OSD RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

Date: February 2007

APPROPRIATION/ BUDGET ACTIVITY
RDT&E/ Defense Wide BA# 3

PE NUMBER AND TITLE
0603711D8Z - Joint Robotics/Autonomous Systems

Cost ($ in Millions)		FY 2006 Actual	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Total Program Element (PE) Cost		0.000	8.775	11.256	14.202	14.626	14.825	15.020	15.231
P710	Joint Robotics Program/Autonomous Systems	0.000	8.775	11.256	14.202	14.626	14.825	15.020	15.231

A. Mission Description and Budget Item Justification: (U) This program element (PE) supports the advanced technology development activities of the Joint Ground Robotics Enterprise (JGRE) with a focus on the development of subsystems and components and efforts to integrate subsystems and components into system prototypes for field experiments and/or tests in simulated environments. Projects deliver advanced technology with direct relevance to enhancing warfighters' capabilities that have been identified during operational assessments and field feedback of current unmanned systems. The PE enables Joint Service coordination and provides for interoperability and commonality among unmanned systems. The primary purpose of this PE is to support efforts to overcome technology barriers in the thrust areas of unmanned ground system technologies to include Autonomous & Tactical Behaviors, Manipulation Technologies, Collaborative Operations, Interoperability, Man-portable Unmanned Ground Systems, and Technology Transition/Transformation. The technologies in the PE are generally at Technology Readiness Levels (TRL) of 4, 5, or 6 making transition and transformation activities critical to closing the requirement to capability gap.

B. Program Change Summary	FY 2006	FY 2007	FY 2008	FY 2009
Previous President's Budget (FY 2007)	0.000	7.700	11.600	14.600
Current BES/President's Budget (FY 2008/2009)	0.000	8.775	11.256	14.202
Total Adjustments	0.000	1.075	-0.344	-0.398
Congressional Program Reductions		-0.055		
Congressional Rescissions				
Congressional Increases		1.125		
Reprogrammings				
SBIR/STTR Transfer				
Other		0.005	-0.344	-0.398

C. Other Program Funding Summary: Not Applicable.

D. Acquisition Strategy: Not Applicable.

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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
07						
08						

Comment: Metrics for the Joint Ground Robotics Enterprise (JGRE) funded RDT&E are articulated in individual project plans and overview quad charts used to form the basis of funding justification and program assessment. These decisions are supported by the JGRE Technology Advisory Board (TAB). The TAB provides technology to capability matrix assessments to inform funding decisions, provide inputs to unmanned system (UMS) roadmaps and ensure technology transitions. In all document sets, project descriptions include task schedules with associated milestones, against which progress toward end goals can be measured. At the level of the performer, efforts are tracked using project technical and management milestones that have been appropriately defined and agreed upon in the project plans. At the enterprise level, the JGRE management structure and process tracks deliverables and examines the transition of technologies and ideas from the performer to DoD programs. The JGRE management structure and process includes a mid-year in progress review (IPR), annual funding justification and prioritization, technology assessments, an O-6 Council and a Senior Steering Group (SSG) overview. These DoD participant reviews include cost, schedule and technical progress assessment against the project milestones. Metric evaluations for the funded actions include, where appropriate, controlled trials, demonstrations, quasi-experimental evaluations, and direct/indirect analysis.

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)

Date: February 2007

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 3	**0603711D8Z - Joint Robotics/Autonomous Systems**	**P710**

Cost ($ in Millions)		FY 2006 Actual	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
P710	Joint Robotics Program/Autonomous Systems	0.000	8.775	11.256	14.202	14.626	14.825	15.020	15.231

A. Mission Description and Project Justification: (U) This program element (PE) and associated projects support the advanced technology development activities of the Joint Ground Robotics Enterprise (JGRE) with a focus on the development of subsystems and components and efforts to integrate subsystems and components into system prototypes for field experiments and/or tests in simulated environments. The PE and subsequent project management enables Joint Service coordination and provides for interoperability and commonality among unmanned systems. The primary purpose of this PE and subsequent projects is to support efforts to overcome technology barriers in the thrust areas of unmanned ground system technologies to include Autonomous & Tactical Behaviors, Manipulation Technologies, Collaborative Operations, Interoperability, Man-portable Unmanned Ground Systems, and Technology Transition/Transformation. The technologies in the PE are generally at Technology Readiness Levels (TRL) of 4, 5, or 6 making transition and transformation activities critical to closing the requirement to capability gap. Within this PE, projects will deliver responses to advanced technology needs directed at enhancing the warfighters' capabilities identified during concept development, operational assessments and field feedback of current unmanned systems.

