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Exhibit R-2, RDT&E Budget Item Justification									Date: February 1999	
APPROPRIATION/BUDGET ACTIVITY RESEARCH, DEVELOPMENT, TEST & EVALUATION, DEFENSE-WIDE, BUDGET ACTIVITY 4					R-1 ITEM NOMENCLATURE JOINT ROBOTICS PROGRAM PE 0603709D8Z					
COST (\$ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost	26.806	16.013	12.937	10.492	11.470	9.112	9.304	9.498	CONTINUING	CONTINUING
MPRS	0.500	2.200	2.200	2.200						
ROCS	3.200	3.600	3.600	3.600						
TECHNOLOGY BASE	6.721	9.813	6.737	4.292						
<p>A. <u>Mission Description and Budget Item Justification.</u> This program is a budget activity level 4 based on the demonstration/validation activities ongoing within the program. This 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 will demonstrate maturity of robotics technologies for their application to the formal acquisition process of land systems and subsystems. Emphasis is on the development of robotic technologies that: are amenable to multi-service applications; provide capability in high hazard environments; provide improved battlefield efficiency using supervised autonomous operational capability; reduce or enhance force manpower and support; and are affordable. This PE consolidates the DoD robotics program for unmanned ground vehicles (UGV) into two activities: (1) advancement of UGV concepts into Advanced Development (AD) acquisition projects and (2) the enhancement and exploitation of critical robotic technologies for today's and future UGV acquisition requirements. Categories under this PE are: (1) Man Portable Robotic Systems (MPRS) - consolidated efforts to develop smaller (10-40 lb. Class) UGVs in response to emerging user requirements. Two MPRS programs are underway: the Basic Unexploded Ordnance System (BUGS), which is a joint service effort to locate and dispose of surface UXO; and the Outdoor Miniature Robotic Ground Vehicle (OMRGV), which is a small robotic vehicle for reconnaissance and other hazardous tasks in special operations or light infantry missions; (2) the Robotics Ordnance Clearing System (ROCS) - a USAF effort to develop a robotic/autonomous vehicle capability for area clearance, including active range clearance (ARC). Platforms include the following: All-purpose Robotics Transport System (ARTS), Subsurface Ordnance Characterization System (SOCS), Automated Ordnance Excavator (AOE), and Joint Amphibious Mine Countermine (JAMC). This technology can also be applied to formerly used defense sites for cleanup/disposal; (3) the Technology Enhancement program (DEMO III) is centered upon the enhancement and exploitation of critical robotics technologies for today's and future UGV acquisition requirements. DEMO III, in part a follow-on to the very successful DEMO II program, is a four year effort to further advance semi-autonomous technologies; and (4) the Joint Architecture for Unmanned Ground Systems (JAUGS) which is a software-standards oriented approach to standardizing all aspects of protocols and approaches to the software aspects of all anticipated DoD unmanned systems.</p>										

Exhibit R-2, RDT&E Budget Item Justification	Date: February 1999
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(U) FY 1998 Accomplishments

VEHICLE TELEOPERATION (VT) (11.500 million)

- Obtained favorable MS I/II for entry into combined Program Definition/Risk Reduction (PDRR) /Engineering and Manufacturing Development (EMD) phase
- Awarded Small Business Innovative Research (SBIR) Phase III contract to enter combined PDRR/EMD phase in support of VT acquisition program
- Developed final Performance Specification for MK4 (EMD) VT kits, and initiated configuration control
- Developed, built, and demonstrated Standardized Teleoperation System (STS) kits for M9 Armored Combat Excavator (ACE), D5, and T3 bulldozers
- Completed initial development testing for the STS
- Completed Limited User Testing for STS on the M-1 tank, and the D7G, D5, T3, and M9 ACE bulldozers
- Increased involvement with USMC and USAF
- Started design/development of Robotic Combat Support System (RCSS) for US Army Engineer School (USAES)
- Defined VT requirements for the USAF, USMC, and USN

TACTICAL UNMANNED VEHICLE (TUV) (4.685 million)

