Department of Defense
Fiscal Year (FY) 2013 President's Budget Submission

February 2012

Army

Justification Book

Research, Development, Test & Evaluation, Army

RDT&E - Volume I, Budget Activity 3

Department of the Army

FY 2013 RDT&E Program

President's Budget 2013

Summary

Exhibit R-1

06-Jan-2012

Summary Recap of Budget Activities	Thousands of Dollars				
	FY2011	FY2012	FY2013	FY2013 OCO	FY2013 Total
Basic research	388,660	456,200	444,071	0	444,071
Applied Research	825,021	946,836	874,730	0	874,730
Advanced technology development	804,783	1,132,838	890,722	0	890,722
Advanced Component Development and Prototypes	930,583	544,328	610,121	19,860	629,981
System Development and Demonstration	3,968,785	3,238,656	3,286,629	0	3,286,629
Management support	1,400,358	1,097,294	1,153,980	0	1,153,980
Operational system development	1,437,782	1,339,540	1,664,534	0	1,664,534
Total RDT&E, Army	9,755,972	8,755,692	8,924,787	19,860	8,944,647

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Line No	Program Element Number	Act	Item	Thousands of Dollars FY2011	FY2012	FY2013	FY2013 OCO	FY2013 Total
			Basic research					
1	0601101A	01	IN-HOUSE LABORATORY INDEPENDENT RESEARCH	21,095	21,031	20,860		20,860
2	0601102A	01	DEFENSE RESEARCH SCIENCES	190,019	213,604	219,180		219,180
3	0601103A	01	UNIVERSITY RESEARCH INITIATIVES	84,445	80,850	80,986		80,986
4	0601104A	01	UNIVERSITY AND INDUSTRY RESEARCH CENTERS	93,101	140,715	123,045		123,045
			Total: Basic research	388,660	456,200	444,071	0	444,071
			Applied Research					
5	0602105A	02	MATERIALS TECHNOLOGY	28,730	50,679	29,041		29,041
6	0602120A	02	SENSORS AND ELECTRONIC SURVIVABILITY	46,491	43,453	45,260		45,260
7	0602122A	02	TRACTOR HIP	14,126	14,207	22,439		22,439
8	0602211A	02	AVIATION TECHNOLOGY	40,869	44,539	51,607		51,607
9	0602270A	02	ELECTRONIC WARFARE TECHNOLOGY	16,939	15,765	15,068		15,068
10	0602303A	02	MISSILE TECHNOLOGY	48,092	67,079	49,383		49,383
11	0602307A	02	ADVANCED WEAPONS TECHNOLOGY	17,542	20,002	25,999		25,999
12	0602308A	02	ADVANCED CONCEPTS AND SIMULATION	19,907	20,900	23,507		23,507
13	0602601A	02	COMBAT VEHICLE AND AUTOMOTIVE TECHNOLOGY	61,893	64,205	69,062		69,062
14	0602618A	02	BALLISTICS TECHNOLOGY	60,595	59,121	60,823		60,823
15	0602622A	02	CHEMICAL, SMOKE AND EQUIPMENT DEFEATING TECHNOLOGY	10,555	4,869	4,465		4,465
16	0602623A	02	JOINT SERVICE SMALL ARMS PROGRAM	7,630	8,231	7,169		7,169
17	0602624A	02	WEAPONS AND MUNITIONS TECHNOLOGY	41,368	54,727	35,218		35,218
18	0602705A	02	ELECTRONICS AND ELECTRONIC DEVICES	63,186	62,862	60,300		60,300
19	0602709A	02	NIGHT VISION TECHNOLOGY	39,131	55,116	53,244		53,244
20	0602712A	02	COUNTERMINE SYSTEMS	18,507	32,728	18,850		18,850
21	0602716A	02	HUMAN FACTORS ENGINEERING TECHNOLOGY	20,583	21,767	19,872		19,872
22	0602720A	02	ENVIRONMENTAL QUALITY TECHNOLOGY	21,704	20,804	20,095		20,095
23	0602782A	02	COMMAND, CONTROL, COMMUNICATIONS TECHNOLOGY	24,914	26,075	28,852		28,852
24	0602783A	02	COMPUTER AND SOFTWARE TECHNOLOGY	6,599	8,577	9,830		9,830
25	0602784A	02	MILITARY ENGINEERING TECHNOLOGY	73,346	80,190	70,693		70,693

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26	0602785A	02	MANPOWER/PERSONNEL/TRAINING TECHNOLOGY	18,982	18,917	17,781		17,781
27	0602786A	02	WARFIGHTER TECHNOLOGY	26,972	46,261	28,281		28,281
28	0602787A	02	MEDICAL TECHNOLOGY	96,360	105,762	107,891		107,891
	Total:		Applied Research	825,021	946,836	874,730	0	874,730
			Advanced technology development					
29	0603001A	03	WARFIGHTER ADVANCED TECHNOLOGY	36,122	52,896	39,359		39,359
30	0603002A	03	MEDICAL ADVANCED TECHNOLOGY	114,036	102,810	69,580		69,580
31	0603003A	03	AVIATION ADVANCED TECHNOLOGY	55,492	62,095	64,215		64,215
32	0603004A	03	WEAPONS AND MUNITIONS ADVANCED TECHNOLOGY	65,495	76,955	67,613		67,613
33	0603005A	03	COMBAT VEHICLE AND AUTOMOTIVE ADVANCED TECHNOLOGY	125,677	145,914	104,359		104,359
34	0603006A	03	COMMAND, CONTROL, COMMUNICATIONS ADVANCED TECHNOLOGY	7,823	5,304	4,157		4,157
35	0603007A	03	MANPOWER, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY	7,694	10,282	9,856		9,856
36	0603008A	03	ELECTRONIC WARFARE ADVANCED TECHNOLOGY	48,698	69,852	50,661		50,661
37	0603009A	03	TRACTOR HIKE	7,761	8,142	9,126		9,126
38	0603015A	03	NEXT GENERATION TRAINING & SIMULATION SYSTEMS	14,788	17,907	17,257		17,257
39	0603020A	03	TRACTOR ROSE	11,872	12,577	9,925		9,925
40	0603105A	03	MILITARY HIV RESEARCH	25,738	22,760	6,984		6,984
41	0603125A	03	COMBATING TERRORISM - TECHNOLOGY DEVELOPMENT	9,424	22,172	9,716		9,716
42	0603130A	03	TRACTOR NAIL		4,271	3,487		3,487
43	0603131A	03	TRACTOR EGGS		2,257	2,323		2,323
44	0603270A	03	ELECTRONIC WARFARE TECHNOLOGY	18,973	23,640	21,683		21,683
45	0603313A	03	MISSILE AND ROCKET ADVANCED TECHNOLOGY	76,272	90,458	71,111		71,111
46	0603322A	03	TRACTOR CAGE	9,661	10,299	10,902		10,902
47	0603461A	03	HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM		227,790	180,582		180,582
48	0603606A	03	LANDMINE WARFARE AND BARRIER ADVANCED TECHNOLOGY	26,089	31,491	27,204		27,204
49	0603607A	03	JOINT SERVICE SMALL ARMS PROGRAM	8,236	7,674	6,095		6,095
50	0603710A	03	NIGHT VISION ADVANCED TECHNOLOGY	71,723	42,348	37,217		37,217
51	0603728A	03	ENVIRONMENTAL QUALITY TECHNOLOGY DEMONSTRATIONS	15,417	15,934	13,626		13,626
52	0603734A	03	MILITARY ENGINEERING ADVANCED TECHNOLOGY	23,617	36,458	28,458		28,458

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53	0603772A	03	ADVANCED TACTICAL COMPUTER SCIENCE AND SENSOR TECHNOLOGY	24,175	30,552	25,226		25,226
	Total:		Advanced technology development	804,783	1,132,838	890,722	0	890,722
			Advanced Component Development and Prototypes					
54	0603305A	04	ARMY MISSLE DEFENSE SYSTEMS INTEGRATION	11,156	24,386	14,505		14,505
55	0603308A	04	ARMY SPACE SYSTEMS INTEGRATION	29,845	9,763	9,876		9,876
56	0603619A	04	LANDMINE WARFARE AND BARRIER - ADV DEV	14,686	19,596	5,054		5,054
57	0603627A	04	SMOKE, OBSCURANT AND TARGET DEFEATING SYS-ADV DEV	2,337	4,572	2,725		2,725
58	0603639A	04	TANK AND MEDIUM CALIBER AMMUNITION	35,849	40,314	30,560		30,560
59	0603653A	04	ADVANCED TANK ARMAMENT SYSTEM (ATAS)	200,312	65,417	14,347		14,347
60	0603747A	04	SOLDIER SUPPORT AND SURVIVABILITY	26,847	13,903	10,073	19,860	29,933
61	0603766A	04	TACTICAL ELECTRONIC SURVEILLANCE SYSTEM - ADV DEV	19,610	5,856	8,660		8,660
62	0603774A	04	NIGHT VISION SYSTEMS ADVANCED DEVELOPMENT	4,975		10,715		10,715
63	0603779A	04	ENVIRONMENTAL QUALITY TECHNOLOGY - DEM/VAL	3,622	5,023	4,631		4,631
64	0603782A	04	WARFIGHTER INFORMATION NETWORK-TACTICAL - DEM/VAL	200,732	185,819	278,018		278,018
65	0603790A	04	NATO RESEARCH AND DEVELOPMENT	4,879	4,839	4,961		4,961
66	0603801A	04	AVIATION - ADV DEV	8,058	7,218	8,602		8,602
67	0603804A	04	LOGISTICS AND ENGINEER EQUIPMENT - ADV DEV	62,999	12,706	14,605		14,605
68	0603805A	04	COMBAT SERVICE SUPPORT CONTROL SYSTEM EVALUATION AND ANALYSIS	20,801	5,250	5,054		5,054
69	0603807A	04	MEDICAL SYSTEMS - ADV DEV	27,247	35,543	24,384		24,384
70	0603827A	04	SOLDIER SYSTEMS - ADVANCED DEVELOPMENT	51,415	18,030	32,050		32,050
71	0603850A	04	INTEGRATED BROADCAST SERVICE	939	1,494	96		96
72	0604115A	04	TECHNOLOGY MATURATION INITIATIVES	3,000	10,165	24,868		24,868
73	0604131A	04	TRACTOR JUTE		15,584	59		59
74	0604284A	04	JOINT COOPERATIVE TARGET IDENTIFICATION - GROUND (JCTI-G) / TECHNOLOG		15,287			
75	0604319A	04	INDIRECT FIRE PROTECTION CAPABILITY INCREMENT 2-INTERCEPT (IFPC2)			76,039		76,039
76	0604775A	04	DEFENSE RAPID INNOVATION PROGRAM	101,265				
77	0604785A	04	INTEGRATED BASE DEFENSE (BUDGET ACTIVITY 4)			4,043		4,043
78	0305205A	04	ENDURANCE UAVS	100,009	43,563	26,196		26,196

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	Total:		Advanced Component Development and Prototypes	930,583	544,328	610,121	19,860	629,981
			System Development and Demonstration					
79	0604201A	05	AIRCRAFT AVIONICS	70,926	119,573	78,538		78,538
80	0604220A	05	ARMED, DEPLOYABLE HELOS	69,922	82,363	70,277		70,277
81	0604270A	05	ELECTRONIC WARFARE DEVELOPMENT	196,428	34,233	181,347		181,347
82	0604280A	05	JOINT TACTICAL RADIO	755				
83	0604290A	05	MID-TIER NETWORKING VEHICULAR RADION (MNVR)			12,636		12,636
84	0604321A	05	ALL SOURCE ANALYSIS SYSTEM	24,322	7,405	5,694		5,694
85	0604328A	05	TRACTOR CAGE	17,914	26,552	32,095		32,095
86	0604601A	05	INFANTRY SUPPORT WEAPONS	73,008	83,395	96,478		96,478
87	0604604A	05	MEDIUM TACTICAL VEHICLES	3,578	3,957	3,006		3,006
88	0604609A	05	SMOKE, OBSCURANT AND TARGET DEFEATING SYS - ENG DEV	5,146				
89	0604611A	05	JAVELIN		9,930	5,040		5,040
90	0604622A	05	FAMILY OF HEAVY TACTICAL VEHICLES	2,829	55,426	3,077		3,077
91	0604633A	05	AIR TRAFFIC CONTROL	9,559	22,900	9,769		9,769
92	0604641A	05	TACTICAL UNMANNED GROUND VEHICLE (TUGV)			13,141		13,141
93	0604642A	05	LIGHT TACTICAL WHEELED VEHICLES	1,918	19,981	20,217		20,217
94	0604661A	05	FCS SYSTEMS OF SYSTEMS ENGR & PROGRAM MGMT	471,559	298,589			
95	0604662A	05	FCS RECONNAISSANCE (UAV) PLATFORMS	18,792				
96	0604663A	05	FCS UNMANNED GROUND VEHICLES	200,000	35,966			
97	0604664A	05	FCS UNATTENDED GROUND SENSORS	1,451				
98	0604665A	05	FCS SUSTAINMENT & TRAINING R&D	598,673				
99	0604710A	05	NIGHT VISION SYSTEMS - ENG DEV	44,513	59,195	32,621		32,621
100	0604713A	05	COMBAT FEEDING, CLOTHING, AND EQUIPMENT	2,043	2,073	2,132		2,132
101	0604715A	05	NON-SYSTEM TRAINING DEVICES - ENG DEV	26,848	29,981	44,787		44,787
102	0604716A	05	TERRAIN INFORMATION - ENG DEV		1,594	1,008		1,008
103	0604741A	05	AIR DEFENSE COMMAND, CONTROL AND INTELLIGENCE - ENG DEV	139,662	82,932	73,333		73,333
104	0604742A	05	CONSTRUCTIVE SIMULATION SYSTEMS DEVELOPMENT	29,287	28,274	28,937		28,937
105	0604746A	05	AUTOMATIC TEST EQUIPMENT DEVELOPMENT	13,553	14,361	10,815		10,815

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106	0604760A	05	DISTRIBUTIVE INTERACTIVE SIMULATIONS (DIS) - ENG DEV	15,031	15,787	13,926		13,926
107	0604780A	05	COMBINED ARMS TACTICAL TRAINER (CATT) CORE	26,699	22,205	17,797		17,797
108	0604798A	05	BRIGADE ANALYSIS, INTEGRATION AND EVALUATION			214,270		214,270
109	0604802A	05	WEAPONS AND MUNITIONS - ENG DEV	25,099	13,815	14,581		14,581
110	0604804A	05	LOGISTICS AND ENGINEER EQUIPMENT - ENG DEV	39,588	173,146	43,706		43,706
111	0604805A	05	COMMAND, CONTROL, COMMUNICATIONS SYSTEMS - ENG DEV	73,042	81,733	20,776		20,776
112	0604807A	05	MEDICAL MATERIEL/MEDICAL BIOLOGICAL DEFENSE EQUIPMENT - ENG DEV	33,262	27,132	43,395		43,395
113	0604808A	05	LANDMINE WARFARE/BARRIER - ENG DEV	37,707	76,248	104,983		104,983
114	0604814A	05	ARTILLERY MUNITIONS - EMD	25,467	37,592	4,346		4,346
115	0604817A	05	COMBAT IDENTIFICATION	2,893				
116	0604818A	05	ARMY TACTICAL COMMAND & CONTROL HARDWARE & SOFTWARE	57,264	93,846	77,223		77,223
117	0604820A	05	RADAR DEVELOPMENT		2,885	3,486		3,486
118	0604822A	05	GENERAL FUND ENTERPRISE BUSINESS SYSTEM (GFEBS)	13,094	793	9,963		9,963
119	0604823A	05	FIREFINDER	22,455	10,348	20,517		20,517
120	0604827A	05	SOLDIER SYSTEMS - WARRIOR DEM/VAL	20,122	61,350	51,851		51,851
121	0604854A	05	ARTILLERY SYSTEMS - EMD	99,937	120,032	167,797		167,797
122	0604869A	05	PATRIOT/MEADS COMBINED AGGREGATE PROGRAM (CAP)	450,584	389,630	400,861		400,861
123	0604870A	05	NUCLEAR ARMS CONTROL MONITORING SENSOR NETWORK	7,017	7,391	7,922		7,922
124	0605013A	05	INFORMATION TECHNOLOGY DEVELOPMENT	50,054	32,065	51,463		51,463
125	0605018A	05	INTEGRATED PERSONNEL AND PAY SYSTEM-ARMY (IPPS-A)	58,348	68,628	158,646		158,646
126	0605450A	05	JOINT AIR-TO-GROUND MISSILE (JAGM)	71,760	126,895	10,000		10,000
127	0605455A	05	SLAMRAAM	18,358	1,529			
128	0605456A	05	PAC-3/MSE MISSILE	121,475	88,909	69,029		69,029
129	0605457A	05	ARMY INTEGRATED AIR AND MISSILE DEFENSE (AIAMD)	246,691	270,180	277,374		277,374
130	0605625A	05	MANNED GROUND VEHICLE	312,269	448,679	639,874		639,874
131	0605626A	05	AERIAL COMMON SENSOR	101,171	31,435	47,426		47,426
132	0605812A	05	JOINT LIGHT TACTICAL VEHICLE (JLTV) ENGINEERING AND MANUFACTURING D			72,295		72,295
133	0303032A	05	TROJAN - RH12	3,578	3,916	4,232		4,232
134	0304270A	05	ELECTRONIC WARFARE DEVELOPMENT	13,134	13,807	13,942		13,942

