets where feasible.
- Support training and maintenance of assets in the field, to include joint EOD teams both stateside and deployed in-theater.
- Collection of performance data to provide feedback to developers for the improvement of RSP systems and technologies.
- Provide technical advice, maintenance, and training to requesting agencies, priority to DoD.
- Maintain and upgrade pool assets, as required.
- Continued robotic payload development.

C. Other Program Funding Summary: Not Applicable.

D. Acquisition Strategy: Not Applicable.

E. Major Performers Not Applicable.

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P724**

Cost ($ in Millions)	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
P724 ADCR	0.324	0.246	0.000	0.000	0.000	0.000	0.000

A. Mission Description and Project Justification: (U) The purpose of the Automatically Deployable Communications Relays (ADCR) project is to develop a practical method of extending range of high-bandwidth wireless digital communications and to overcome line-of-sight (LOS) problems for unmanned ground vehicles (UGV). The proposed method provides a universal relay-deploying module that connects to a UGV through a standard Ethernet. The deployer contains several radio relay "bricks" that are dropped off automatically (transparent to the operator) in order to form a chain of communication relay nodes, thereby extending the effective range between the base station and the UGV. This project is a follow-on to a DARPA funded research project into autonomous wireless ad hoc network maintenance, and heavily leverages the prior effort. Four systems will be developed in response to requests from other military users, including NAVEODTECHDIV and TARDEC.

B. Accomplishments/Planned Program:

Accomplishment/Planned Program Title	FY 2005	FY 2006	FY 2007
(U) FY 2005 Accomplishments	0.324	0.000	0.000

- Developed system architecture. Deployer module will have its own radio and will connect to the unmanned platform via an Ethernet connection.
- Deployer and relay brick architectures have been developed and documented.
- Performed antenna signal strength pattern test on several commercial 2.4GHz antennas. Selected the best performer to be the basis for our antenna system.
- Conducted antenna height vs. useable distance tests using simulation tools. Identified ideal height for our application.
- Prototyped a mechanism for extending the antenna to desired height.
- Prototyped a mechanism for "self-righting" the brick upon being dropped.
- Developed and tested a new DC-DC power regulator board that extended the operating time of the relay bricks by 40%.
- Completed battery and charger testing and selection.
- Developed Deployer software Application Programming Interface.
- Deployer software and relay brick software are under development (to be completed by end of CY05).
- Brick mechanical design is in progress. First prototype will be available before the end of the September 2005.
- Completed initial shock testing.
- Confirmed design interoperability with all targeted robots.

Accomplishment/Planned Program Title	FY 2005	FY 2006	FY 2007
(U) FY 2006 Plans	0.000	0.246	0.000

- Redesign the Compact Ad Hoc Networking Radio (CANR) card for dual military/commercial frequencies.
- Implement rigorous network security protocols.

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 4	**0603709D8Z - Joint Robotics Program**	**P724**

- Produce second-generation ADCR systems based on new radios.
- Completed Brick prototype by the end of December. Perform electrical and mechanical testing and verification. Finalize software. Test dropp off and shock resistance.
- Complete one Deployer system by the end of February 2006. Finalize design and perform electrical and mechanical testing.
- Perform final testing on complete system (deployer and six relay bricks), targeted for a Man-Portable Robotic System (MPRS) URBOT.
- Produce three more systems to be delivered to NAVEODTECHDIV and TARDEC, for operation on the MTRS, TAGS-DM, and Remotec Wolverine unmanned vehicles.
- Generate final report.

C. Other Program Funding Summary: Not Applicable.

D. Acquisition Strategy D. Acquisition Strategy:
Prototype systems are being built for NAVEODTECHDIV and TARDEC. Possible transitional targets include:
Navy - MTRS
Army - FCS
Marines - Gladiator
Air Force - ReDCAR
SOCOM
Intelligence community

E. Major Performers Not Applicable.

OSD RDT&E COST ANALYSIS (R3)

Date: February 2006

APPROPRIATION/ BUDGET ACTIVITY
RDT&E/ Defense Wide BA# 4

PE NUMBER AND TITLE
0603709D8Z - Joint Robotics Program

PROJECT
P724

I. Product Development	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2005 Cost	FY 2005 Award Date	FY 2006 Cost	FY 2006 Award Date	FY 2007 Cost	FY 2007 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Subtotal:			0									

II. Support Costs	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2005 Cost	FY 2005 Award Date	FY 2006 Cost	FY 2006 Award Date	FY 2007 Cost	FY 2007 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Subtotal:			0									

III. Test And Evaluation	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2005 Cost	FY 2005 Award Date	FY 2006 Cost	FY 2006 Award Date	FY 2007 Cost	FY 2007 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Subtotal:			0									

IV. Management Services	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY 2005 Cost	FY 2005 Award Date	FY 2006 Cost	FY 2006 Award Date	FY 2007 Cost	FY 2007 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Subtotal:			0									

Project Total Cost:			**0**									