- Finalized System Specification for TUV and developed a Draft Request For Proposal (RFP) for EMD
- Continued long-term User Appraisals in support of Evolutionary Acquisition Strategy
- Improved reliability performance in SARGE prototype for participation in Military Operations on Urban Terrain (MOUT) Advanced Concepts Technology Demonstration (ACTD)
- Trained USMC Chemical, Biological Incident Response Force (CBIRF) and integrated robotics into contingency exercise training

JOINT ARCHITECTURE FOR UNMANNED GROUND SYSTEMS (JAUGS) DEVELOPMENT (0.200 million)

- Continued to update JAUGS based on technology improvements, Joint Technical Architecture (JTA) standards established by DoD, and mission requirements
- Coordinated JAUGS activities closely with 4D/RCS and Demo III development efforts
- Began validation process on the JAUGS
- Incorporated JAUGS as a requirement in the TUV contract requirements package
- Incorporated JAUGS into the VT contract
- Commenced planning and coordination for the configuration management of JAUGS

Exhibit R-2, RDT&E Budget Item Justification					Date: February 1999
<p>U) <u>FY 1999 Plans</u> JOINT ARCHITECTURE FOR UNMANNED GROUND SYSTEMS (JAUGS) DEVELOPMENT (0.400 million)</p> <ul style="list-style-type: none"> • Evolve, refine, and update to achieve greater autonomous capability. Inputs will be received primarily from user appraisals, fielded systems feedback, and industry/Tech Base development efforts • Implement JAUGS throughout the Joint Robotics Program • Place JAUGS under configuration control 					
<p>(U) <u>FY 2000 Plans</u> JOINT ARCHITECTURE FOR UNMANNED GROUND SYSTEMS (JAUGS) DEVELOPMENT (0.400 million)</p> <ul style="list-style-type: none"> • Evolve, refine, and update to achieve greater autonomous capability. Inputs will be received primarily from user appraisals, fielded systems feedback, and industry/Tech Base development efforts • Continue configuration management and control 					
<p>(U) <u>FY 2001 Plans</u> JOINT ARCHITECTURE FOR UNMANNED GROUND SYSTEMS (JAUGS) DEVELOPMENT (0.400 million)</p> <ul style="list-style-type: none"> • Evolve, refine, and update to achieve greater autonomous capability. Inputs will be received primarily from user appraisals, fielded systems feedback, and industry/Tech Base development efforts • Continue configuration management and control 					
<p>B. <u>Program Change Summary</u> (\$ million)</p>					
	<u>FY1998</u>	<u>FY1999</u>	<u>FY2000</u>	<u>FY2001</u>	<u>Total Cost</u>
Previous President's Budget	27.085	16.217	13.156	10.681	Continuing
Appropriated Value					
Adjustments to Appropriated Value					
a. Congressionally Directed					
Appropriation Reduction					
b. Congressionally Directed					
Undistributed Reduction					
c. Below Threshold					
Program Reduction	(0.279)	(0.204)	(0.219)	(0.189)	
Current Budget Submit/President's Budget	26.806	16.013	12.937	10.492	Continuing
Change Summary Explanation:					
Funding: N/A					

Exhibit R-2, RDT&E Budget Item Justification		Date: February 1999			
Schedule: N/A Technical: N/A					
C. <u>Other Program Funding Summary</u>					
D. <u>Acquisition Strategy</u>					
E. <u>Schedule Profile</u>					
Fiscal Year actual and planned events:					
	FY1998	FY1999	FY2000	FY2001	
Acquisition Milestones					
Standardized Teleoperation System (now known as Standardized Robotic System (SRS)		MSI/II			
Engineering Milestones					
T&E Milestones					
Contract Milestones		EMD			