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	Total:		System Development and Demonstration	3,968,785	3,238,656	3,286,629	0	3,286,629
	Management support							
135	0604256A	06	THREAT SIMULATOR DEVELOPMENT	25,367	26,117	18,090		18,090
136	0604258A	06	TARGET SYSTEMS DEVELOPMENT	8,362	11,229	14,034		14,034
137	0604759A	06	MAJOR T&E INVESTMENT	40,671	49,359	37,394		37,394
138	0605103A	06	RAND ARROYO CENTER	19,763	20,352	21,026		21,026
139	0605301A	06	ARMY KWAJALEIN ATOLL	190,005	145,377	176,816		176,816
140	0605326A	06	CONCEPTS EXPERIMENTATION PROGRAM	17,101	28,755	27,902		27,902
141	0605502A	06	SMALL BUSINESS INNOVATIVE RESEARCH	232,092				
142	0605601A	06	ARMY TEST RANGES AND FACILITIES	399,931	311,650	369,900		369,900
143	0605602A	06	ARMY TECHNICAL TEST INSTRUMENTATION AND TARGETS	68,118	70,116	69,183		69,183
144	0605604A	06	SURVIVABILITY/LETHALITY ANALYSIS	42,320	43,414	44,753		44,753
145	0605605A	06	DOD HIGH ENERGY LASER TEST FACILITY	4,568	18			
146	0605606A	06	AIRCRAFT CERTIFICATION	4,938	5,621	5,762		5,762
147	0605702A	06	METEOROLOGICAL SUPPORT TO RDT&E ACTIVITIES	6,983	7,171	7,402		7,402
148	0605706A	06	MATERIEL SYSTEMS ANALYSIS	18,863	19,638	19,954		19,954
149	0605709A	06	EXPLOITATION OF FOREIGN ITEMS	5,285	5,436	5,535		5,535
150	0605712A	06	SUPPORT OF OPERATIONAL TESTING	68,481	68,678	67,789		67,789
151	0605716A	06	ARMY EVALUATION CENTER	60,694	63,202	62,765		62,765
152	0605718A	06	ARMY MODELING & SIM X-CMD COLLABORATION & INTEG	3,787	3,415	1,545		1,545
153	0605801A	06	PROGRAMWIDE ACTIVITIES	71,984	82,923	83,422		83,422
154	0605803A	06	TECHNICAL INFORMATION ACTIVITIES	49,579	55,286	50,820		50,820
155	0605805A	06	MUNITIONS STANDARDIZATION, EFFECTIVENESS AND SAFETY	42,474	57,054	46,763		46,763
156	0605857A	06	ENVIRONMENTAL QUALITY TECHNOLOGY MGMT SUPPORT	3,084	4,953	4,601		4,601
157	0605898A	06	MANAGEMENT HQ - R&D	15,845	17,530	18,524		18,524
158	0909999A	06	FINANCING FOR CANCELLED ACCOUNT ADJUSTMENTS	63				
	Total:		Management support	1,400,358	1,097,294	1,153,980	0	1,153,980

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			Operational system development					
159	0603778A	07	MLRS PRODUCT IMPROVEMENT PROGRAM	19,016	66,641	143,005		143,005
160	0607665A	07	BIOMETRICS ENTERPRISE	65,781	45,511			
161	0607865A	07	PATRIOT PRODUCT IMPROVEMENT			109,978		109,978
162	0102419A	07	AEROSTAT JOINT PROJECT OFFICE	399,477	327,338	190,422		190,422
163	0203347A	07	INTELLIGENCE SUPPORT TO CYBER (ISC) MIP	2,283				
164	0203726A	07	ADV FIELD ARTILLERY TACTICAL DATA SYSTEM	23,812	29,500	32,556		32,556
165	0203735A	07	COMBAT VEHICLE IMPROVEMENT PROGRAMS	187,207	36,150	253,959		253,959
166	0203740A	07	MANEUVER CONTROL SYSTEM	24,648	42,347	68,325		68,325
167	0203744A	07	AIRCRAFT MODIFICATIONS/PRODUCT IMPROVEMENT PROGRAMS	121,084	149,469	280,247		280,247
168	0203752A	07	AIRCRAFT ENGINE COMPONENT IMPROVEMENT PROGRAM	688	822	898		898
169	0203758A	07	DIGITIZATION	6,103	8,016	35,180		35,180
170	0203759A	07	FORCE XXI BATTLE COMMAND, BRIGADE AND BELOW (FBCB2)	3,748				
171	0203801A	07	MISSILE/AIR DEFENSE PRODUCT IMPROVEMENT PROGRAM	23,415	53,015	20,738		20,738
172	0203808A	07	TRACTOR CARD	14,340	42,487	63,243		63,243
173	0208053A	07	JOINT TACTICAL GROUND SYSTEM	12,005	27,586	31,738		31,738
174	0208058A	07	JOINT HIGH SPEED VESSEL (JHSV)	3,041		35		35
175	0301359A	07	SPECIAL ARMY PROGRAM					
176	0303028A	07	SECURITY AND INTELLIGENCE ACTIVITIES		2,850	7,591		7,591
177	0303140A	07	INFORMATION SYSTEMS SECURITY PROGRAM	12,232	15,684	15,961		15,961
178	0303141A	07	GLOBAL COMBAT SUPPORT SYSTEM	123,136	160,491	120,927		120,927
179	0303142A	07	SATCOM GROUND ENVIRONMENT (SPACE)	32,525	12,085	15,756		15,756
180	0303150A	07	WWMCCS/GLOBAL COMMAND AND CONTROL SYSTEM	12,606	23,899	14,443		14,443
181	0305204A	07	TACTICAL UNMANNED AERIAL VEHICLES	38,049	26,508	31,303		31,303
182	0305208A	07	DISTRIBUTED COMMON GROUND/SURFACE SYSTEMS	125,404	31,649	40,871		40,871
183	0305219A	07	MQ-1 SKY WARRIOR A UAV	119,195	121,846	74,618		74,618
184	0305232A	07	RQ-11 UAV	1,547	1,935	4,039		4,039
185	0305233A	07	RQ-7 UAV	7,555	31,896	31,158		31,158
186	0305235A	07	MQ-18 UAV		7,500	2,387		2,387
187	0307665A	07	BIOMETRICS ENABLED INTELLIGENCE	2,069	15,018	15,248		15,248

Line No	Program Element Number	Act	Item	Thousands of Dollars FY2011	FY2012	FY2013	FY2013 OCO	FY2013 Total
188	0708045A	07	END ITEM INDUSTRIAL PREPAREDNESS ACTIVITIES	56,816	59,297	59,908		59,908
		Total:	Operational system development	1,437,782	1,339,540	1,664,534	0	1,664,534
Total:	RDT&E, Army			9,755,972	8,755,692	8,924,787	19,860	8,944,647

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Budget Activity 03: Advanced Technology Development (ATD)
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Program Element Table of Contents (Alphabetically by Program Element Title)

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APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603001A: *Warfighter Advanced Technology*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	36.122	52.896	39.359	-	39.359	42.186	42.958	43.139	44.680	Continuing	Continuing
242: *AIRDROP EQUIPMENT*	3.677	3.854	3.222	-	3.222	3.268	3.312	3.363	4.221	Continuing	Continuing
543: *AMMUNITION LOGISTICS*	1.304	2.184	2.308	-	2.308	2.505	2.524	2.261	2.300	Continuing	Continuing
C07: *JOINT SERVICE COMBAT FEEDING TECH DEMO*	2.310	2.409	2.180	-	2.180	2.237	2.505	2.504	2.466	Continuing	Continuing
J50: *FUTURE WARRIOR TECHNOLOGY INTEGRATION*	28.831	42.352	28.616	-	28.616	30.495	30.721	31.328	31.947	Continuing	Continuing
VT5: *EXPEDITIONARY MOBILE BASE CAMP DEMONSTRATION*	-	2.097	3.033	-	3.033	3.681	3.896	3.683	3.746	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program element (PE) provides Soldiers and Small Combat Units with the most effective personal clothing, equipment, and combat rations, and shelters and logistical support items at the least weight and sustainment burden. This PE supports the maturation and demonstration of technologies associated with air delivery of personnel and cargo (Project 242), rapid ammunition/munitions deployability and resupply (Project 543), combat rations and combat feeding equipment (Project C07), combat clothing and personal equipment (including protective equipment such as personal armor, helmets, and eye wear) (Project J50) and expeditionary base camps (Project VT5). Project J52 funds congressional special interest items. The projects in this PE adhere to Tri-Service Agreements on clothing, textiles, and food with coordination provided through the Cross-Service Warfighter Equipment Board, the Soldier as a System Integrated Concepts Development Team, and the DoD Combat Feeding Research and Engineering Board.

Work in this PE is related to, and fully coordinated with, PE 0602786A (Warfighter Technology), PE 0602105A (Materials Technology), PE 0602618A (Ballistics Technology), PE 0602624A (Weapons and Munitions Technology), PE 0602705A (Electronics and Electronic Devices), PE 0603004A (Weapons and Munitions Advanced Technology), PE 0603008A (Command, Control, Communications Advanced Technology), PEs 0602623A and 0603607A (Joint Service Small Arms Program) and PEs 0602784A (Military Engineering Technology) and 0603734A (Military Engineering Advanced Technology).

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Work is led, performed, and/or managed by the Natick Soldier Research, Development, and Engineering Center (NSRDEC), Natick, MA and the Armament Research, Development, and Engineering Center (ARDEC), Picatinny, NJ.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army					DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*		R-1 ITEM NOMENCLATURE PE 0603001A: *Warfighter Advanced Technology*			
B. Program Change Summary ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**
Previous President's Budget	37.364	52.979	40.814	-	40.814
Current President's Budget	36.122	52.896	39.359	-	39.359
Total Adjustments	-1.242	-0.083	-1.455	-	-1.455
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.951	-			
• Adjustments to Budget Years	-	-	-1.455	-	-1.455
• Other Adjustments 1	-0.291	-0.083	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603001A: *Warfighter Advanced Technology*	PROJECT 242: *AIRDROP EQUIPMENT*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
242: *AIRDROP EQUIPMENT*	3.677	3.854	3.222	-	3.222	3.268	3.312	3.363	4.221	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates equipment and innovative techniques for precision aerial delivery of cargo and personnel. Aerial delivery is a key capability for rapid force projection and global precision delivery. These efforts are designed to advance state of the art precision delivery technologies such as parachutes, guidance and navigation and control components and subsystems, tracking sensors, software algorithms, and safety rigging which integrates with currently equipped aircraft, unmanned aerial systems (UAS) and advanced rotary wing aircraft. These efforts provide the Warfighter with highly accurate, timely cargo/payload delivery and resupply in all terrain and weather conditions. Precision delivery/resupply reduces vulnerability of ground soldiers, aircraft and crew. Precision aerial delivery supports remote warfare with activities such as placement of battlefield sensors, reduction of Soldier load and initial delivery of key expeditionary base camp assets. Demonstrated technologies transition to Product Manager (PM)-Force Sustainment Systems (PM FSS), PM-Soldier Clothing and Individual Equipment (PM-SCIE) as well as other Army PMs.

Efforts in this program element support the Army science and technology Soldier portfolio.

Work in this project is fully coordinated with PE 0602786A (Warfighter Technology).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Natick Soldier Research, Development, and Engineering Center (NSRDEC), Natick, MA.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Advanced Precision Aerial Delivery of Cargo	2.941	2.889	-
Description: Beginning in FY13, this effort will be captured in the new Airdrop/Aerial Delivery Demonstration technology effort. This effort demonstrates enhancements for increasing the precision of aerial delivery using components and technical breakthroughs from PE 0602786A/Project 283.			
FY 2011 Accomplishments: Matured and demonstrated precision airdrop sensor technologies for real-time monitoring of height (height sensors integrated with terrain data) as well as air properties (temperature, air density, velocity, changing pressure); conducted scaled (i.e., weight, altitude and number of parachutes) airdrop testing of the low velocity, heavy payload (22K-42K lb) technologies. Evaluated results and select full scale design for Above Ground Level (500 ft.) delivery of heavy payloads.			
FY 2012 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603001A: *Warfighter Advanced Technology*	PROJECT 242: *AIRDROP EQUIPMENT*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Mature, demonstrate and transition sensor technologies for real-time monitoring of weather to PM-FSS JPADS ; mature advanced rotary wing aerial delivery sling load net technologies for low cost one-time-use.			
Title: Advanced Airborne Insertion (Personnel Airdrop) ***Description:*** Beginning in FY13, this effort will be captured in the new Airdrop/Aerial Delivery Demonstration technology effort. This effort demonstrates technical breakthroughs identified by PE 0602786A/Project 283 which provide safety and security enhancements for the aerial insertion of Airborne troops. ***FY 2011 Accomplishments:*** Transitioned mature chest-mounted navigational aid and display technologies to PM-SCIE and demonstrated payload-to-payload and jumper-to-jumper in-flight communications. ***FY 2012 Plans:*** Mature technologies for cargo/jumper locators and demonstrate payload-to-payload, jumper-to-jumper and payload-to-jumper in-flight communications.	0.736	0.965	-
Title: Airdrop/Aerial Delivery ***Description:*** This effort (previously conducted in Advanced Precision Aerial Delivery of Cargo and Advanced Airborne Insertion (Personnel Airdrop) matures and demonstrates parachute materials and designs, precision guidance and navigation software and hardware, tracking sensors and safety devices to increase the accuracy in the delivery of cargo to remote locations and/or complex terrains, as well as, increase safety of personnel insertions into theaters of operations. Projects transition to this effort from previous Advanced Precision Aerial Delivery of Cargo entry. This work further evolves breakthroughs from PE 0602786A/ Project 283 and is coordinated with PE0602786A/Project VT4. ***FY 2013 Plans:*** Will demonstrate Helicopter Sling Load (HSL) hardware for unmanned payload hookup to increase safety for ground personnel; mature in-flight deconfliction and tracking sensors and software to prevent midair collisions of payloads; demonstrate mission planning software and tracking devices for rapid drop zone (DZ) assembly of troops and their equipment.	-	-	3.222
Accomplishments/Planned Programs Subtotals	3.677	3.854	3.222

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603001A: *Warfighter Advanced Technology*	PROJECT 242: *AIRDROP EQUIPMENT*

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603001A: *Warfighter Advanced Technology*	PROJECT 543: *AMMUNITION LOGISTICS*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
543: *AMMUNITION LOGISTICS*	1.304	2.184	2.308	-	2.308	2.505	2.524	2.261	2.300	Continuing	Continuing

Note

Not applicable

A. Mission Description and Budget Item Justification

This project matures and demonstrates technologies for rapidly deploying and resupplying munitions and improving the return of unused ammunition from deployment. This effort contributes to force readiness and reduction in the logistics footprint through improvements in Materials Handling Equipment (MHE), ammunition and missile packaging/palletization, explosives safety, weapons re-arm, and asset throughput/management.

Efforts in this program element support the Army science and technology Soldier portfolio.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Work in this project is performed and managed by the US Army Armament Research, Development, and Engineering Center (ARDEC), Picatinny Arsenal, NJ.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Tactical Ammunition Accountability (TAA)	1.304	-	-
Description: This effort demonstrates advanced supply chain procedures coupled with state-of-the-art remote surveillance devices at the weapon system/munition level to provide precise knowledge of ammunition count, location and health status throughout an Area Of Responsibility (AOR).			
FY 2011 Accomplishments: Completed development of the automated expenditure reporting design; conducted demonstration in a tactically relevant environment.			
Title: Automated Material Handling Technology	-	1.300	2.308
Description: This effort demonstrates smart sensors and robotic load handling equipment as add-on kits for side loading forklifts used in ammunition storage igloos and tactical forklifts to provide quick, safe, and cost effective transfer of munitions pallets between storage areas and transportation assets.			
FY 2012 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603001A: *Warfighter Advanced Technology*	PROJECT 543: *AMMUNITION LOGISTICS*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Apply automated capabilities to a manually operated forklift and evaluate performance within an ammunition igloo. ***FY 2013 Plans:*** Will integrate inventory planning and control software into a robotics applique kit; demonstrate autonomous forklift operations in an ammunition igloo.			
Title: Weapon System Rearm Technology ***Description:*** This effort demonstrates automated modular re-arm systems for the medium caliber ground combat vehicle, as well as towed and self-propelled howitzers. ***FY 2012 Plans:*** Will select concepts and preliminary designs for re-arm system designs.	-	0.884	-
Accomplishments/Planned Programs Subtotals	1.304	2.184	2.308

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603001A: *Warfighter Advanced Technology*	PROJECT C07: *JOINT SERVICE COMBAT FEEDING TECH DEMO*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
C07: *JOINT SERVICE COMBAT FEEDING TECH DEMO*	2.310	2.409	2.180	-	2.180	2.237	2.505	2.504	2.466	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates technologies for military combat feeding systems and combat rations. Areas of emphasis include: enhanced nutrient composition to maximize cognitive and physical performance on the battlefield; cutting edge food stabilization and preservation techniques that increase the variety and quality of rations used by the Joint Services; novel ration packaging solutions to minimize degradation of combat rations during storage; field portable biosensors for food borne pathogen detection and identification as well as predictive modeling tools to protect the Warfighter from food borne illnesses. This project demonstrates combat feeding equipment with reduced logistics (in component parts, weight, volume, fuel, and water) and labor requirements, while improving the quality of food service. The project, a Department of Defense (DoD) program for which the Army has Executive Agent responsibility, provides technology development for Joint Service Combat Feeding. The DoD Combat Feeding Research and Engineering Board provides oversight for this project. Demonstrated field feeding equipment transition to Product Manager (PM)-Force Sustainment Systems (PM FSS).