B. Accomplishments/Planned Program:

Accomplishment/Planned Program Title	FY 2006	FY 2007	FY 2008	FY 2009
(U) Autonomous & Tactical Behaviors	0.000	1.265	2.440	2.663
FY 2007, 2008 and 2009 Plans: Support the development of vehicle onboard intelligence and tactical behaviors to allow the fielding of advanced autonomous unmanned systems. Baseline user identified mission scenarios to develop operational behaviors enabling unmanned operations within the conduct of mission tasks. Increase the warfighter's capability by transferring and developing technologies that will have an immediate impact on the autonomy and functional capabilities of current and future robotic systems. Enable transitioning of technologies appropriate for small robots from the technology transfer program to fielded systems.				

Accomplishment/Planned Program Title	FY 2006	FY 2007	FY 2008	FY 2009
(U) Collaborative Operations	0.000	1.303	1.846	2.162
FY 2007, 2008 and 2009 Plans: Integrate communication, mission planning, interface technologies, and advanced intelligence capabilities to support collaborative operations between manned and unmanned systems. Develop and assess several strategies to enhance tele-operation of current UGVs and collaborative UAV teams. Collaborative and tactical behaviors include system convoying, teamed obstacle avoidance, area perception and relative position information sharing.				

Accomplishment/Planned Program Title	FY 2006	FY 2007	FY 2008	FY 2009
(U) Interoperability	0.000	1.044	1.268	1.535
FY 2007, 2008 and 2009 Plans: Promote and guide technology development to meet joint requirements and promote ground as well as air unmanned systems interoperability. Support the bridging of				

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currently incompatible robots and controllers from various manufacturers, using different communications channels and hardware. Optimize best features of prior/ongoing research efforts into a maturing, standardized system that can be easily ported to robotic platforms used DoD-wide.

Accomplishment/Planned Program Title	FY 2006	FY 2007	FY 2008	FY 2009
(U) Man-Portable Unmanned Ground System Technologies	0.000	1.442	1.383	2.755

FY 2007, 2008 and 2009 Plans: Increase the warfighter's capability by transferring and developing technologies that will have an immediate impact on the functional capabilities of man-portable robotic systems. Enable transitioning of technologies appropriate for small robots from the technology transfer program to fielded systems. Specific technologies include obstacle detection/obstacle avoidance (ODOA) and collaborative behaviors for small vehicles.

Accomplishment/Planned Program Title	FY 2006	FY 2007	FY 2008	FY 2009
(U) Technology Transition/Transformation	0.000	2.034	2.913	3.382

FY 2007, 2008 and 2009 Plans: Facilitate integration of and ensure the ultimate transfer or transformation of technologies to ongoing programs. Exploit the best features of past and on-going efforts while supporting the development of technologies that have low risk to transition. Technologies of interest include: Interface Technologies (Human Robot Interaction), Autonomous Operations (Information Fusion, Perception, and Navigation), Autonomous Technologies (Positioning), and Platform Technologies.

Accomplishment/Planned Program Title	FY 2006	FY 2007	FY 2008	FY 2009
(U) Manipulation Technologies	0.000	1.687	1.406	1.705

FY 2007, 2008 and 2009 Plans: Incorporate existing technologies into systems representative to those in use, demonstrate ease of robotic manipulation, support the development of mobile manipulation, expedite the transition and integration of corresponding robotic technologies to enhance the current fielded systems with more functionalities, autonomy and state-of-the-art behavior with interface methods from the RTD&E environment.

C. Other Program Funding Summary	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	To Compl	Total Cost
PE 0603709D8Z Joint Robotics Program (BA4)	27.264	12.210	11.860	11.867	12.119	12.389	12.711	13.041	0.000	113.461
PE 0604709D8Z Joint Robotics Program (BA5)	20.464	6.004	2.911	0.000	0.000	0.000	0.000	0.000	0.000	29.379

Comment:

D. Acquisition Strategy The Joint Ground Robotics Enterprise (JGRE) utilizes several contracting and management strategies to achieve its objectives. JGR has established relationships with the several agencies to include the National Center for Defense Robotics (NCDR) and the Army's Rapid Equipping Force (REF) to support the rapid acquisition and evaluation of promising unmanned system technologies. Funding is provided to Service lab partners and other developers to promote common technology solutions across platforms and Services.

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E. Major Performers Not Applicable.