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Exhibit R-2a, RDT&E Project Justification									Date:		
APPROPRIATION/BUDGET ACTIVITY			PROGRAM ELEMENT			PROJECT NAME AND NUMBER					
RDT&E, DEFENSE WIDE, BUDGET ACTIVITY 4			PE 0603709D8Z			MAN PORTABLE ROBOTIC SYSTEMS (MPRS)					
Cost (\$ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost	
MPRS	0.500	2.200	2.200	2.200					CONT	CONT	
RDT&E Articles Qty											
<p>A. <u>Mission Description and Budget Item Justification.</u> The MPRS program is a research and development program to provide small, man portable unmanned platforms to support the missions of light and special operations forces. The program meets mission needs in the areas of reconnaissance during Military Operations in Urban Terrain (MOUT), as well as locating and disposing of very sensitive unexploded ordnance. This program has been renamed MPRS to assume a broader application of small, man portable systems. Previously it was only the Basic Unexploded Ordnance Gathering System (BUGS).</p> <p>(U) <u>FY 1998 Accomplishments</u></p> <ul style="list-style-type: none"> • Demonstrated prototype multiple BUG systems • Demonstrated vehicular operation for RECORM autonomous sensor platform • Obtained approval of Operational Requirements Document (ORD) for the Outdoor Miniature Robotic Ground Vehicle (OMRGV) <p>(U) <u>FY 1999 Plans</u></p> <ul style="list-style-type: none"> • Initiate testing of autonomous sensing of UXO in conjunction with reactive, autonomous vehicle control • Initiate sensor platform/small expendable MPRS integration • Initiate OMRGV development efforts <p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none"> • Continue development of MPRS system prototypes • Conduct developmental testing of MPRS prototypes • Complete OMRGV prototype integration and check-out <p>(U) <u>FY 2001 Plans</u></p> <ul style="list-style-type: none"> • Complete developmental testing of BUGS prototypes • Conduct Analysis of Alternatives (AOA) and obtain Milestone 0 decision 											

UNCLASSIFIED

Exhibit R-2a, RDT&E Project Justification		Date: February 1999			
B.	Other Program Funding Summary				
C.	Acquisition Strategy				
D.	Schedule Profile				
	Fiscal Year actual and planned events:				
		FY1998	FY1999	FY2000	FY2001
Acquisition					
Milestones					
OMRGV		ORD			
BUGS				MS0	
Engineering Milestones					
T&E Milestones					
Contract Milestones					

UNCLASSIFIED

Exhibit R-3 Cost Analysis (page 1)									Date: February 1999			
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603709D8Z						MAN PORTABLE ROBOTIC SYSTEMS (MPRS)			
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development			0.355	0.950		0.600		0.400				
Ancillary Hardware Development												
Systems Engineering			0.100	0.150		0.200		0.300				
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development			0.455	1.100		0.800		0.700		CONT	CONT	
Remarks: [1] MIPR/CPIF/FPIF/FFP activities												
Development Support												
Software Development				0.530		0.500		0.300				
Training Development												
Integrated Logistics Support				0.050		0.200		0.100				
Configuration Management												
Technical Data												
GFE												
Subtotal Support				0.580		0.700		0.400		CONT	CONT	
Remarks												

UNCLASSIFIED

Exhibit R-3 Cost Analysis (page 2)									Date: February 1999			
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603709D8Z						MAN PORTABLE ROBOTIC SYSTEMS (MPRS)			
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Developmental Testing				0.300		0.500		0.800				
Operational Testing												
Tooling												
GFE												
Subtotal T&E				0.300		0.500		0.800		CONT	CONT	
Remarks												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support			0.025	0.150		0.150		0.250				
Program Management Personnel												
Travel			0.020	0.070		0.050		0.050				
Labor (Research Personnel)												
Miscellaneous												
Subtotal Management			0.045	0.220		0.200		0.300		CONT	CONT	
Remarks												
Total Cost			0.500	2.200		2.200		2.200				
Remarks												