Efforts in this program element support the Army science and technology Soldier portfolio.

Work in this project complements and is fully coordinated with PE 0602787A (Medical Technology).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the US Army Natick Soldier Research, Development and Engineering Center (NSRDEC), Natick, MA.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Joint Combat Feeding Equipment Technology	0.884	1.200	0.940
Description: Beginning in FY13, this effort will be renamed from Combat Feeding Equipment Technologies to Joint Combat Feeding Equipment Technology Demonstration. This effort demonstrates equipment and energy technologies to enhance effectiveness and reduce logistics footprint of field feeding systems.			
FY 2011 Accomplishments: Demonstrated a JP8 powered flameless individual in-line water heater for heating dehydrated rations and beverages; demonstrated a passive container cooling system for rations stored in high ambient temperature to reduce ration spoilage.			
FY 2012 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603001A: *Warfighter Advanced Technology*	PROJECT C07: *JOINT SERVICE COMBAT FEEDING TECH DEMO*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Demonstrate a fully integrated Battlefield Kitchen with improved habitability and safety, as well as reduced fuel consumption; demonstrate a grey water recycling system for mobile kitchens to manage liquid waste on the battlefield; demonstrate mission tailorable, man-portable appliances capable of integrating into current kitchen platforms. ***FY 2013 Plans:*** Will conduct technology demonstration of kitchen appliances with an integrated fuel fired, low cost, rugged burner that enables high efficiency operation and is logistically supportable.			
Title: Ration Stabilization, Packaging, Nutrient Delivery and Food Safety Technology ***Description:*** This effort matures and demonstrates mature nutritional biochemistry, food processing and packaging solutions to enhance nutrition and improve food stabilization, ration packaging and food safety to support Warfighter's physical and cognitive performance on the battlefield. ***FY 2011 Accomplishments:*** Demonstrated shelf stable sandwiches with emulsion based fillings; health benefits of probiotic ration components for bacterial reductions in fresh vegetables and component food. Developed packaging prototypes using novel multilayer polymer films to enhance barrier's mechanical and insulating properties and transition ration, packaging and nutrient delivery technologies. ***FY 2012 Plans:*** Demonstrate ration packaging permeability models that will be used to develop better ration packaging systems to decrease battlefield waste and packaging weight; demonstrate fortified ration components that will result in a wider variety of eat-on-the-go rations with nutrient composition optimized for Warfighter physical and cognitive performance for specific missions. ***FY 2013 Plans:*** Will evaluate the effectiveness of using Super-Critical Carbon Dioxide to increase the long term storage shelf life of rations; evaluate the capability for the Joint Biological Agent Identification System (JBAIDS) to detect both bio-threat agents and food service risk and demonstrate nutritional compounds identified in collaboration with US Army Medical Research Institute of Environmental Medicine to augment muscle recovery.	1.426	1.209	1.240
Accomplishments/Planned Programs Subtotals	2.310	2.409	2.180

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603001A: *Warfighter Advanced Technology*	PROJECT C07: *JOINT SERVICE COMBAT FEEDING TECH DEMO*

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603001A: *Warfighter Advanced Technology*	PROJECT J50: *FUTURE WARRIOR TECHNOLOGY INTEGRATION*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
J50: *FUTURE WARRIOR TECHNOLOGY INTEGRATION*	28.831	42.352	28.616	-	28.616	30.495	30.721	31.328	31.947	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures, demonstrates and integrates light weight and multifunctional materials and components to provide the Soldier and Small Combat Units (SCU) with the most effective personal protection, electronics connectivity and mission specific equipment while reducing physical weight, cognitive burden and sustainment needs of the Small Combat Unit. Efforts in this project focus on maturing, integrating and demonstrating personal protection (such as armor, headgear, eyewear and hearing protection); durable clothing for all weather conditions; lightweight, durable, reliable hand held electronic components for communication and situational awareness; and power components/power management solutions. In addition, special focus is on understanding and demonstrating the impacts of physical and cognitive load on Soldier mission performance and implementing strategies to reduce load and/or optimize loads to reduce injuries. These efforts integrate geographically dispersed laboratory environments to conduct comprehensive assessments and report the technical viability of Soldier system solutions and conducts field demonstrations to obtain relevant feedback for user acceptance and performance validation.

Efforts in this program element support the Army science and technology Soldier portfolio.

Work in this project complements and is fully coordinated with PEs 0602786A (Warfighter Technology), PE 0602618A (Ballistics Technology), PE 0602105A (Materials Technology), PE 0602787A (Medical Technology), PE 0602716A (Human Factors Engineering Technologies), PE 0602705A (Electronics and Electronic Devices), PE 0603710A (Night Vision Advanced Technology), PE 0602624A (Weapons and Munitions Technology), PE 0603005A (Combat Vehicle and Automotive Advanced Technology), PE 0603004A (Weapons and Munitions Advanced Technology) and 0603015A (Next Generation Training & Simulation Systems.)

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the US Army Natick Soldier Research, Development and Engineering Center (NSRDEC), Natick, MA.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Soldier/Small Unit Ballistic and Blast Protection	3.521	8.278	-
Description: Beginning in FY13, this effort will be captured in the Soldier /Small Unit Integrated Protection and Load Management technology effort. This effort matures and demonstrates Soldier systems level modeling, test devices, protocols and technologies to improve Warfighter survivability against blast and ballistic (B&B) threats. Work in this project is fully coordinated with PEs 0602786A/Project H98, 0602618/Project 61 and 0602787A/Project 878 Demonstrated technologies transition to Product Manager-Soldier Protection and Individual Equipment and/or industry partners..			
FY 2011 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603001A: *Warfighter Advanced Technology*	PROJECT J50: *FUTURE WARRIOR TECHNOLOGY INTEGRATION*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Developed and refined test devices and protocols for additional injury mechanisms of blast and ballistic events; refined and evaluated ballistic and blast protection system prototypes and obtained user feedback; developed/refined combat effectiveness metrics linking physical effects of load to cognitive performance. ***FY 2012 Plans:*** Improve the body armor assessment protocol by validating range of motion measurements with operationally-relevant Soldier agility assessment techniques; demonstrate head and face protection retrofit for existing helmets and will transition detailed specification and prototypes; synchronize and focus Modeling and Simulation programs to analyze existing data (mobility, protection, payload, lethality) and establish trade space, quantify risk/tradeoffs to optimize protection concepts and advance state-of-the-art design rules for individual armor.			
Title: Soldier/Small Unit Integrated Protection and Load Management ***Description:*** This effort (previously conducted under Soldier/Small Unit Ballistic and Blast Protection, and Soldier/Small Unit Load Management and Mobility Enhancement) matures and demonstrates proven components and material innovations which are integrated into experimental ensembles or prototypes that have potential to significantly increase protection of individual Soldiers and/or reduce physical load at equal or better capability. This work is fully coordinated with PE 060786A/Project H98, PE 0602716A/Project H70 and PE 0602705/Project H94. Demonstrated technologies transition to various PEO-Soldier Product Managers. ***FY 2011 Accomplishments:*** Fabricated, evaluated and optimized interfaces for Soldier-centric headgear components; refined headgear system design based on sizing, shape, stability and balance; used human performance, Soldier load, and threat assessment data to begin optimization of modular Soldier as System protection variants; identified baseline data required to support development of leader mission planning tools to assist leaders in the field in the selection of appropriate mission specific modular load configurations. ***FY 2012 Plans:*** Continue to refine and improve the integrated Soldier-centric headgear design and conduct system evaluations; select promising Flame Resistant, visual, thermal, ballistic and concealment/signature management technologies; and baseline mission specific equipment for modular Soldier as a System protection variants. ***FY 2013 Plans:*** Will demonstrate protective eyewear with improved ballistic impact, anti-fog, scratch resistance lenses; demonstrate upgradeable headgear protection with improved ballistic, eye, face, hearing protection and a display that enhances the situational awareness in combat conditions (night, rain, obscurants); complete validation of a body armor assessment protocol integrating Soldier agility and physiology parameters; develop camouflage ensemble components for a lab-based assessment; build on ballistic and blast strategy developed in FY12 to exploit lighter weight materials, processing methods, and equipment configurations to reduce	3.684	4.440	10.820

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Soldier borne load; apply modeling and simulation tools to assess load mitigating technologies to reduce physical injuries and enhance small unit mobility and Soldier endurance.			
Title: Soldier/Small Unit Load Management and Mobility Enhancement ***Description:*** Beginning in FY13, this effort will be captured in the Soldier /Small Unit Integrated Protection and Load Management technology effort. This effort uses a system engineering approach to reduce Soldier and Small Unit load by integrating lighter weight materials into components, employing energy/power management strategies and devising mechanisms/equipment to offload some mission equipment. This work is fully coordinated with PE 060786A/Project H98, PE 0602716A/Project H70 and PE 0602705/Project H94. ***FY 2011 Accomplishments:*** Investigated load carriage options for placement of Soldier loads (i.e., fuel, batteries) on the Lower Body Human Augmentation (LBHA) System; drafted technical and operationally-based system assessment protocols and analyzed components of Soldier Load which could be matured with lighter weight raw materials, reduce packaging or maturing technologies. ***FY 2012 Plans:*** Focus on a holistic approach to identify capabilities that enable the Small unit to efficiently shoot or move across varying terrain; devise measures to assess the impact of load on marksmanship performance; conduct field validation of mobility aids to exploit Soldier's use and application of spatial information; develop Soldier/Small Unit applications to be incorporated into mission planning tools for load management, Soldier cross-loading and resupply analysis.	3.021	4.520	-
Title: System Integration of Soldier and Small Unit Operated Electronics ***Description:*** This effort (previously titled Small Unit C4 Interfaces) matures and integrates hardware and software components into a robust and effective information system of systems for Soldier and Small Unit. The goal of this effort is to define standard electronic interfaces for select platforms and aggregate information from unattended robotic assets that support Small Unit operations. Effort is coordinated with PE 0602786A/Project H98, PE 0603710A/Project K70 and PE 0602624A/Project H18 PE 0603005/Project 497 and PE 0603004/Project 232. ***FY 2011 Accomplishments:*** Conducted laboratory analysis and conducted field demonstrations of Soldier-borne wireless personal area network (WPAN) system and obtained National Security Agency (NSA) approvals; demonstrated an on-Soldier system architecture that tightly couples three existing subsystems (battery, radio, headset), analyzes system performance/efficiency and develop user interface technologies. ***FY 2012 Plans:***	6.823	6.935	7.212

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603001A: *Warfighter Advanced Technology*	PROJECT J50: *FUTURE WARRIOR TECHNOLOGY INTEGRATION*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Continue gunfire detection, optical weapon sights and target identification efforts started in Small Combat Unit Lethality Integration effort and integrate into Soldier network; increase WPAN functionality to connect a wide range of Soldier-borne hardware components (such as sensors for weapon target pairing) and optimize form factor for efficient operation and layout; conduct field trials to characterize the system architecture with the complete integration of the WPAN and develop and demonstrate user interface technologies for mission command networking of Soldier and unmanned sensors; conduct field demonstrations of capabilities Small Units employ during intelligence gathering, training, and other operations; optimize Soldier acceptance parameters including form factor graphical user displays for efficient task completion and power management ***FY 2013 Plans:*** Will mature and optimize information portrayal interfaces for full spectrum operations in cognitively burdened environments; refine system architectures by duty positions for hand held (e.g. Smart phones) access to Company level data required during tactical operations in restricted terrains and expeditionary base camps; mature and demonstrate optimized dismounted operations software algorithms enabling tactile relevant information transfer and explore technology solutions to refine the design sets for integrating nano unmanned air system into the Soldier Network architecture.			
Title: Soldier and Small Unit Power and Energy ***Description:*** This effort matures and demonstrates lightweight, energy dense Soldier power storage, generation and power management components and subsystems. The goal is to fully support the power needs of a dismounted mission in an electronically equipped battlefield. This effort is fully coordinated with 0602705A/Project H11 and Project H94. ***FY 2011 Accomplishments:*** Conducted field evaluation of fuel cells (reformed and direct methanol); demonstrated improved hybrid power technology components which can supply a 24 hour mission; conducted field demonstrations of engine based generator and charger system for tactical battery charging; matured a conformal headgear power source and wireless power transfer from body to weapon or helmet. ***FY 2012 Plans:*** Demonstrate central conformal headgear power source; demonstrate wireless power transfer from body to weapon or helmet; and mature multi-fueled (JP8, DF, kerosene) man-packable tactical power source and battery charger; evaluate laboratory data assessing network power requirements and mature smaller, lighter wearable hybrid power source to enable extended missions. Effort is coordinated with PE 0602705A/projects H11 and H94. ***FY 2013 Plans:*** Will integrate improved power source with one or more systems and demonstrate performance in a relative environment; integrate and evaluate wearable fuel cell hybrid power source enabling longer mission durations; mature higher efficiency wireless power transfer on the body to eliminate cables; demonstrate higher power and energy density multi-fuel engine based man-packable	3.561	3.325	3.441

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
power source; investigate energy harvesting models and concepts; analyze energy efficiency improvements in power sinks to optimize battery size; will demonstrate power centric software.			
Title: Small Combat Unit Lethality Integration ***Description:*** This effort pursues distributed unmanned sensors, integrated gunfire detection system, optical weapon sight with net-centric tactical fire control software that utilizes human decision aides to improve the lethality and combat effectiveness of the Soldier and Small Combat Unit. This project is fully coordinated with PE 0602624A/Project H18 (Weapons and Munitions Technology) and PE 0603004/Project 232 (Weapons and Munitions Advanced Technology). ***FY 2011 Accomplishments:*** Matured and demonstrated Soldier-borne 3D gunfire detection capabilities and technologies; demonstrated optical weapon sight (smart sight) using ballistic tables to accurately laze target and perform cooperative engagement; incorporated unmanned assets (Air Vehicles, Ground Vehicles and Ground Sensors) into target identification network and demonstrated target (Soldier and Vehicle) of destruction through innovative message processing, synchronization and accumulation of internal platoon fire assets such as 40 mm grenades, 60 mm Mortars, 120 mm Mortars and Javelin Weapon System.	3.467	-	-
Title: System Integration Laboratory for Evaluation of Emerging Technological Capabilities ***Description:*** This effort (previously titled Small Unit Systems Engineering, Integration and Demonstration) develops and matures a system integration laboratory environment in which current and emerging Soldier systems can be evaluated in a controlled laboratory environment to determine viability and military utility. This effort also matures and integrates human performance assessment measures, evaluation devices required at various testing locations and develops standardized methodologies required for demonstrations. This effort is coordinated with PE 0602716A/Project H70, PE 0602786A/Project H98, 060315A/ Project S28 and 0603004A/Project 232. ***FY 2011 Accomplishments:*** Completed enhancement of simulation tools for improved assessment of Soldier networked systems and developed, integrated and demonstrated embedded laboratory data collection tools for assessing network power requirements and mobility technologies; developed and demonstrated networked Soldier System interoperable information management algorithms, software, hardware and network component interfaces and power centric architectures; demonstrated and assessed the interoperability of existing and emerging networked hardware and software technologies in field relevant environments. ***FY 2012 Plans:***	4.754	4.854	7.143

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Develop, integrate, and demonstrate embedded laboratory data collection tools for assessing cognitive burden associated with information management algorithms and physical burden associated with hardware and network component interfaces; continue assessing maturity of Soldier-borne technologies and power centric architectures in simulated field relevant environments. ***FY 2013 Plans:*** Will optimize laboratory diagnostic tool suites required to measure and analyze mission effectiveness, power, and mobility metrics that will provide the necessary information to make trade-off decisions for Soldier and Small Unit capability sets and enabling technologies; will mature the Soldier/Squad virtual simulation capability by integrating design and performance parameters including physical and cognitive load, select blast and ballistic effects, mission command networking, and terrain data.			
Title: Small Combat Unit Load Reduction ***Description:*** Identify technologies to improve Soldier and Small Unit mobility and endurance. Analyze reductions in physical load and load related injuries as well as impacts to cognitive behavior and mission success. Conduct concept and technology assessments of components and subsystems or systems models and demonstrate general military utility when applied to different types of military techniques. Work in this effort is fully coordinated with all other tasks in this PE. Beginning in FY13, the results from this effort will transition to Soldier/Small Unit Integrated Protection and Load Management. ***FY 2012 Plans:*** Define a Small Combat Unit representative load baseline; survey Government and Industry to identify and harvest opportunities to reduce or better manage loads; identify tools necessary to diagnose and visualize load effects of equipment as well as measure mission effectiveness and mobility; develop concept and technology assessment plan with methods, metrics and measures; conduct a technology assessment of the representative baseline; conduct a concept assessment of the best collection of soldier technologies identified in survey; identify impact to capabilities created by the concept and identify tradeoffs required to make a difference in Small Combat Unit Load.	-	10.000	-
Accomplishments/Planned Programs Subtotals	28.831	42.352	28.616

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

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COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
VT5: *EXPEDITIONARY MOBILE BASE CAMP DEMONSTRATION*	-	2.097	3.033	-	3.033	3.681	3.896	3.683	3.746	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates mission-specific plug and play components, subsystems and modules designed to optimize manpower requirements, improve situational awareness, increase survivability, improve habitation, reduce logistics footprint, enhance supportability and reduce cost. Expeditionary Base Camp (EBC) systems (or remote command outposts) provide an operational capability for Small Combat Units (battalion and below) and Soldiers which are rapidly deployable/ re-locatable and require no Military Construction and limited materiel handing support. The need for this technologically enabled capability has arisen as a result of new tactics, techniques and procedures used in austere, remote, and challenging environments in which stability operations, counterinsurgency operations and peace keeping missions are conducted. This project integrates mature technologies to create mission specific lab demonstrators and evaluates the performance capabilities using metrics and methodologies developed under PE 0602786//Project VT4.