UNCLASSIFIED

Exhibit R-2a, RDT&E Project Justification									Date:	
APPROPRIATION/BUDGET ACTIVITY			PROGRAM ELEMENT			PROJECT NAME AND NUMBER				
RDT&E, DEFENSE WIDE, BUDGET ACTIVITY 4			PE 0603709D8Z			ROBOTIC ORDNANCE CLEARING SYSTEM (ROCS)				
Cost (\$ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost
ROCS	3.200	3.600	3.600	3.600					CONT	CONT
RDT&E Articles Qty										
<p>A. <u>Mission Description and Budget Item Justification.</u> The Robotics Ordnance Clearing System (ROCS) is a generic examination of Unexploded Ordnance (UXO) clearing applications and assessments. Prototypes are being examined for force protection in Saudi Arabia, range clearance at Nellis AFB, NV, as well as terrain assessments for probability of UXO. The US Air Force has created a Operational Requirements Document (ORD) for both force protection and active range clearance systems, utilizing the All-purpose Remote Transport System (ARTS).</p> <p>(U) <u>FY 1998 Accomplishments</u></p> <ul style="list-style-type: none"> • Built and fielded the 2nd All-purpose Remote Transport System (ARTS) for Active Range Clearance at Nellis Air Force Base (AFB), NV • Secured ARTS Program Objective Memorandum (POM) Funding for FY99-FY02 procurement for 21 systems • Built in-house ARTS for test and evaluation at various demonstrations • Integrated controls for brush-cutting attachment for rapid vegetation removal • Performed vegetation removal on ordnance ranges on Howard AFB, Panama • Demonstrated multi-sensor platform (magnetometers, ground penetrating radar and EM-61) at Yuma Proving Grounds • Built and fielded ARTS for Eglin AFB Explosive Ordnance Disposal (EOD) unit to recover test munitions • Completed and delivered backhoe remote control package with technical transfer documentation to Eglin AFB EOD • Participated with HQ Air Combat Command (ACC) in drafting the ARTS operational requirements document (ORD) • Designed and built a stainless steel version of ARTS platform as tow vehicle for a subsurface detection platform • Develop controller area network interface for autonomous control modules • Completed ARTS technology transfer documentation package (baseline version) • Demonstrated ARTS at the U.S. Marine Corps Commandant's War Fighting Experiment at Camp Lejeune, NC 										

UNCLASSIFIED

Exhibit R-2a, RDT&E Project Justification	Date: February 1999
<ul style="list-style-type: none"> • Designed and integrated an ARTS surface scrap removal system to remove debris and process for disposal • Integrated UGV/S JPO's fiber optic control capability into the ARTS control system for both RF and fiber control • Provided 2 commercial versions of ARTS for urgent and compelling need for Southwest Asia and validated tech transfer package • Developed and integrated 2 Standardized Teleoperation System onto D-8 Caterpillar bulldozers • Provided and modified 2 protective armor kits for D-8 bulldozer • Designed and modified 9 Israeli mine plows for quick attachment to D-8 bulldozer <p>(U) <u>FY 1999 Plans</u></p> <ul style="list-style-type: none"> • Finalize documentation for the operation and maintenance of the ARTS • Have USAF Chief of Staff sign ORD • Integrate a dual-arm manipulator system for the Eglin AFB EOD ARTS • Develop a semi-autonomous point-to-point travel capability for Nellis range clearance operations • Integrate and demonstrate a lower-cost navigation system using multiple navigation sensors and Kalman filter technology • Deliver remaining 7 ARTS identified for urgent and compelling need for Southwest Asia • Upgrade the 2 Nellis prototypes to ARTS baseline configuration • Transfer and integrate semi-autonomous control functions developed under the subsurface ordnance characterization system (SOCS) to the field prototype Active Range Ordnance Mapping System (AROMS) • Integrate CO2 laser system to the ARTS tele-remote operation • Develop an automated ordnance recognition system for identifying BLU-97 and BLU-63 submunitions • Modify the UGV/S JPO designed mini-flail and integrate into the ARTS platform • Continue evaluation of new subsurface sensors to establish operating parameters and merits • Investigate the utilization of the ARTS for forest fire fighting applications • Conduct explosive testing of the high energy access and disablement device on ARTS • Modify ARTS software to be JAUGS compliant <p>(U) <u>FY 2000 Plans</u></p> <ul style="list-style-type: none"> • Complete integration and testing of CO2 laser system • Develop a vision based ordnance recognition system for BLU-97 and BLU-63 submunitions 	