Efforts in this program element support the Army science and technology Soldier portfolio.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Work in this project is led, performed and/or managed by the US Army Natick Soldier Research, Development and Engineering Center (NSRDEC), Natick, MA and fully coordinated with PE 0602786A (Warfighter Technology), PE 0602784A and 0603734A (Military Engineering) PE 0603004A (Weapons and Munitions Advanced Technology), PE 0603005A (Combat Vehicle and Automotive Advanced Technology), PE 0603125A (Combating Terrorism Technology Development), and PE 0603772A (Advanced Tactical Computer Science and Sensor Technology).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Expeditionary Base Camp (EBC) Technology Demonstrations	-	2.097	3.033
Description: This effort assesses and integrates maturing technologies required to plan, establish, operate, protect, sustain and redeploy a holistic small unit base camp system and manage its power, waste and water resources.			
FY 2012 Plans: Assess maturing power, waste and water technologies and define an operationally effective architecture for a basic base camp demonstrator; begin system integration of best performing components, and validate system effectiveness measures; begin to			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
mature and demonstrate the architecture for a unit mission base camp planning tool identifying pertinent system aspects such as interoperability requirements and power demand. ***FY 2013 Plans:*** Will apply FY12 system effectiveness measures and technical performance criteria to validate that the baseline architecture reduces basing manpower needs and operational energy efficiencies; use performance measures, interoperability criteria and power demand as attributes to begin development of a small unit base camp planning tool; mature passive protection, power, waste and water technology systems in compliance with the parameters defined in the baseline architecture.			
Accomplishments/Planned Programs Subtotals	-	2.097	3.033

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

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COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	114.036	102.810	69.580	-	69.580	70.759	74.388	74.563	75.561	Continuing	Continuing
810: *IND BASE ID VACC&DRUG*	19.290	18.617	19.574	-	19.574	20.739	20.483	19.774	19.935	Continuing	Continuing
814: *NEUROFIBROMATOSIS*	15.430	12.780	-	-	-	-	-	-	-	Continuing	Continuing
840: *COMBAT INJURY MGMT*	42.441	38.598	37.396	-	37.396	36.516	37.715	38.125	38.758	Continuing	Continuing
945: *BREAST CANCER STAMP PROCEEDS*	0.878	-	-	-	-	-	-	-	-	Continuing	Continuing
97T: *NEUROTOXIN EXPOSURE TREATMENT*	19.288	15.975	-	-	-	-	-	-	-	Continuing	Continuing
FH4: *FORCE HEALTH PROTECTION - ADV TECH DEV*	1.904	1.540	1.690	-	1.690	1.781	1.797	1.828	1.859	Continuing	Continuing
MM2: *MEDICAL ADVANCE TECHNOLOGY INITIATIVES (CA)*	7.715	5.991	-	-	-	-	-	-	-	Continuing	Continuing
MM3: *WARFIGHTER MEDICAL PROTECTION & PERFORMANCE STDS*	7.090	9.309	10.920	-	10.920	11.723	14.393	14.836	15.009	Continuing	Continuing

Note

FY11 and FY12 increases are due to congressional adds.

A. Mission Description and Budget Item Justification

This program element (PE) maturates and demonstrates advanced medical technologies including drugs, vaccines, medical devices, and diagnostics and developing medical practices and procedures to effectively protect and improve the survivability of US Forces across the entire spectrum of military operations. Tri-Service coordination and cooperative efforts are focused in four principal medical areas: Combat Casualty Care, Military Operational Medicine, Militarily Relevant Infectious Diseases, and Clinical and Rehabilitative Medicine.

Promising medical technologies are refined and validated through extensive testing, which is closely monitored by the U.S. Food and Drug Administration (FDA) and Environmental Protection Agency (EPA), as part of their processes for licensing new medical products. The FDA requires medical products to undergo extensive preclinical testing in animals and/or other models to obtain preliminary efficacy and toxicity information before they can be tested in humans (clinical trials). Clinical trials are conducted in three phases to prove the safety of a drug, vaccine, or device for the targeted disease or medical condition, starting in Phase 1 with a small number of healthy volunteers. Each successive phase includes larger numbers of human subjects and requires FDA cognizance prior to proceeding. Work conducted in this PE primarily focuses on late stages of technology maturation activities required to conduct Phase 2 human expanded safety and efficacy clinical trials. Some

high risk technologies may require additional maturation with FDA guidance prior to initiating these clinical trials. Such things as proof of product stability and purity are necessary to meet FDA standards before entering later stages of testing and prior to transitioning into a formal acquisition program and conducting Phase 3 trials for licensure. Activities in the PE may include completion of preclinical animal studies and Phase 1 and 2 clinical studies involving human volunteers according to the FDA and EPA requirements. Promising medical technologies that are not regulated by the FDA are modeled, prototyped, and tested in relevant environments.

Blast research efforts in this PE are fully coordinated with the United States Army Natick Soldier Research, Development and Engineering Center. This coordination enables improved body armor design and rations for Soldiers. Additionally, the activities funded in this PE are externally peer reviewed and fully coordinated with all Services as well as other agencies through the Joint Technology Coordinating Groups of the Armed Services Biomedical Research Evaluation and Management (ASBREM) Committee. The ASBREM Committee serves to facilitate coordination and prevent unnecessary duplication of effort within DoD?s biomedical research and development community, as well as their associated enabling research areas.

Project 810 matures and demonstrates US Food and Drug Administration (FDA) regulated medical countermeasures such as drugs, vaccines, and diagnostic systems to naturally occurring infectious diseases and wound infections of military importance, as identified by worldwide medical surveillance and military threat analysis. The project also supports testing of personal protective measures such as repellents and insecticides regulated by the U. S. Environmental Protection Agency (EPA). This project is being coordinated with the Defense Health Program.
Project 840 validates studies on safety and effectiveness of drugs, biologics (products derived from living organisms), medical devices and medical procedures intended to minimize immediate and long-term effects from battlefield injuries; advanced technology development and clinical studies for treatment of ocular and visual system traumatic injury; and restoration of function and appearance by regenerating skin, muscle, and bone tissue in battle-injured casualties. Additionally, this project develops and realistically tests improved occupant protection systems through medical research to characterize mechanisms of injuries sustained by occupants of ground-combat vehicles subjected to underbody blast events, determine human tolerance limits to underbody blast forces, and develop tools to predict injuries to ground-combat vehicle occupants exposed to underbody blast forces.
Project FH4 matures, validates, and supports enhanced Force Health Protection of Soldiers against threats in military operations and training. Health-monitoring tools are matured to rapidly identify deployment stressors that affect the health of Joint Forces. These databases and systems enhance the Department of Defense's (DoD's) ability to monitor and protect against adverse changes in health, especially mental health effects caused by changes in brain function. Force Health Protection work is conducted in close coordination with the Department of Veterans Affairs. The program is maturing the development of global health monitoring (e.

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B. Program Change Summary ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**
Previous President's Budget	71.510	68.171	65.647	-	65.647
Current President's Budget	114.036	102.810	69.580	-	69.580
Total Adjustments	42.526	34.639	3.933	-	3.933
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	44.000	34.639			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-3.193	-			
• Adjustments to Budget Years	-	-	3.933	-	3.933
• Other Adjustments 1	1.719	-	-	-	-

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COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
810: *IND BASE ID VACC&DRUG*	19.290	18.617	19.574	-	19.574	20.739	20.483	19.774	19.935	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates U.S. Food and Drug Administration (FDA) regulated medical countermeasures such as drugs, vaccines, and diagnostic systems to naturally occurring infectious diseases that are threats to U.S. military deployed forces. The focus of the program is on prevention, diagnosis, and treatment of diseases that can adversely impact military mobilization, deployment, and operational effectiveness. Prior to licensure of a new drug or vaccine to treat or prevent disease, the FDA requires testing in human subjects. Studies are conducted stepwise: first to prove the product is safe in humans, second to demonstrate the desired effectiveness and optimal dosage in a small study, and third to demonstrate effectiveness in large, diverse human populations. All test results are submitted to the FDA for evaluation to ultimately obtain approval (licensure) for medical use. This project supports studies for safety and effectiveness testing on small study groups after which they transition to the next phase of development for completion of studies in larger populations. The project also supports testing of personal protective measures that can reduce disease transmission from biting insects and other vectors to include products such as repellents and insecticides which are regulated by the U.S. Environmental Protection Agency (EPA).

Research conducted in this project focuses on the following five areas:
(1) Drugs to Prevent/Treat Parasitic (symbiotic relationship between two organisms) Diseases
(2) Vaccines for Preventing Malaria
(3) Bacterial Threats
(4) Viral Threats
(5) Diagnostics and Disease Transmission Control

Research is conducted in compliance with FDA regulations for medical products for human use and EPA regulations for insect control products that impact humans or the environment (e.g., repellents and insecticides).

Work is managed by the Walter Reed Institute of Research (WRAIR), U.S. Army Medical Institute of Infectious Disease (USAMRIID), and coordinated with Naval Medical Research Center (NMRC). The Army is responsible for programming and funding all DoD naturally occurring infectious disease research requirements, thereby precluding duplication of effort within the Military Departments.

Promising medical countermeasures identified in this project are further matured under PE 0603807A, project 808.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

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Work in this project is performed by the Walter Reed Army Institute of Research, Silver Spring, MD, and its overseas laboratories; the U.S. Army Medical Research Institute of Infectious Diseases, Fort Detrick, MD; and the Naval Medical Research Center, Silver Spring, MD, and its overseas laboratories.

Efforts in this project support the Soldier Portfolio and the principle area of Military Relevant Infectious Diseases.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Drugs to Prevent/Treat Parasitic Diseases	3.366	2.335	2.932
Description: This effort selects promising malaria and leishmaniasis (a disease transmitted by sand flies) drug candidates for testing in humans, and prepare data packages required for FDA approval of testing in humans and conduct testing. Studies have shown that the malaria parasite can become resistant to existing drugs, which makes it necessary to continually research new and more effective treatments. ***FY 2011 Accomplishments:*** Based on selection of promising candidates in previous year, expanded testing in humans of treatment options for malaria and leishmaniasis; worked with commercial manufacturer to change the dosing and subsequent labeling of Malarone for other malaria treatment indications ***FY 2012 Plans:*** Initiate safety and effectiveness studies in human volunteers on the most promising candidate identified from preclinical studies. ***FY 2013 Plans:*** Will evaluate effectiveness of new anti-parasitic drugs through testing in human populations exposed to malaria and leishmania infections.			
Title: Vaccines for Prevention of Malaria	4.100	4.905	5.556
Description: This effort selects candidate vaccines for various types of malaria, including the severe form of malaria (Plasmodium falciparum) and the less severe but relapsing form (Plasmodium vivax), and prepares technical data packages required for FDA approval of testing in humans. Conduct testing of promising malaria vaccine candidates in humans. A malaria vaccine would minimize the progression and impact of drug resistance and poor Warfighter compliance with taking preventive anti-malarial drugs. ***FY 2011 Accomplishments:*** Conducted studies to determine optimal dosing schedule of new Plasmodium falciparum malaria vaccine candidate, and planned for safety and effectiveness tests in larger populations in endemic areas; down-selected best and most effective vaccine candidates, for further development; assessed effectiveness of Plasmodium vivax malaria candidate vaccines in humans. ***FY 2012 Plans:***			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Formulate new candidate vaccines against Plasmodium falciparum and Plasmodium vivax malaria as well as test them in uninfected adults for safety, immunogenicity (ability to produce an immune response), and effectiveness; further test the most promising vaccine candidates in adults and children in larger test populations where malaria occurs naturally; transfer vaccine candidate to the advanced development program. ***FY 2013 Plans:*** Will conduct clinical trials of multiple types of vaccines in human populations using laboratory-based human challenge model. Then, for promising candidates, optimize administration for testing in human populations naturally exposed to malaria. If a successful candidate is identified, it will transition to advanced development.			
Title: Bacterial Threats ***Description:*** This effort selects promising candidate vaccines against each of the three main bacterial causes of diarrhea (E. coli, Campylobacter, and Shigella; a significant threat during initial deployments), and meningococcal vaccine candidates (a threat to trainees, deployed troops, and military families) for testing in human subjects. Data packages are prepared, as required for FDA approval, and testing is conducted in human subjects. ***FY 2011 Accomplishments:*** Continued safety and effectiveness trials of Invaplex and live attenuated Shigella vaccine; continued safety and effectiveness trial to establish most promising E. coli vaccine; undertook a safety study in humans of the meningococcal Group B multicomponent vaccine. ***FY 2012 Plans:*** Conduct human trials of live attenuated Shigella vaccine and E. coli vaccine to determine their effectiveness;, complete transfer of meningococcal vaccine technology to commercial partner. ***FY 2013 Plans:*** Will conduct second human clinical trial for E. coli vaccines to determine the best candidate vaccine, route of administration, and dosage; conduct additional human clinical trials on best Shigella vaccine based on FY 2012 human trial results; evaluate results of Campylobacter clinical trial conducted in FY 2012.	5.398	7.594	5.508
Title: Viral Threats Research ***Description:*** This effort selects the most promising vaccine candidates for evaluation in human subjects against Human Immunodeficiency Virus (HIV), dengue fever (a severe debilitating disease caused by a virus and transmitted by a mosquito) and hantavirus (severe viral infection that causes internal bleeding and is contracted from close contact with rodents). Conduct FDA-required nonclinical safety and protection testing (laboratory-based) in animals, prepare FDA investigational new drug technical data packages, and conduct clinical testing of candidate vaccines in humans.	3.362	1.825	3.359

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
FY 2011 Accomplishments: Further developed the hantavirus vaccine with support of a commercial partner; conducted testing in humans for safety and effectiveness of the final dengue vaccine candidate. ***FY 2012 Plans:*** Further develop the hantavirus vaccine with support of a commercial partner to include evaluation of vaccine delivery methods to improve effectiveness and safety; transition to advanced development program. ***FY 2013 Plans:*** Will demonstrate the concept of a prime-boost dengue virus (DENV) vaccine strategy, which stimulates different parts of the immune system and enhances the body's overall immune response, to improve current vaccine and reduce developmental risk; conduct further clinical testing of dengue vaccine candidates; further develop the hantavirus vaccine with support of a commercial partner to include evaluation of vaccine delivery methods to improve effectiveness and safety; transition to advanced development, will prepare and conduct safety studies in human volunteers with new HIV vaccine candidates at multiple sites worldwide.			
Title: Diagnostics and Disease Transmission Control ***Description:*** This effort conducts human subject testing of FDA-regulated field medical diagnostic devices and EPA-approved measures to control insect-borne pathogens and diseases such as Q fever (sand fly fever), Japanese encephalitis, Rickettsial disease (carried by ticks, fleas, and lice), and other pathogens transmitted by arthropods (animals without a backbone with segmented bodies and jointed limbs, such as a scorpion, crab, or centipede). ***FY 2011 Accomplishments:*** Transitioned new repellent to advanced development; evaluated a field device to detect the dengue virus in mosquitoes in conjunction with commercial partner; assisted commercial partners in fielding of FDA-approved point-of-care tests for dengue fever and leishmaniasis. ***FY 2012 Plans:*** Complete the evaluation of repellent products; Assist the commercial partners in fielding FDA-approved rapid human diagnostics (point-of-care tests) for Q-fever; evaluate a field detection device to detect Japanese encephalitis and other pathogens transmitted by arthropods (animals without a backbone with segmented bodies and jointed limbs, such as a scorpion, crab, or centipede) in collaboration with commercial partner. ***FY 2013 Plans:*** Will complete field evaluation of passive arthropod (animals without a backbone with segmented bodies and jointed limbs, such as a scorpion, crab, or centipede) repellent systems that do not require application of chemicals to skin or clothing; complete	3.064	1.958	2.219

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
field evaluations on prototype rapid diagnostic kits developed for the detection of selected vector-borne pathogens (pathogens transmitted by insects such as malaria, Leishmania, and dengue virus); complete the development of the enteric JBAIDS assay to transition the assay to advanced development; complete field evaluations and FDA-required 510K clearance on the Dengue Rapid Diagnostic Device (DRDD).			
Accomplishments/Planned Programs Subtotals	19.290	18.617	19.574

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

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COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
814: *NEUROFIBROMATOSIS*	15.430	12.780	-	-	-	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Neurofibromatosis research.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Neurofibromatosis (NF) Research Program	15.430	12.780	-
Description: This congressionally directed project conducted research on Neurofibromatosis (NF). ***FY 2011 Accomplishments:*** This congressionally directed project conducted research on Neurofibromatosis (NF). ***FY 2012 Plans:*** This congressionally directed project conducted research on Neurofibromatosis (NF).			
Accomplishments/Planned Programs Subtotals	15.430	12.780	-

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603002A: *MEDICAL ADVANCED TECHNOLOGY*	PROJECT 840: *COMBAT INJURY MGMT*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
840: *COMBAT INJURY MGMT*	42.441	38.598	37.396	-	37.396	36.516	37.715	38.125	38.758	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures, demonstrates, and validates promising medical technologies and methods to include control of severe bleeding, treatment for traumatic brain injury (TBI), revival and stabilization of trauma patients, and prognostics and diagnostics for life support systems. Post-evacuation medical research focuses on continued care and rehabilitative medicine for extremity (arms and legs), facial/maxillary (jaw bone), and ocular (eye) trauma and leveraging recent innovations in regenerative medicine and tissue engineering techniques.

Research conducted in this project focuses on the following six areas:

(1) Damage Control Resuscitation
(2) Combat Trauma Therapies
(3) Traumatic Brain Injury
(4) Combat Critical Care Engineering
(5) Clinical and Rehabilitative Medicine
(6) Underbody Blast Injury Assessment

All research is conducted in compliance with U.S. Food and Drug Administration (FDA) requirements for licensure of medical products for human use.

Promising efforts identified through applied research conducted under PE 0602787A, project 874, are further matured under this project. Promising results identified under this project 840 are further matured under PE 0603807A, project 836.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Work in this project is performed by the U.S. Army Dental Trauma Research Detachment (USADTRD) and the U.S. Army Institute of Surgical Research (USAISR), Fort Sam Houston, TX; the Walter Reed Army Institute of Research (WRAIR), Silver Spring, MD; and the Armed Forces Institute of Regenerative Medicine (AFIRM), Fort Detrick, MD.

Efforts in this project support the Soldier Portfolio and the principle areas of Combat Casualty Care and Military Operational Medicine.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Damage Control Resuscitation	14.223	11.486	9.722

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603002A: *MEDICAL ADVANCED TECHNOLOGY*	PROJECT 840: *COMBAT INJURY MGMT*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Description: This effort supports work required to validate safety and effectiveness of drugs and medical procedures to maintain metabolism and minimize harmful inflammation after major trauma. Efforts focus on blocking complement activation (a series of disease fighting proteins and their reactions in the body) from damaging healthy cells of the body and preventing or minimizing secondary organ failure (including brain and spinal cord injury). ***FY 2011 Accomplishments:*** Began human evaluation of blood substitutes and noninvasive interventions for internal bleeding; evaluated guidelines for combined use of plasma, clotting factors and complement inhibitors (CIs) (normal physiological responses to trauma) using a representative, large animal model to potentially change clinical resuscitation guidelines. ***FY 2012 Plans:*** Initiate limited clinical studies of coagulation factor and platelet function in burn patients; conduct studies of acute coagulopathy (clotting or bleeding disorder) of traumatic shock; evaluate currently available blood products in a large animal (pig) model. ***FY 2013 Plans:*** Will continue coagulation (blood clotting) factor and platelet function studies of ways to stop bleeding; study the use of compounds to reduce inflammation as a therapy for bleeding due to trauma.			
Title: Combat Trauma Therapies ***Description:*** This effort focuses on work required to validate safety and effectiveness of drugs, biologics (products derived from living organisms), and medical procedures intended to minimize immediate and long-term effects from battlefield injuries. This effort includes neuroprotective research - funding in this area is transitioned to Traumatic Brain Injury in FY 2012. ***FY 2011 Accomplishments:*** Began the next study of the candidate neuroprotective drug for FDA approval (effectiveness); began animal studies of an anti-seizure mixture of multiple drugs in combination and studies of silent brain seizures after traumatic brain injury (TBI); developed a mandibular (jaw) defect model; continued evaluation of pain management regimens to improve long-term outcomes; used a small animal model to down-select therapeutics for blast-induced TBI; continued in-house human clinical trials of promising treatments and therapies for battlefield trauma. ***FY 2012 Plans:*** Continue studies in wound healing, as well as skin, muscle, and bone repair. Transition skin and muscle work to more relevant animal models and continue in-house human trials. In FY 2012, work in neuroprotection research is transitioned to Traumatic Brain Injury. ***FY 2013 Plans:***	16.750	3.558	5.658

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603002A: *MEDICAL ADVANCED TECHNOLOGY*	PROJECT 840: *COMBAT INJURY MGMT*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Will conduct small scale clinical trials for most promising therapies for loss of large volumes of muscle and wound healing agents.			
Title: Traumatic Brain Injury ***Description:*** This effort supports work required to validate safety and effectiveness of drugs, biologics (products derived from living organisms), and medical procedures intended to minimize immediate and long-term effects from penetrating brain injuries. This research area starts in FY 2012. ***FY 2012 Plans:*** Will complete the FDA effectiveness study of the candidate neuroprotective drug for treatment of TBI and will complete the pivotal trial for a bench-top assay for use in hospitals using candidate biomarkers for the detection of TBI; will transition to advanced development; Will continue development of a smaller, deployable diagnostic device for brain trauma as well as a hand held version; will evaluate progesterone (steroid hormone) and nitrite as therapeutic interventions for blast injury. ***FY 2013 Plans:*** Will identify combination theraputics for advanced development/clinical trials for TBI that substantially mitigate for reduce TBI-induced non-convulsive seisures and brain damage.	-	4.273	3.255
Title: Combat Critical Care Engineering ***Description:*** This effort supports diagnostic and therapeutic medical devices, algorithms, software, and data-processing systems for resuscitation, stabilization, and life support; this research area started in FY 2010. ***FY 2011 Accomplishments:*** Completed evidence-based decision support development for early indicators of reduction in blood volume, the need for intervention, and closed loop care during casualty transport. Continued to support simulation development to reduce reliance on live tissues in training. ***FY 2012 Plans:*** Begin collection of continuous waveform data (output from vital signs monitors) in burn and trauma patients with blood loss to refine algorithm; evaluate commercially-viable measurement systems and novel remote triage devices (both wear-and-forget and stand-off devices) for effectiveness and specificity to blood loss. ***FY 2013 Plans:*** Will initiate clinical trials of machine-learning monitoring, using algorithms based on sensor data in multiple applications (early-onset of blood loss, blood loss volume, and risk for cardiovascular collapse); transition vital signs technology to advance development for further test and evaluation, FDA licensure, and for fielding.	3.287	3.056	3.973
Title: Clinical and Rehabilitative Medicine	8.181	10.900	10.588

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603002A: *MEDICAL ADVANCED TECHNOLOGY*	PROJECT 840: *COMBAT INJURY MGMT*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Description: This effort supports clinical studies of treatment of ocular and visual system traumatic injury, as well as restoration of function and appearance by regenerating skin, muscle, and bone tissue in battle-injured casualties. Areas of interest for regenerative medicine include healing without scarring, repair of compartment syndrome (muscle and nerve damage following reduced blood flow due to swelling), replacement skin, and facial reconstruction. ***FY 2011 Accomplishments:*** Conducted studies using relevant large animals to evaluate the most promising treatments for repairing traumatic eye injuries; concluded FY 2010 clinical trials; began studies of skin cells or tissue from patient engineered and transplanted back into the patient as a replacement for burned tissue. ***FY 2012 Plans:*** Conduct preclinical studies on novel drug delivery, diagnostic and/or tissue repair strategies for eye injury, as well as initial clinical studies of vision rehabilitation strategies; conduct preclinical and initial clinical studies of strategies for maxillofacial reconstruction, including wound healing control and tissue engineering/regeneration techniques, to restore facial features; begin a pilot clinical trial of a drug that reduces the spread of burn damage; finish preclinical research on engineered implants; start a pilot clinical trial on bone regeneration using scaffold and stem cell technologies; and continue an ongoing clinical trial in muscle regeneration. ***FY 2013 Plans:*** Will continue to develop drug delivery and diagnostic and tissue repair strategies, including stem cell therapies for traumatic eye injury; continue development and standardization of animal models to assess soft and hard tissue regeneration technologies; continue studies of burn, scar less wound, soft tissue, and bone repair strategies; continue development and testing of stem cell therapies and scaffolds (tissue-engineered grafts) in animal models; continue the evaluation of candidate strategies for maxillofacial (head, neck, face, and jaw) reconstruction, including wound-healing control and tissue engineering/regeneration techniques to restore facial features.			
Title: Under Body Blast Injury Assessment ***Description:*** This one-year effort supports research to enable the Live-Fire Test and Evaluation (LFT&E) community to conduct realistic survivability testing of ground-combat vehicles subjected to underbody blast (UBB) threats, with a primary emphasis on assessing potential occupant casualties, as well as to enable the development and testing of improved occupant protection systems. UBB creates injurious forces on occupants of ground-combat vehicles that are more violent and that act in directions not normally encountered in civilian automotive accidents. Injury prediction tools that were developed to assess occupant safety in automobile crashes are not adequate for assessing occupant survivability in ground-combat vehicles exposed to UBB threats. Accurately predicting the spectrum of injuries caused by UBB forces in live-fire tests of ground-combat vehicles presents a unique	-	5.325	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603002A: *MEDICAL ADVANCED TECHNOLOGY*	PROJECT 840: *COMBAT INJURY MGMT*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
challenge for the DoD. A UBB medical research program is being initiated to understand the human tolerance limits and injury mechanisms needed to accurately predict injuries to ground-combat vehicle occupants caused by UBB events. ***FY 2012 Plans:*** Initiate research to develop biomedically-valid UBB human tolerance limits and injury prediction tools for supporting the development of DoD blast injury prevention standards for survivability assessments and protection systems development; accelerate development and integration of human tolerance limits and injury prediction tools to enhance the LFT&E community?s ability to accurately assess ground-combat vehicle occupant survivability in UBB events.			
Title: Administrative Activities for Prior Year Clinical Trials ***Description:*** Contract law requires the government to fulfill its responsibilities for the life of the Congressional Special Interest (CSI) award as stated in the terms and conditions. Each award may have an execution and award management tail of up to five years post-award, which usually occurs 18 months after the start of the fiscal year. ***FY 2013 Plans:*** Funding for scientific expertise, legal, contracting, research protections, regulatory affairs, and resource support personnel to manage 627 active projects in FY 2012 to be closed out over the POM.	-	-	4.200
Accomplishments/Planned Programs Subtotals	42.441	38.598	37.396

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603002A: *MEDICAL ADVANCED TECHNOLOGY*	PROJECT 945: *BREAST CANCER STAMP PROCEEDS*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
945: *BREAST CANCER STAMP PROCEEDS*	0.878	-	-	-	-	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project receives funds as proceeds from the sale of Breast Cancer Stamps.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Breast Cancer Stamp Proceeds	0.878	-	-
Description: This is a Congressional Interest Item.			
FY 2011 Accomplishments: Breast Cancer Stamp Proceeds			
Accomplishments/Planned Programs Subtotals	0.878	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603002A: *MEDICAL ADVANCED TECHNOLOGY*	PROJECT 97T: *NEUROTOXIN EXPOSURE TREATMENT*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
97T: *NEUROTOXIN EXPOSURE TREATMENT*	19.288	15.975	-	-	-	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Neurotoxin Exposure Treatment.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Peer-Reviewed Neurotoxin Exposure Treatment Parkinsons Research Program	19.288	15.975	-
Description: This congressionally directed project conducts research for the Neurotoxin Exposure Treatment Parkinsons Research Program. ***FY 2011 Accomplishments:*** Conducted research for the Neurotoxin Exposure Treatment Parkinsons Research Program. ***FY 2012 Plans:*** Conduct research for the Neurotoxin Exposure Treatment Parkinsons Research Program.			
Accomplishments/Planned Programs Subtotals	19.288	15.975	-

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603002A: *MEDICAL ADVANCED TECHNOLOGY*	PROJECT FH4: *FORCE HEALTH PROTECTION - ADV TECH DEV*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
FH4: *FORCE HEALTH PROTECTION - ADV TECH DEV*	1.904	1.540	1.690	-	1.690	1.781	1.797	1.828	1.859	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures, demonstrates, and supports enhanced force health protection of Soldiers against threats in military operations and training. Health-monitoring tools are matured to rapidly identify deployment stressors that affect the health of Joint Forces. These databases and systems enhance the Department of Defense's (DoD's) ability to monitor and protect against adverse changes in health, especially mental health effects caused by changes in brain function. Force Health Protection work is conducted in close coordination with the Department of Veterans Affairs. The program is maturing the development of global health monitoring (e.g., development of neuropsychological evaluation methodologies), and validating clinical signs and symptoms correlating to medical records, diagnosed diseases, and mortality rates. The key databases supporting this program are the Millennium Cohort Study and the Total Army Injury and Health Outcomes Database. These databases allow for the examination of interactions of psychological stress and other deployment and occupational stressors that affect Warfighter health behaviors.

This project contains no duplication with any effort within the Military Departments and includes direct participation by other Services. The cited work is fully coordinated with Natick Soldier Research Development Engineering Command (NSRDEC), Natick, MA.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Work in this project is performed by the U.S. Army Center for Environmental Health Research (USACEHR), Fort Detrick, MD; the U.S. Army Research Institute of Environmental Medicine (USARIEM), Natick, MA; and the Naval Health Research Center (NHRC), San Diego, CA.

Efforts in this project support the Soldier Portfolio and the principle areas of Combat Casualty Care and Military Operational Medicine.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Health Research	1.904	1.540	1.690
Description: This effort supports validation of interventions developed from the Millennium Cohort study (a prospective health project in military service members designed to evaluate the long-term health effects of military service, including deployments), validation of biomarkers of exposure, methods to detect environmental contamination and toxic exposure, and validation of thoracic injury prediction models of blast exposure.			
FY 2011 Accomplishments: Transitioned thoracic blast injury models and an integrated software version for combined blunt trauma and toxic gas inhalation to Army Research Laboratory Survivability, Lethality Assessment Division (Soldier Survivability Assessment Program) and to the			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603002A: *MEDICAL ADVANCED TECHNOLOGY*	PROJECT FH4: *FORCE HEALTH PROTECTION - ADV TECH DEV*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Public Health Command (Health Hazard Assessment Program); conducted a systematic validation of prospective data to correlate relationships in PTSD and depression with suicide. ***FY 2012 Plans:*** Validate potential intervention strategies for reduction of mental health symptoms and factors associated with suicide, with a goal to reduce the suicide rate; validate sensor components to include whole-body acceleration (tertiary blast injury) and headform acceleration (traumatic brain injury). ***FY 2013 Plans:*** Will mature strategic findings from studies that support policy formation and guide further research to promote the longer-term physical and mental health of the Force. This will lead to a greater appreciation of the post-traumatic stress disorder for the senior military leadership and will help mitigate the physical and psychological effects of military service, protecting the Warfighter from potentially devastating consequences.			
Accomplishments/Planned Programs Subtotals	1.904	1.540	1.690

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603002A: *MEDICAL ADVANCED TECHNOLOGY*	PROJECT MM2: *MEDICAL ADVANCE TECHNOLOGY INITIATIVES (CA)*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
MM2: *MEDICAL ADVANCE TECHNOLOGY INITIATIVES (CA)*	7.715	5.991	-	-	-	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Medical Advanced Technology Initiatives.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Military Burn Trauma Research Program. ***Description:*** This is a Congressional Interest Item. ***FY 2011 Accomplishments:*** Military Burn Trauma Research Program. ***FY 2012 Plans:*** Military Burn Trauma Research Program.	7.715	5.991	-
Accomplishments/Planned Programs Subtotals	7.715	5.991	-

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603002A: *MEDICAL ADVANCED TECHNOLOGY*	PROJECT MM3: *WARFIGHTER MEDICAL PROTECTION & PERFORMANCE STDS*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
MM3: *WARFIGHTER MEDICAL PROTECTION & PERFORMANCE STDS*	7.090	9.309	10.920	-	10.920	11.723	14.393	14.836	15.009	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project supports the Medical and Survivability technology areas of the future force with laboratory validation studies and field demonstrations of biomedical products designed to protect, sustain, and enhance Soldier performance in the face of a myriad of environmental, physiological stressors, and materiel hazards encountered in training and operational environments. This effort focuses on demonstrating and transitioning technologies as well as validated tools associated with biomechanical-based health risks, injury assessment and prediction, Soldier survivability, and performance during continuous operations. The three main thrust areas are (1) Physiological Health and Environmental Protection, (2) Injury Prevention and Reduction, and (3) Psychological Health and Resilience.