<p align="center">Exhibit R-2a, RDT&E Project Justification</p>	<p>Date: February 1999</p>					
<ul style="list-style-type: none"> • Continue development of semi-autonomous control for automating the entire range clearance process including <ul style="list-style-type: none"> Multi-vehicle operations for windrowing of submunitions <ul style="list-style-type: none"> - Ordnance removal/disposal - Scrap and debris removal • Develop vision-based thermal recognition system for forest fire fighting • Develop vision-based color recognition system for defoliant applications • Incorporate technology advancements such as obstacle detection and avoidance from Demo III program • Investigate semi-autonomous excavation control utilizing in-bucket sensing capability • Address the integration of ARTS command and control with the UAV "Tactical Control System" <p>(U) <u>FY 2001 Plans</u></p> <ul style="list-style-type: none"> • Develop multi-vehicle control scheme for active range clearance • Investigate advanced navigation technologies including <ul style="list-style-type: none"> - Real-time obstacle avoidance/detection - Generic graphical user interface for robotic vehicle control - Improved command and control for ground based vehicle systems • Explore applications for ground-based robotic systems • Investigate control schemes for advanced navigation using artificial intelligence/neural networks <p>B. Other Program Funding Summary</p> <p>C. Acquisition Strategy</p> <p>D. Schedule Profile</p> <p>Fiscal Year actual and planned events:</p> <table border="0" style="margin-left: 200px;"> <tr> <td></td> <td align="center">FY1998</td> <td align="center">FY1999</td> <td align="center">FY2000</td> <td align="center">FY2001</td> </tr> </table> <p>Acquisition Milestones</p> <p>Engineering Milestones</p> <p>T&E Milestones</p> <p>Contract Milestones</p>			FY1998	FY1999	FY2000	FY2001
	FY1998	FY1999	FY2000	FY2001		

UNCLASSIFIED

Exhibit R-3 Cost Analysis (page 1)									Date: February 1999			
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603709D8Z						Robotic Ordnance Clearing System (ROCS)			
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development			0.700	0.800		0.800		0.800				
Ancillary Hardware Development			0.100	0.100		0.100		0.100				
Systems Engineering			0.100	0.100		0.100		0.100				
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development			0.900	1.000		1.000		1.000		CONT	CONT	
Remarks:												
Development Support			0.350	0.300		0.300		0.300				
Software Development			0.350	0.300		0.300		0.300				
Training Development			0.100	0.100		0.100		0.100				
Integrated Logistics Support			0.050	0.050		0.050		0.050				
Configuration Management			0.050	0.050		0.050		0.050				
Technical Data			0.150	0.150		0.150		0.150				
GFE												
Subtotal Support			1.050	0.950		0.950		0.950		CONT	CONT	
Remarks												

UNCLASSIFIED

Exhibit R-3 Cost Analysis (page 2)										Date: February 1999		
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4				PROGRAM ELEMENT PE 0603709D8Z						Robotic Ordnance Clearing System (ROCS)		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Developmental Testing			0.100	0.200		0.200		0.200				
Operational Testing			0.050	0.100		0.100		0.100				
Tooling												
GFE												
Subtotal T&E			0.150	0.300		0.300		0.300		CONT	CONT	
Remarks												
Contractor Engineering Support			0.450	0.600		0.600		0.600				
Government Engineering Support			0.100	0.100		0.100		0.100				
Program Management Support			0.150	0.150		0.150		0.150				
Program Management Personnel			0.100	0.100		0.100		0.100				
Travel			0.100	0.100		0.100		0.100				
Labor (Research Personnel)			0.100	0.200		0.200		0.200				
Miscellaneous			0.100	0.100		0.100		0.100				
Subtotal Management			1.100	1.350		1.350		1.350		CONT	CONT	
Remarks												
Total Cost			3.200	3.600		3.600		3.600				
Remarks												