This project contains no duplication with any effort within the Military Departments and includes direct participation by other Services. The cited work is fully coordinated with Natick Soldier Research Development Engineering Command (NSRDEC), Natick, MA.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Work in this project is performed by the U.S. Army Research Institute of Environmental Medicine (USARIEM), Natick, MA; and the U.S. Army Aeromedical Research Laboratory (USAARL), Fort Rucker, AL.

Efforts in this project support the Soldier Portfolio and the principle areas of Combat Casualty Care and Military Operational Medicine.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Physiological Health and Environmental Protection (Sleep Research/Environmental Monitoring)	2.096	1.600	1.597
Description: This effort developments laboratory products, interventions, and decision aids for the validation of physiological status and prediction of Soldier performance in extreme environments.			
FY 2011 Accomplishments: Validated the next generation of individual physiological sensors for the prediction of heat injuries in training environments; performed advanced evaluations of a computational model for predicting performance affected by chronic sleep restriction in the operational environment.			
FY 2012 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603002A: *MEDICAL ADVANCED TECHNOLOGY*	PROJECT MM3: *WARFIGHTER MEDICAL PROTECTION & PERFORMANCE STDS*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Complete field studies of the heat strain decision-aid with the U.S. Army Ranger School to reduce the risk of heat injuries during training; validate a computational model for predicting performance affected by chronic sleep restriction in the operational environment. ***FY 2013 Plans:*** Will evaluate real-time 'thermal strain monitoring and management' system in Brigade Modernization exercise or similar operationally-relevant field environment; identify model factors accounting for individual differences in vulnerability to sleep loss and model stimulant countermeasure effects. These results will serve to manage thermal strain and sleep loss in real-time.			
Title: Environmental Health and Protection - Physiological Awareness Tools and Warrior Sustainment in Extreme Environments ***Description:*** This effort developments non-invasive technologies, decision-aid tools, and models to enhance Warrior protection and sustainment across the operational spectrum. ***FY 2012 Plans:*** Will validate and transition non-invasive hydration assessment sensors to the advanced development program. ***FY 2013 Plans:*** Will refine novel hydration sensor technologies with a goal of achieving high (80-95%) diagnostic accuracy. This will serve to reduce the incidence of electrolyte-related injury among Warfighters.	-	1.544	1.726
Title: Injury Prevention and Reduction (Physical Performance Enhancement) ***Description:*** This effort validates injury prediction tools for brain, spine, and thoracic injury from blast, blunt, and ballistic impact. ***FY 2011 Accomplishments:*** Validated safe, rapid assessment criteria for spinal injury risk prediction; completed validation of facial fracture dose-response models and injury risk functions using an instrumented headform; transitioned integrated software version for combined blunt trauma and toxic gas inhalation; refined analysis tools which can use non- or minimally-invasive techniques to detect bone injury. ***FY 2012 Plans:*** Validate software that accounts for the effects of clothing and body armor on the body following blast; validate software to estimate lung, heart, and rib injury from blunt trauma due to debris impact (secondary blast injury); validate the effectiveness of selected elements of neurosensory performance assessment batteries. ***FY 2013 Plans:***	3.644	3.600	4.392

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603002A: *MEDICAL ADVANCED TECHNOLOGY*	PROJECT MM3: *WARFIGHTER MEDICAL PROTECTION & PERFORMANCE STDS*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Will validate the feasibility of using physiologically based injury models to interpret sensors and will develop real-time exposure and response algorithms of injury risk and performance status following blast and blunt force thoracic trauma, including penetration wounding, and pulmonary injuries from blast and blunt trauma caused by ballistic impact.			
Title: Psychological Health and Resilience ***Description:*** This effort validates neurocognitive assessment and brain injury detection methods, and validate tools and preclinical methods to treat post-traumatic stress disorder in a military population. ***FY 2011 Accomplishments:*** Validated utility of neurocognitive measures for tracking and monitoring recovery rate after concussion; (validated rodent Post-Traumatic Stress Disorder model using current treatment methods). ***FY 2012 Plans:*** Determine effectiveness of various treatment modalities (e.g., occupational therapy, counseling, etc.); validate screening/scoring guidelines for revisions to the Post-Deployment Health Assessment and the Post-Deployment Health Reassessment. ***FY 2013 Plans:*** Will develop guidance on pharmacological interventions to improve psychological and neurophysiological functioning post-concussion; conduct studies to develop and validate reliable metrics for identification, time course, and prospective neurocognitive/neurological effects of mild Traumatic Brain Injury (mTBI); convene working group panels to develop and execute strategic findings from studies that support policy formation. Additionally, the panels will design a strategic research approach to promote the longer-term physical and mental health of the Force.	1.350	2.565	3.205
Accomplishments/Planned Programs Subtotals	7.090	9.309	10.920

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603003A: *AVIATION ADVANCED TECHNOLOGY*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	55.492	62.095	64.215	-	64.215	69.519	80.869	81.595	86.804	Continuing	Continuing
313: *ADV ROTARYWING VEH TECH*	40.692	44.868	44.814	-	44.814	49.206	60.813	62.822	67.836	Continuing	Continuing
435: *AIRCRAFT WEAPONS*	2.525	-	-	-	-	-	-	-	-	Continuing	Continuing
436: *ROTARYWING MEP INTEG*	1.705	7.607	9.492	-	9.492	12.037	9.805	9.001	10.490	Continuing	Continuing
447: *ACFT DEMO ENGINES*	10.570	9.620	9.909	-	9.909	8.276	10.251	9.772	8.478	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program element (PE) matures and demonstrates manned and unmanned rotary wing vehicle (RWV) technologies to enable Army aviation modernization. Within this PE, aviation technologies are advanced and integrated into realistic and robust demonstrations. Project 313 matures and demonstrates enabling component, subsystems and systems in the following areas: rotors, drive trains, structures and survivability. Project 435 focuses on weapons integration and demonstration. Project 436 matures and demonstrates mission equipment packages to enable control of unmanned systems. Project 447 matures and demonstrates affordable and efficient engines. Focus areas include: engines & drive trains; rotors & vehicle management systems; platform design & structures; aircraft & occupant survivability; aircraft weapons & sensors; maintainability & sustainability; and unmanned & optionally manned systems. A major effort in this PE is the Joint Multi-Role (JMR) Aircraft Demonstrator.

Work in this PE contributes to the Army S&T Air Systems portfolio and is related to and fully coordinated with PE 0602211A (Aviation Technology), PE 0603313A (Missile and Rocket Advanced Technology), PE 0603710A (Night Vision Advanced technology), and PE 0603270A (Electronic Warfare Technology).

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering S&T focus areas and the Army Modernization Strategy.

Work in this PE is performed by the Aviation and Missile Research, Development, and Engineering Center (AMRDEC) with facilities located at Redstone Arsenal, AL; Fort Eustis, VA; and Moffett Field, CA.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army					DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*		R-1 ITEM NOMENCLATURE PE 0603003A: *AVIATION ADVANCED TECHNOLOGY*			
B. Program Change Summary ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**
Previous President's Budget	57.454	62.193	66.660	-	66.660
Current President's Budget	55.492	62.095	64.215	-	64.215
Total Adjustments	-1.962	-0.098	-2.445	-	-2.445
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.558	-			
• Adjustments to Budget Years	-	-	-2.445	-	-2.445
• Other Adjustments 1	-0.404	-0.098	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603003A: *AVIATION ADVANCED TECHNOLOGY*	PROJECT 313: *ADV ROTARYWING VEH TECH*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
313: *ADV ROTARYWING VEH TECH*	40.692	44.868	44.814	-	44.814	49.206	60.813	62.822	67.836	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates components, subsystems and systems for rotorcraft (both manned and unmanned) that provide, improved aircraft & occupant survivability, reduced maintenance & sustainment costs, and greater performance through improved rotors, drives, vehicle management systems and platform design & structures. Systems demonstrated include rotors, drivetrains, robust airframe structures and integrated threat protection systems. A major effort in this project is the Joint Multi-Role (JMR) Aircraft Demonstrator.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering S&T focus areas and the Army Modernization Strategy.

Work in this project is performed by the Aviation Applied Technology Directorate of the Aviation and Missile Research, Development, and Engineering Center (AMRDEC), Fort Eustis, VA, and the System Simulation Development Directorate, AMRDEC, Redstone Arsenal, AL. Work in this project is coordinated with Program Manager Aircraft Survivability Equipment (PM-ASE).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Rotorcraft Survivability	11.880	6.783	-
Description: These efforts increase rotorcraft survivability by reducing platform signatures and providing the means to more efficiently counter enemy detection and tracking systems. This effort also enhances situational awareness, allowing manned/ unmanned aircraft to avoid enemy air threats. This effort continues in FY13 under the Aircraft & Occupant Survivability Systems effort. ***FY 2011 Accomplishments:*** Integrated the lightweight, multi-function laser on an Apache platform and demonstrated improved countermeasures effectiveness through flight testing on a threat range; and demonstrated an aircraft survivability software adapter to allow plug & play capability for legacy and future aircraft survivability equipment (ASE) components and software products through hardware-in-the-loop (HITL) lab testing. ***FY 2012 Plans:*** Conduct follow-on HITL demonstration of survivability software adapter utilizing Integrated Aircraft Survivability Equipment (IASE) system, developed by PM-ASE, and additional aircraft survivability systems; and finalize Super - Application Programming Interface (API) definition to allow plug & play capability for legacy and future aircraft ASE.			
Title: Integrated Aircraft and Crew Protection	3.275	5.290	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603003A: *AVIATION ADVANCED TECHNOLOGY*	PROJECT 313: *ADV ROTARYWING VEH TECH*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Description: This effort demonstrates combined rotorcraft platform durability and survivability improvements through a fully optimized and integrated and hardened structure, Vehicle Management System (VMS), and rotors/subsystems technology integration program. This work continues in FY13 under the Aircraft & Occupant Survivability Systems effort. ***FY 2011 Accomplishments:*** Finalized the platform system trade studies; and conducted hardware refinement and validation to mature system level solutions of structures, rotors, subsystems and VMS technologies. ***FY 2012 Plans:*** Fabricate and demonstrate, at the full-scale component level, technology optimized concepts in structures, rotors, subsystems, and vehicle management systems areas, derived from the earlier trade studies. Begin design of a combat tempered platform integrated technology demonstrator and conduct system trade studies.			
Title: Aircraft & Occupant Survivability Systems ***Description:*** This effort increases rotorcraft survivability by reducing platform signatures, providing the means to more efficiently counter enemy detection and tracking systems, and also increases protection to the aircraft and aircrew against ballistic munitions, crash landings, and post-crash fire events. This effort enhances air crew situational awareness, allowing manned/unmanned aircraft to avoid enemy air threats. Prior to FY13, these efforts were exhibited under the Rotorcraft Survivability effort and the Integrated Aircraft and Crew Protection effort. ***FY 2013 Plans:*** Will research concepts that most effectively and efficiently make the pilot aware of the current threat situation and offer the best survivability actions to dynamic threats. Design a 3D route optimization planner architecture that allows the aircraft to maneuver to its flight dynamic limits, coupled with real-time threat lethality predictions; initiate component and full-scale preliminary design of a combat tempered platform that exemplifies enhanced aircraft and crew/occupant protection, improved battlefield durability, and reduced environmental vulnerability; begin to substantiate the results of the system level trade studies, which are key to understanding structural design parameters, and the performance of the optimized concepts through integrated, full-scale component testing; and begin system engineering trades and validation of component integration.	-	-	9.178
Title: Rotor Design and Capabilities ***Description:*** This effort determines the performance benefits of advanced rotors and air vehicles through the evaluation of alternative designs aimed to satisfy future force capability needs for increased system durability, speed, range and payload. The rotor design work continues in FY13 under the Rotors & Vehicle Management Systems effort. Air vehicle design work continues in FY13 under the Platform Design & Structures Systems effort.	11.601	14.487	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603003A: *AVIATION ADVANCED TECHNOLOGY*	PROJECT 313: *ADV ROTARYWING VEH TECH*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
FY 2011 Accomplishments: Demonstrated enhanced integrated rotor durability to assess benefit to aircraft maintenance; demonstrated permanent erosion protection, reliable icing protection and battle damage assessment as well as repair technologies on full-scale rotor blades; and demonstrated improved hover performance. ***FY 2012 Plans:*** Complete assessment of reconfigurable rotors technology; design a high performance, low vibration, low noise rotor and integrated control system; investigate advanced air vehicle concepts that address Army Aviation performance gaps; and initiate trade studies that support the evaluation of candidate next generation air vehicle designs that will include performance, survivability, cost and sustainability attributes to be pursued for demonstration.			
Title: Adaptive Vehicle Management System (AVMS) ***Description:*** The AVMS integrates advanced flight controls with real-time aircraft state information to enable safe, low-effort maneuvering and real-time adaptation to aircraft state changes (degradation, damage, mission, etc.). The AVMS demonstrates technology that enables Level 1 (most acceptable) handling qualities in the entire flight envelope, reduces flight control line replaceable unit counts by over 20%, and reduces flight control system weight. This work continues in FY13 under the Rotors & Vehicle Management Systems effort. ***FY 2011 Accomplishments:*** Completed preliminary design of required AVMS hardware and software; prioritized technologies to be flight demonstrated and conducted a risk/reward assessment of each technology; and generated several candidate systems to analyze in simulation to support a planned flight demonstration. ***FY 2012 Plans:*** Finish simulation evaluation of candidate systems to determine final candidates via flight demonstration; and begin detailed analysis and design of the best candidate AVMS suites in preparation for flight demonstration.	1.354	3.847	-
Title: Rotors & Vehicle Management Systems ***Description:*** This effort demonstrates the performance benefits of advanced rotors through the evaluation of alternative designs aimed to satisfy future force capability needs for increased system durability, speed, range and payload. This effort also integrates advanced flight controls with real-time aircraft state information into vehicle management systems to enable safe, low-effort maneuvering and real-time adaptation to aircraft state changes (degradation, damage, mission, etc.). Prior to FY13, these efforts were exhibited under the Adaptive Vehicle Management System effort and the rotor design work of the Rotor Design and Capabilities effort.	-	-	9.590

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603003A: *AVIATION ADVANCED TECHNOLOGY*	PROJECT 313: *ADV ROTARYWING VEH TECH*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
FY 2013 Plans: Will conduct testing to mitigate risk and address integration issues associated with integrating multiple active technologies into a rotor system; conduct detailed design of reconfigurable rotors with integrated active rotor components; demonstrate improved state sensing subsystems (rotor states, weight on wheels, external loads), rotating to non-rotating data and power transfer, real time adaptive control laws, and software validation technologies; develop a fault tolerant architecture that combines flight safety critical, mission critical and other non-safety critical subsystems into an integrated rotorcraft guidance and control system (Adaptive VMS); design and fabricate system hardware and software components in preparation for flight demonstration.			
Title: Platform Design & Structures Systems ***Description:*** Design, fabricate, evaluate and demonstrate advanced vertical lift aircraft system configurations that address Joint-Multi-Role (JMR) medium class capability needs. Utilize multiple contractors to determine optimum vehicle attributes that meet future force capability needs for increased system speed, range, payload, and reduced operating costs. Conduct preliminary and detailed system design of multiple candidate systems. Flight demonstrate operational capability of JMR system. Prior to FY13, this effort was exhibited under the Rotor Design and Capabilities effort. ***FY 2013 Plans:*** Will complete initial Operations Analysis and will use results to assign warfighter value to aircraft features and attributes; complete Configuration Trades & Analysis tasks, utilizing multiple contractors, that document design trades, cost/weight sensitivity studies, and vehicle configuration recommendations; investigate space, weight & power requirements and provisions for aircraft mission equipment (avionics, weapons, sensors); develop a demonstrator performance specification; initiate preliminary design of multiple aircraft concepts.	-	-	11.770
Title: Rotorcraft Drive Systems ***Description:*** This effort demonstrates advanced rotorcraft drive technologies with the potential to: increase the horsepower-to-weight ratio; reduce drive system noise; reduce production, operating and support costs; and provide automatic component impending failure detection. ***FY 2011 Accomplishments:*** Investigated material technologies through bench testing to validate materials for lightweight housings, new bearings and ultra-highly loaded gears; initiated preliminary and detailed design of a demonstrator drive system; and evaluated these technologies relative to conventional single-speed transmissions as well as proposed multi-speed drive configurations. ***FY 2012 Plans:***	3.165	3.992	5.000

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603003A: *AVIATION ADVANCED TECHNOLOGY*	PROJECT 313: *ADV ROTARYWING VEH TECH*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Complete detailed design and begin fabrication of drive system component test hardware to validate key materials for ultra-highly loaded gears and bearings as well as lightweight gearbox housings with improved corrosion resistance and reduced operational maintenance. ***FY 2013 Plans:*** Will conduct testing of component hardware to validate gear and bearing designs; evaluate modeling and design tools for accuracy to predict component stresses and material properties; test advanced oils and additives for extending component durability; assess reliability of new technologies for improved aircraft affordability; and test advanced cooling technologies for reduced aircraft weight.			
Title: Maintainability & Sustainability Systems (previously titled as Capability-based Operations & Sustainment Technologies (COST)) ***Description:*** Mature and demonstrate technologies that improve the operational availability of rotorcraft while reducing operating and support (maintenance) costs. Efforts include component sensing, diagnostics, prognostics, and control systems. ***FY 2011 Accomplishments:*** Developed prognostic technologies to predict failures and remaining useful life of engine accessories such as fuel controls, pumps and generators; and began demonstration of on-board automatic adjustments for in-flight rotor smoothing/balance capability. ***FY 2012 Plans:*** Demonstrate individual algorithms for prognostics of engine components, structural integrity, rotor components, and vehicle management systems for improved component time on wing and reduced maintenance; and develop data fusion techniques to improve sensor coverage and account for system-to-system influences. ***FY 2013 Plans:*** Will perform an aircraft level demonstration of the integrated set of technologies developed in FY11 and project the operational benefits and support cost savings; demonstrate additional prognostic technologies for accessories and controls; validate prognostic algorithms for structural integrity, corrosion, electrical distribution system, and rotor components; flight test energy harvesting sensors used to monitor component health and extend component service times; and validate a sensor network system for reducing aircraft weight and improving health monitoring capabilities.	5.650	6.669	6.976
Title: Real-time Airspace Collision Avoidance and Teaming (REACT) and Joint Common Architecture (JCA) ***Description:*** This program evaluates, and integrates real-time airspace de-confliction and collision avoidance technologies. The JCA effort will develop standards and requirements for an aviation open systems, mission processing architecture that is scalable across joint rotorcraft missions. This effort will implement these standards into a prototype processing system and demonstrate through Software Integration Lab (SIL) testing.	3.767	3.800	2.300

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603003A: *AVIATION ADVANCED TECHNOLOGY*	PROJECT 313: *ADV ROTARYWING VEH TECH*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
FY 2011 Accomplishments: Evaluated and demonstrated airspace/battlespace integration technologies, including real-time situational awareness display concepts and collision avoidance technology concepts, and evaluated effectiveness. ***FY 2012 Plans:*** Increase complexity of airspace/battlespace scenario and demonstrate effectiveness of real-time displays and collision avoidance technologies; and begin development of a software developer toolkit and integrator toolkit to verify software compliance with defined JCA standards and requirements. ***FY 2013 Plans:*** Will publish version 3 of the JCA standard that defines an open avionics systems architecture for future vertical lift aircraft and validate performance of the supporting JCA Ecosystem components (Software Developer's Tool Kit, Integrator's Tool Kit, Conformance Test Tool, Repository, and Simulation/Stimulation tools).			
Accomplishments/Planned Programs Subtotals	40.692	44.868	44.814

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603003A: *AVIATION ADVANCED TECHNOLOGY*	PROJECT 435: *AIRCRAFT WEAPONS*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
435: *AIRCRAFT WEAPONS*	2.525	-	-	-	-	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops, demonstrates and integrates manned and unmanned sensor and weaponization technologies such as advanced missiles, guns, fire controls, advanced target acquisition and pilotage sensors into Army aviation platforms. Efforts are directed toward reducing the integrated weight of weapons, increasing engagement ranges, providing selectable effects on a variety of threats, and enabling cost-effective integration across multiple aviation platforms.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering S&T focus areas and the Army Modernization Strategy.

Work in this project is performed by the Aviation and Missile Research, Development, and Engineering Center (AMRDEC), Redstone Arsenal, AL and Fort Eustis, VA.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Aviation Multi-Platform Munition (AMPM)	2.525	-	-
Description: Aircraft weapons efforts were consolidated in this project to focus technologies toward integrating a new lightweight weapon for use with both manned and unmanned rotorcraft systems. ***FY 2011 Accomplishments:*** Completed the system concept and system engineering plan for integration of smart weapons, to include initial definition of a universal weapon integration architecture; and demonstrated smart weapon (Shadow Hawk) integration implementing the Universal Armaments Interface (UAI) standard.			
Accomplishments/Planned Programs Subtotals	2.525	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603003A: *AVIATION ADVANCED TECHNOLOGY*	PROJECT 436: *ROTARYWING MEP INTEG*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
436: *ROTARYWING MEP INTEG*	1.705	7.607	9.492	-	9.492	12.037	9.805	9.001	10.490	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and validates man-machine integration and mission equipment software and hardware technologies for unmanned and optionally manned aircraft systems. Efforts focus on artificial intelligence, intelligent agents, cognitive decision aiding (CDA), sensors, avionics, communications, and pilot vehicle interfaces. This project improves the overall mission execution by demonstrating manned and unmanned system teaming, enhanced helicopter pilotage capability, improved crew workload distribution, and new capabilities for both manned and unmanned aircraft. This project supports Army transformation by providing mature technology to greatly expand the capabilities of unmanned aircraft, in current operating roles and future unmanned wingman roles. This project also develops, demonstrates and integrates manned and unmanned sensor and weaponization technologies such as advanced missiles, guns, fire controls, advanced target acquisition and pilotage sensors into Army aviation platforms. Efforts are directed toward reducing the integrated weight of weapons, increasing engagement ranges, providing selectable effects on a variety of threats, and enabling cost-effective integration across multiple aviation platforms.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering S&T focus areas and the Army Modernization Strategy.

Work in this project is performed by the Aviation Applied Technology Directorate of the Aviation and Missile Research, Development and Engineering Center (AMRDEC), Fort Eustis, VA.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Unmanned and Optionally Manned Systems (previously titled as Intelligent Autonomy for Unmanned Systems)	1.705	2.719	4.992
Description: Mature and apply tactical behavior algorithms and safe-flight technologies to enable unmanned and optionally manned aircraft to maintain safe, responsive, flexible and tactical formation flight with manned helicopters for unmanned wingman applications in re-supply, reconnaissance, surveillance and attack missions.			
FY 2011 Accomplishments: Evaluated and down-selected flight-following algorithms. Assessed architectures for integrating flight-following algorithms and tactical behaviors with flight controls.			
FY 2012 Plans: Migrate autonomy functions from ground control station to the unmanned aircraft to enable precise adjustment of delivery location in re-supply mission and autonomous onboard real time mission re-planning.			
FY 2013 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603003A: *AVIATION ADVANCED TECHNOLOGY*	PROJECT 436: *ROTARYWING MEP INTEG*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Will complete fabrication of unattended delivery and landing system through incorporation of 3-D terrain analysis and mapping; and mature and integrate multi-vehicle control technologies for cargo/resupply Unmanned Aerial System (UAS) operations; and prepare for flight demonstration.			
Title: Aircraft Weapon & Sensor Systems (previously titled as Aviation Weapons System Integration) ***Description:*** Develop an integrated, networked sensor and weapons management system that enables manned-unmanned teams to conduct cooperative precision engagements of short dwell targets with distributed Mission Equipment Packages (MEPs) . ***FY 2012 Plans:*** Develop a lightweight, integrated weapon system for manned and unmanned engagements of ground and airborne targets, to include advanced munitions for platform self-defense from threat unmanned aircraft. ***FY 2013 Plans:*** Will perform detailed design of the lightweight, integrated weapon system concept developed in FY12 to defeat threat aircraft systems (manned and unmanned) and soft ground targets; design target tracking algorithms to enable airborne engagement of maneuvering targets; evaluate performance of airburst munition fuzing concepts.	-	4.888	4.500
Accomplishments/Planned Programs Subtotals	1.705	7.607	9.492

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603003A: *AVIATION ADVANCED TECHNOLOGY*	PROJECT 447: *ACFT DEMO ENGINES*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
447: *ACFT DEMO ENGINES*	10.570	9.620	9.909	-	9.909	8.276	10.251	9.772	8.478	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates power system technologies through design, fabrication, and evaluation of advanced engine components in order to improve the performance of turbine engines for rotorcraft. This project supports Army modernization by demonstrating mature technologies for lighter turbine engines that provide increased power, increased fuel efficiency, improved sustainability and reduced maintenance. These advanced engine designs will significantly improve the overall aircraft performance characteristics and reduce the logistical footprint of rotary wing aircraft.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering S&T focus areas and the Army Modernization Strategy.

Work in this project is performed by the Aviation Applied Technology Directorate of the Aviation and Missile Research, Development, and Engineering Center (AMRDEC), at Fort Eustis, VA.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Advanced Affordable Turbine Engine (AATE) Technology	10.570	-	-
Description: Demonstrate a 3000 horsepower gas turbine engine for improved operational capability for Blackhawk, Apache, and other future rotorcraft. AATE includes two competitive engine demonstrator efforts (1 - General Electric and 2 - Advanced Turbine Engine Company (ATEC) (Honeywell and Pratt & Whitney Joint Venture)). Work in this project is complementary with efforts in PE 0602211A, project 47A. ***FY 2011 Accomplishments:*** Completed optimized component evaluations and analyzed results in support of engine demonstration; integrated optimized components into goal engine demonstrator hardware; completed full engine demonstration to include final engine performance and weight assessment; completed additional engine evaluations to gain insight into engine durability characteristics; and upon completion of this effort, this program transitions to the PEO Aviation Improved Turbine Engine Program (ITEP) for Engineering Manufacturing Development (EMD).			
Title: Future Affordable Turbine Engine (FATE)	-	9.620	9.909
Description: Demonstrate an advanced, innovative 7000 shp class gas turbine engine that provides significant improvement in operational capability for current and future rotorcraft. FATE uses sequential design and fabrication iterations to mature a design to demonstrate significant reduction in specific fuel consumption (SFC); significant improvement in horsepower-to-weight ratio; and significant reduction in production and maintenance cost compared to year 2000 state-of-the-art engine technology. The sequential design and fabrication process will begin with the compressor subsystem, then the combuster subsystem, then the			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603003A: *AVIATION ADVANCED TECHNOLOGY*	PROJECT 447: *ACFT DEMO ENGINES*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
turbine subsystem, and finally the mechanical systems. Work in this project is coordinated with efforts in PE 0602211A, project 47A. ***FY 2012 Plans:*** Complete preliminary design, detailed design, and component fabrication efforts for initial build of advanced engine system demonstrator, building on knowledge gained under other DoD Versatile Affordable Advanced Turbine Engine (VAATE) efforts; and design activities include 2-D and 3-D mechanical and aero-thermal efforts to evaluate the merits of individual components. ***FY 2013 Plans:*** Will complete detailed system design activities and initiate tests for multiple engine subsystems and components (e.g. compressor, turbine, combustor, and mechanical systems), with an emphasis on the compressor and turbine subsystems of the advanced FATE design; validate the design's aerodynamic performance and mechanical integrity, prior to the first, integrated, full-engine test; analyze completed component test results to support redesign efforts as required for future engine builds.			
Accomplishments/Planned Programs Subtotals	10.570	9.620	9.909

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603004A: *Weapons and Munitions Advanced Technology*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	65.495	76.955	67.613	-	67.613	76.236	87.269	84.938	95.891	Continuing	Continuing
232: *ADVANCED LETHALITY & SURVIVABILITY DEMO*	45.373	54.124	50.578	-	50.578	58.985	63.898	61.023	67.960	Continuing	Continuing
L96: *HIGH ENERGY LASER TECHNOLOGY DEMO*	19.162	18.379	13.965	-	13.965	13.971	19.677	19.832	23.286	Continuing	Continuing
L97: *SMOKE AND OBSCURANTS ADVANCED TECHNOLOGY*	0.960	4.452	3.070	-	3.070	3.280	3.694	4.083	4.645	Continuing	Continuing

Note

FY 13 Reduced for higher priority efforts

A. Mission Description and Budget Item Justification

This program element (PE) matures weapons and munitions components/subsystems and demonstrates lethal and non-lethal weapons and munitions with potential to increase force application and force protection capabilities across the spectrum of operations. The weapons and munitions include artillery, mortars, medium caliber, tank fired, and shoulder fired. Project 232 focuses on affordable delivery of scalable (lethal to non-lethal) effects. Project L96 matures and integrates critical high energy laser subsystems into a mobile demonstrator to explore and validate system performance in relevant environments. Project L97demonstrates performance of advanced obscurants and delivery of mechanisms and conducts forensic analysis of explosives and hazardous materials to enable detection by Soldier and Small Units.

Work in this PE is related to, and fully coordinated with, PE 0602120A (Sensors and Electronic Survivability), PE 0602307A (Advanced Weapons Technology), PE 0602618A (Ballistics Technology), PE 0602622A (Chemical, Smoke, and Equipment Defeating Technology), PE 0602624A (Weapons and Munitions Technology), PE 0602772A (Advanced Tactical Computer Science and Sensor Technology), PE 0602782A (Command, Control, Communications Technology), PE 0603005A (Combat Vehicle and Automotive Advanced Technology), PE 0603008A (Electronic Warfare Advanced Technology), and PE 0603313A (Missile and Rocket Advanced Technology).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work in this PE is performed by the Armament Research, Development, and Engineering Center (ARDEC), Picatinny Arsenal, NJ; Edgewood Chemical Biological Center (ECBC), Edgewood, MD; and the U.S. Army Space and Missile Defense Center (SMDC), Huntsville, AL.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army					DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*		R-1 ITEM NOMENCLATURE PE 0603004A: *Weapons and Munitions Advanced Technology*			
B. Program Change Summary ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**
Previous President's Budget	64.438	77.077	82.110	-	82.110
Current President's Budget	65.495	76.955	67.613	-	67.613
Total Adjustments	1.057	-0.122	-14.497	-	-14.497
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	3.200	-			
• SBIR/STTR Transfer	-1.589	-			
• Adjustments to Budget Years	-	-	-14.497	-	-14.497
• Other Adjustments 1	-0.554	-0.122	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603004A: *Weapons and Munitions Advanced Technology*	PROJECT 232: *ADVANCED LETHALITY & SURVIVABILITY DEMO*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
232: *ADVANCED LETHALITY & SURVIVABILITY DEMO*	45.373	54.124	50.578	-	50.578	58.985	63.898	61.023	67.960	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates enabling technologies for affordable precision lethal and non-lethal weapons and munitions. Technologies include advanced energetic materials, insensitive munitions, novel fuze designs, penetrators, scalable effects and pulsed laser and millimeter wave sources for high power microwave (HPM) systems.

Work in this PE is related to, and fully coordinated with, PE 0602120A (Sensors and Electronic Survivability), PE 0602307A (Advanced Weapons Technology), PE 0602618A (Ballistics Technology), PE 0602622A (Chemical, Smoke, and Equipment Defeating Technology), PE 0602624A (Weapons and Munitions Technology), PE 0602772A (Advanced Tactical Computer Science and Sensor Technology), PE 0602782A (Command, Control, Communications Technology), PE 0603005A (Combat Vehicle and Automotive Advanced Technology), PE 0603008A (Electronic Warfare Advanced Technology), and PE 0603313A (Missile and Rocket Advanced Technology).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Efforts in this project support the Ground domain portfolio.