UNCLASSIFIED

Exhibit R-2a, RDT&E Project Justification									Date: February 1999	
APPROPRIATION/BUDGET ACTIVITY			PROGRAM ELEMENT			PROJECT NAME AND NUMBER				
RDT&E, DEFENSE WIDE, BUDGET ACTIVITY 4			PE 0603709D8Z			TECHNOLOGY BASE				
Cost (\$ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY2005	Cost to Complete	Total Cost
TECHNOLOGY BASE	6.721	9.813	6.737	4.292					CONT	CONT
RDT&E Articles Qty										

A. Mission Description and Budget Item Justification. The Demo III Unmanned Ground Vehicle (UGV) Program is designed to advance and demonstrate the technology required to develop future unmanned ground combat vehicles through three major thrusts: (1) concerted technology development; (2) modeling, simulation and experimentation; and (3) technology integration and evaluation with users. Demo III focuses on demonstration of technology that will enable the development of small, highly agile, unmanned vehicles capable of off-road, semi-autonomous operation at speeds of up to 32 km/hr during daylight and 16 km/hr at night by 4Q FY 2001. Demo III supports development of two emerging ORDs at the U.S. Army Armor School for a robotic scout system and a robotic leader-follower system. Technologies for these systems are applicable to a wide array of Army programs.

(U) FY1998 Accomplishments:

- Concerted Technology Development: The technology development community, drawn primarily from government laboratories such as NIST, the Jet Propulsion Laboratory (JPL), and ARL, has organized itself into a series of working groups to address six technology areas deemed critical to the success of the program. The primary focus of the effort has centered on the development of perception for autonomous mobility; algorithms for local planning and autonomous behaviors; an intelligent software architecture and a small, highly capable control interface that can be integrated into standard display units. A development plan that will provide the critical elements of technology required to advance technology and meet performance goals specified for Demo III has been charted, initial steps towards implementing the plan have been executed and first demonstrations of incremental advancement have been completed. The working groups have also completed detailed trade studies of required technologies.
- Modeling, Simulation and Experimentation: A modeling, simulation and experimentation effort conducted by the MMBL, with assistance from ARL, has been running in parallel with the technology development program. The program has the twin goals of utilizing simulations to estimate the operational effectiveness of differing technological solutions and hardware/software configurations and developing TTPs required to employ this technology effectively. An important outcome of this

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<ul style="list-style-type: none"> • effort will be the technical support package (TSP) that will be required to support the second generation Tactical Unmanned Vehicle (TUV) user appraisal currently scheduled for FY 2002. The second of four constructive simulations and the first virtual simulation investigating alternative chassis configurations with differing size, weight, and mobility characteristics, together with a series of reconnaissance, surveillance and target acquisition (RSTA) mission packages of varying capability using Modular Semi-Automated Forces (ModSAF) simulations at the MMBL has been completed. Here, the Demo III XUVs were employed together with manned systems to form notional battalion and brigade scout forces engaged in both offensive and defensive operations as part of a mechanized combined arms force. Measures of effectiveness, such as loss exchange ratio were obtained for a limited number of experiments employing accepted, standard operational scenarios. • The technology integration effort represents the third thrust of the Demo III effort. This final component of the program will integrate technology on-board a testbed vehicle and demonstrate autonomous mobility required to conduct the military scout mission under tactical conditions. Unlike the other program elements, this program element was designed to be conducted by an industrial contractor chosen through a competitive procurement process that is being managed by the U.S. Army Tank -automotive Research, Development, and Engineering Center (TARDEC). In January 1998, TARDEC awarded a contract to a contractor team lead by Robotic Systems Technology (RST), teaming with Science Applications International Corporation (SAIC) Center for Intelligent Systems (CIS) and Sarnoff Corporation. A Preliminary Design Review (PDR) was conducted in late July by the technology integration contractor team who presented their initial design and integration plans - the result of an extensive series of trade studies and analyses conducted over the past five months - for review, analysis and constructive criticism by the government participants, and for further refinement prior to the Critical Design Review (CDR). <p>(U) <u>FY 1999 Plans</u></p> <ul style="list-style-type: none"> • Conduct Critical Design Review (CDR) of Demo III XUV with contractor team • Complete the second Constructive Simulation • Fabricate first two (2) XUV platforms and integrate system architecture and sensors to meet Demo III Alpha (A) performance goals • Fabricate the first of two Operator Control Units to be available by Demo III A • Conduct Demo III A consisting of an Engineering Evaluation Test and a Battle Lab Warfighting Experiment (BLWE) <p>(U) <u>FY 2000 Plans:</u></p> <ul style="list-style-type: none"> • Fabricate the second two (2) XUV platforms with integrated architecture and sensors to meet Demo III 	

Exhibit R-2a, RDT&E Project Justification				Date:					
<p>Bravo performance goals</p> <ul style="list-style-type: none"> • Fabricate the second Operator Control Unit • Complete the second Virtual Simulation • Initiate the third Virtual Simulation • Initiate the third and fourth Constructive Simulations • Complete Demo III Bravo (B) consisting of an Engineering Evaluation Test and a Battle Lab Warfighting Experiment (BLWE) <p>(U) <u>FY 2001 Plans:</u></p> <ul style="list-style-type: none"> • Conduct Demo III consisting of an Engineering Evaluation Test and a Battle Lab Warfighting Experiment (BLWE) with troops demonstrating four XUV platforms performing autonomous operation over rugged terrain as part of a mixed military force containing both manned and unmanned vehicles <p>B. Other Program Funding Summary</p> <p>C. Acquisition Strategy</p> <p>D. Schedule Profile</p> <p>Fiscal Year actual and planned events:</p> <table border="0"> <tr> <td></td> <td>FY1998</td> <td>FY1999</td> <td>FY2000</td> <td>FY2001</td> </tr> </table>						FY1998	FY1999	FY2000	FY2001
	FY1998	FY1999	FY2000	FY2001					
Acquisition Milestones									
Engineering Milestones									
T&E Milestones		DEMOIIIA	DEMOIIIB	DEMOIII					
Contract Milestones		Integration							
		Contract							

UNCLASSIFIED

Exhibit R-3 Cost Analysis (page 1)									Date: February 1999			
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4			PROGRAM ELEMENT PE 0603709D8Z						Technology Base			
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Primary Hardware Development	CPAF	RST, MD	1.983	2.250		1.250		1.000				
Ancillary Hardware Development	CPAF	RST, MD		1.425		0.725						
Systems Engineering	CPAF	RST, MD	0.708	0.900		0.400						
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development			2.691	4.575		2.375		1.000		CONT	CONT	
Remarks: RST, Westminster, Maryland												
Development Support												
Software Development			1.445	0.775		0.750		0.650				
Software Development	CPAF	RST, MD	1.430	1.125		0.900		0.350				
Training Development				0.067				0.542				
Integrated Logistics Support								0.250				
Configuration Management												
Technical Data				1.271		0.712						
GFE												
Subtotal Support			2.875	3.238		2.362		1.792		CONT	CONT	
Remarks: RST, Westminster, Maryland												

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Exhibit R-3 Cost Analysis (page 2)										Date: February 1999		
RDT&E, DEFENSE-WIDE, BUDGET ACTIVITY 4				PROGRAM ELEMENT PE 0603709D8Z						Technology Base		
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total 1998 Cost	1999 Cost	1999 Award Date	2000 Cost	2000 Award Date	2001 Cost	2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Developmental Testing				1.000		1.000		1.000				
Operational Testing												
Tooling												
GFE												
Subtotal T&E				1.000		1.000		1.000		CONT	CONT	
Remarks												
Contractor Engineering Support			0.400									
Government Engineering Support			0.368									
Program Management Support			0.200	0.750		0.750		0.250				
Program Management Personnel												
Travel			0.187	0.250		0.250		0.250				
Labor (Research Personnel)												
Miscellaneous												
Subtotal Management			1.155	1.000		1.000		0.500		CONT	CONT	
Remarks												
Total Cost			6.721	9.813		6.737		4.292				
Remarks												