Work in this project is performed by the Armament Research, Development, and Engineering Center (ARDEC), Picatinny Arsenal, NJ.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Ground Based Networked Munitions Technologies	3.101	3.151	-
Description: This effort provides follow-on technology advancement to ground based munitions systems currently being developed with improved capabilities. This includes an autonomous non-lethal response system.			
FY 2011 Accomplishments: Demonstrated a non-lethal layered response concept, focusing on ability to deploy munitions that can be fired in succession to intended ranges; continued to mature low-collateral self destruct concept by demonstrating a system with a representative explosively formed penetrator warhead.			
FY 2012 Plans: Integrate imagery and image processor, in a translucent protective container with Spider Munition Control Unit (MCU), for TRL 6 demonstration; incorporate the low collateral SD technology into a representative Scorpion System and conclude it with a final			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
TRL 6 test/demonstration; demonstrate the disposable radio repeater technology to maintain and regain signal from the Spider to the hand held device during the TRL 6 testing.			
Title: Scalable Effect Weapons and Munitions System ***Description:*** This effort matures scalable warhead technology and materials as well as demonstrates them in weapon and munition concepts that can be gun or missile launched to deliver a broad spectrum of effects. This ranges from non-lethal to lethal, against threat personnel and other targets. ***FY 2011 Accomplishments:*** Fabricated and integrated hardware as well as conducted fully integrated gun-launched firing demonstrations against varied targets and scenarios in a relevant environment to demonstrate scalable and adaptive effects with medium caliber cartridges, artillery shells, and unitary warheads for rocket applications; and verified system scalable lethality performance using technical data and modelind and simulation analysis.	11.363	-	-
Title: Operationally Adaptable Effects ***Description:*** Beginning in FY13, this effort utilizes the technologies demonstrated in Scalable Effect Weapons and Munitions System, which ended in FY11, to enable the defeat of a wide range of threats and provide scalable capabilities to engage ground targets and aerial threats, prevent fratricide and minimize collateral damage. ***FY 2013 Plans:*** Will design and fabricate variable yield unitary warhead that uses reactive materials, preformed fragmenting composite casing and dual purpose energetics to demonstrate improved scalable lethal and non-lethal effects.	-	-	2.904
Title: Soldier and Small Unit Lethality Integration ***Description:*** This effort leverages the soldier radio waveform (SRW) to enable network lethality at the small combat unit (SCU) level. ***FY 2011 Accomplishments:*** Refined and evaluated coordinated target hand-off, attack capability, as well as de-confliction with a small UGV/small UAV; and demonstrated network fire capabilities and fire control decision aides.	2.959	-	-
Title: Tunable Pyrotechnics ***Description:*** This effort demonstrates smoke and flare countermeasure for passive protection for ground and air combat platforms.	2.928	2.997	2.993

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603004A: *Weapons and Munitions Advanced Technology*	PROJECT 232: *ADVANCED LETHALITY & SURVIVABILITY DEMO*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
FY 2011 Accomplishments: Conducted a comprehensive evaluation on the performance of the compositions in a countermeasure mission using computer models of the decoy, evaluated effectiveness against simulation threat systems and captive IR seeker threat systems; and matured formulation characterization of IR and visible illumination compositions. ***FY 2012 Plans:*** Validate performance of advanced countermeasure flares through captive seeker flight testing and demonstrate performance of the pyrotechnic portion of the pocket hand-held signal with respect to the color given off and its illumination intensity. ***FY 2013 Plans:*** Will demonstrate and validate performance of ultraviolet, laser beam rider, and imaging seeker counter measures; subsequently validate performance using flares through flight testing; compare results to modeling and simulation studies and use derived information to advance computer modeling and simulation capabilities.			
Title: Extended Area Protection and Survivability (EAPS) ***Description:*** This effort demonstrates the use of command-guided medium caliber projectiles for the interception and destruction of incoming rockets, artillery, and mortar rounds (RAM). ***FY 2011 Accomplishments:*** Demonstrated with a fully loaded round with the capability to track, perform command maneuver and detonate warheads through an radio frequncy link. ***FY 2012 Plans:*** Integrate developed gun system with optimized ammunition to provide salvo firing capability; validate fire control software and integration into gun system; verify optimized warhead performance; assess software and firmware improvements to track, divert and initiate the warhead of multiple targets simultaneously. ***FY 2013 Plans:*** Will demonstrate the ability to track, command maneuver, and command detonate multiple in-flight projectiles against RAM targets and improve software based on flight results.	4.358	9.901	8.493
Title: Military Operations in Urban Terrain (MOUT)/Urban Lethal Technologies ***Description:*** This effort demonstrates the next generation of explosive wall breaching and shoulder launched weapon warhead technologies. ***FY 2011 Accomplishments:***	6.606	4.894	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Matured fuzing technologies and build a lab demonstrator for shoulder launched weapons; matured standoff breaching warhead design and build a lab demonstrator; evaluated the enhanced shoulder launched weapon and breeching warhead in a militarily relevant environment. ***FY 2012 Plans:*** Integrate optimized flight projectile, fire from enclosure (from cover) propulsion and light weight composite launcher; optimize system against requirements; demonstrate integrated system capability; and validate system capability against target set.			
Title: Advanced Lethality Demonstration ***Description:*** This effort matures and demonstrates novel penetrator designs (without using depleted uranium), as well as, alternative lethal mechanisms to maintain or exceed tank main gun performance against multiple target types into the future. ***FY 2011 Accomplishments:*** Initiated performance assessment of three novel penetrator configurations at both ordnance and hypervelocity; conducted system trade studies; fabricated and bench test full scale surrogates to evaluate tactical deployment concepts; and revised baseline tank main gun kinetic energy (KE) cartridge system designs to incorporate these novel penetrator configurations. ***FY 2012 Plans:*** Optimize and validate tactical size KE penetrator against actual range targets; will provide lethality maps for modeling and simulation. ***FY 2013 Plans:*** Will fabricate several full-up KE rounds with selected novel penetrator and demonstrate lethality performance meets modeling and simulation predictions and range objectives in a instrumented range; design based on results, refine design and prepare additional testing on range and simulated operational environment, i.e., fired from a tank.	3.685	2.318	3.060
Title: Dual-Use Improved Conventional Munitions (DPICM) Replacement Acceleration ***Description:*** This effort matures and demonstrates ultra high reliability fuzing, advanced kill mechanisms, and alternative dispensing technologies to provide increased battlefield lethality with reduced unexploded ordnance (UXO) compliant with current DoD cluster munitions policy. ***FY 2011 Accomplishments:*** Matured and demonstrated enabling components as well as subsystems that provide: ultra high reliability through exploitation of novel power sources and redundant fuze architecture; enhanced lethal effects against armored targets via optimization of high	3.487	5.205	6.977

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
velocity penetrators and explosives; increased area coverage through demonstration of innovative munitions dispense systems; and provided UXO compliance via improved self-destruct/self-neutralization features. ***FY 2012 Plans:*** Demonstrate fuze reliability through static and ballistic testing; optimize warhead design based on feedback and will use input to validate systems effectiveness modeling. ***FY 2013 Plans:*** Will complete warhead insensitive munition tests, producibility studies and final static arena tests validating system lethality; conduct instrumented ballistic firings and dispersion verification tests of finalized dispense/stabilizer designs; build optimized fuze technology demonstrator and conduct evaluation testing; finalize submunition baseline, build demonstrator and conduct final 155mm integrated ballistic demonstration validating demonstrator.			
Title: Medium Caliber Weapon Systems ***Description:*** This effort matures and demonstrates advanced medium caliber rounds, weapon and ammunition handling systems optimized for remote operation. This effort addresses multiple warfighter capability gaps including super high elevation engagement, high performance stabilization, remote ammunition loading, weapon safety and reliability, improved lethality, accuracy, and the ability to fire a suite of ammunition from non-lethal to highly lethal, to provide escalation of force capability in one system. ***FY 2011 Accomplishments:*** Matured and demonstrated initial model designs and components for alternative lethality mechanisms; developed demonstration system mature controls and software; initiated system engineering analyses and testing; explored remote armament designs and built demonstrators. ***FY 2012 Plans:*** Build advanced prototypes using mature system dynamic models to optimize system precision, accuracy, reliability and lethality against new and existing target sets, with new munitions and weapon enhancements; mature remaining system dynamics models; utilize systems engineering to optimize components maturation efforts for maximum return on investments and performance; demonstrate scalable lethality effects leveraging non-lethal munition technologies; conduct live fire demonstrations in Mann barrels (test barrels designed to isolate munitions characteristics); and advanced medium and remote small caliber rounds, weapons, as well as ammunitions system prototypes. ***FY 2013 Plans:*** Will mature and demonstrate air burst munition and armament to validate accuracy; conduct analysis to model accuracy performance and optimize air burst munition; mature air burst munition; optimize performance of onboard fuze and fuze setter	6.886	10.932	12.408

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
for programmable airburst munition; provide interface control documents for weapon, ammunition handling system and air burst munition; optimize fire control software for scenario based touch screen user interface; mature fire control system with downrange wind sensor, dynamic meteorological, environmental, temperature (MET) sensor and improved laser ranging; continue with the maturation phase of remote weapon station to reach a higher level of ruggedness and reliability; optimize the control system; improve the operator control interface; conduct extended system level cycling tests; mature weapon and ammo handling/turret cycling tests to determine system reliability and effectiveness; demonstrate remote weapon station capabilities using both lethal and non lethal ammunition.			
Title: Advanced Power and Energy Management for Munitions ***Description:*** This effort demonstrates the technology options available to provide the next generation of gun fired smart munitions, with advanced fuzing and power components for improved performance. ***FY 2012 Plans:*** Demonstrated technologies for reserve batteries that use methods to integrate energy storage with new architectures that have superior characteristics for energy management; matured electrochemical architectures which were miniaturized for integration into semiconductor devices capable to scale up into standard reserve cell to power munitions systems; demonstrated novel methods and techniques designed to reduce the power consumption of advanced gun fired smart munitions, as well as advanced technology to develop future generation of energy harvesters. ***FY 2013 Plans:*** Will investigate fabricate technologies for gravity sensor, and perform small scale environmental testing; for proximity sensor, design necessary components and integrate into preliminary sensor, and conduct performance tests in lab environment; for multi-point initiation, create breadboard multi-point system based on artillery application, testing control circuitry and simultaneity; fabricate demonstration millimeters thin lithium- ion batteries and demonstrate environmental robustness; mature supercapacitor for munition application and fabricate for bench and environmental evaluation.	-	1.747	3.119
Title: Scale-up of Energetic Materials ***Description:*** This effort matures and demonstrates the performance and insensitivity of energetic materials in medium cal (direct fire) and large cal (indirect fire) weapons. ***FY 2012 Plans:*** Assess propulsion system as well as explosive warhead performance improvements against most critical current and projected threat targets; fabricate and bench test improved energetic materials in tactical quantities and configurations to evaluate performance improvements. ***FY 2013 Plans:***	-	2.500	2.948

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Will investigate insensitive materials of interest for augmenting lethality ; scale up and formulate nano energetics for increased performance; scale up organic compounds based explosives to augment energy and lethality outcomes.			
Title: Counter Countermeasure (CCM) Technology Demonstrations ***Description:*** This effort demonstrates the continued effectiveness of US weapon systems and ammunition against current and projected enemy countermeasures, including conventional and classified threats and unexploded ordnance. ***FY 2012 Plans:*** Conduct performance assessment of counter countermeasure technologies for application to prioritize weapon systems with the most critical need; conduct system trade studies; fabricate surrogates to evaluate improvements; and assess technologies for application to Army unique needs for mitigation of unexploded ordnance. ***FY 2013 Plans:*** Will mature and demonstrate CCM technologies that optimize performance against threats, e.g. novel anti-armor weapon systems to defeat Active Protection Systems protected platforms; mature technology to reduce mounted soldier vulnerability by decreasing time on target.	-	1.345	0.737
Title: Lethality Efforts ***Description:*** This effort demonstrates several advanced lethality efforts, including weaponization of a robotic armed vehicle, air burst fuzing technology to enhance lethality against personnel in defilade, next generation kinetic energy penetrators, improved interception of Kinetic Energy Active Protection System projectiles, and increased lethality for medium caliber technologies. ***FY 2012 Plans:*** Mature and demonstrate enabling technologies, tactically relevant to the Kinetic Energy Active Protection System, and its subsystems to increase the battlefield lethality/survivability; demonstrate technologies for longer range artillery systems by optimizing alternative launch mechanisms for indirect fire extended range; demonstrate technologies for sensor-fused munitions for anti-armor and area defense capability; demonstrate technologies for improving precision that will extend beyond existing ranges. ***FY 2013 Plans:*** Will mature existing weapon platform and fire control software for integration and demonstration on a robotic platform; mature and demonstrate enabling integrated technologies tactically relevant to increasing battlefield lethality/survivability; continue to demonstrate technologies for improving precision that extends beyond existing ranges.	-	9.134	3.439
Title: Networked Effects Decision Suite	-	-	3.500

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Description: This effort provides sensor-to-shooter capabilities to deliver desired effects on target, specifically addressing accurate target location and target hand-off, improving accuracy and lethality at the small combat level. ***FY 2013 Plans:*** Will improve weapon target pairing (WTP) enhancement for non-lethal effects; improve fire support of unmanned aerial vehicle/ unmanned ground vehicle tactical behavior along with the remote weapon station collaborative effort; validate de-conflction of target data received; demonstrate improvements to validate the enhanced sensor-to-shooter WTP capabilities for lethal and non-lethal effects; validate the networked fire control perfomance utilizing existing hardware and software.			
Accomplishments/Planned Programs Subtotals	45.373	54.124	50.578

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603004A: *Weapons and Munitions Advanced Technology*	PROJECT L96: *HIGH ENERGY LASER TECHNOLOGY DEMO*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
L96: *HIGH ENERGY LASER TECHNOLOGY DEMO*	19.162	18.379	13.965	-	13.965	13.971	19.677	19.832	23.286	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates advanced technologies for future High Energy Laser (HEL) weapons technology. The major effort under this project is the phased approach for mobile high power solid state laser (SSL) technology demonstrations that are traceable to the form, fit, and function requirements for a HEL weapon. At entry level weapon power of around 10 kW, SSL technology has the potential to engage and defeat small caliber mortars, unmanned aerial vehicles (UAVs), surface mines, sensors, and optics. At full weapon system power levels of around 100 kW, SSL technology has the potential to engage and defeat rockets, artillery and mortars (RAM), UAVs, and anti-tank guided missiles (ATGMs), as well as surface mines, sensors, and optics at tactically relevant ranges. HELs are expected to complement conventional offensive and defensive weapons at a lower cost-per-shot than current systems and without the need to strategically, operationally, or tactically stockpile ordnance. This effort utilizes a modular building block approach with open systems architecture to ensure growth, interoperability, and opportunity for technology insertions for maturation of laser, beam control, sensor/radar, integration of power and thermal management subsystems, as well as Battle Management Command, Control, and Computers (BMC3).

This project supports Army science and technology efforts in the Ground portfolio.

Work in this project is related to, and fully coordinated with, efforts in PE 0602307A (Advanced Weapons Technology), PE 0602890F (High Energy Laser Research), PE 0603924F (HEL Advanced Technology Program), PE 0603005A (Combat Vehicle and Automotive Advanced Technology), PE 0603924D8Z (High Energy Laser Advanced Technology Program), PE 0602120A (Sensors and Electronic Survivability), and PE 0605605A (DOD High Energy Laser Systems Test Facility).

The cited work is consistent with the Department of Defense Research and Engineering Strategic Plan and the Army Modernization Strategy.

Work is performed by the US Army Space and Missile Defense Command Technical Center, Huntsville, AL.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: High Energy Laser Technology Demonstrator (HEL TD) Beam Control System (BCS)	19.162	18.379	-
Description: This effort matures and integrates a Beam Control System (BCS) into a mobile platform (Heavy Expanded Mobility Tactical Truck) and demonstrates BCS performance using low power SSLs. After the completion of the HEL TD BCS low power demonstrations in FY12, follow-on activities using the rugged, mobile BCS will be conducted under the High Energy Laser Mobile Demonstrations (HELMD) planned program. HELMD is the follow-on set of activities that utilize the mobile platform with rugged BCS to continue integration and demonstration of other subsystems required for a HEL weapon, such as power, thermal management, and a rugged laser.			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603004A: *Weapons and Munitions Advanced Technology*	PROJECT L96: *HIGH ENERGY LASER TECHNOLOGY DEMO*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
FY 2011 Accomplishments: Completed the fabrication, assembly, and functional testing of the BCS; completed coating process for primary mirror; explored integration issues of subsystems onto a tactical vehicle platform; conducted low power HEL testing to demonstrate target acquisition, tracking, and aim point selection; evaluated performance from low power testing and began necessary changes; purchased test targets; and began design and fabrication of hardware and development of software interfaces to integrate the BCS and a 10kW Commercial-Off-The-Shelf (COTS) SSL for integration risk reduction and system high power testing. ***FY 2012 Plans:*** Conduct high power HEL demonstrations of target acquisition, tracking, aim point selection and lethality against rockets, mortar, and other selected targets. Pre-demonstration activities include BCS and 100 kW SSL hardware integration with check out activities. Integrate High Energy Laser Joint Technology Office (HEL JTO) provided Adaptive Optics (AO) technologies into the BCS and prepare for AO demonstrations at HELSTF.			
Title: Laser System Ruggedization ***Description:*** This effort ruggedizes laser systems for integration on tactical platforms. Ruggedization includes modifications of the laser system to withstand vibration, temperature, and contamination environments expected on the HELMD platform, and other selected tactical platforms, while ensuring platform volume, weight, and interface specifications are met. The laser system consists of laser devices, such as the laboratory laser devices developed under PE 0602307A, Project 042, and the prime power and thermal management subsystems required for the laser device operation. ***FY 2013 Plans:*** Will use the HEL technology selected under PE 0602307A, Project 042 to begin ruggedization of a 25-50kW class laser device for integration on the HELMD platform; validate vibration, temperature, and contamination environment specifications for the laser device and supporting equipment, as well as volume, weight, and interface specifications to ensure compatibility with the platform; begin ruggedization efforts for available programmable pulsed power technology to provide prime power for the 25-50 kW laser device; and ruggedize available thermal management technology that can cool the 25-50 kW laser device.	-	-	6.983
Title: High Energy Laser Mobile Demonstrations (HELMD) ***Description:*** This effort initially integrates a commercial-off-the-shelf (COTS) laser subsystem (then later a ruggedized higher power laser subsystem) into the existing mobile laser demonstrator platform along with the ruggedized BCS built under the HEL TD effort. The goal is to demonstrate and evaluate performance of a complete mobile high power laser weapon in a relevant environment. ***FY 2013 Plans:***	-	-	6.982

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Will capitalize on the availability of COTS 10 kW class lasers and reduce risk for integration of higher power lasers on a mobile platform by integrating a COTS 10kW laser system on the HELMD platform to conduct demonstrations, including assessment of mobile SSL performance against mortars and other selected targets; demonstrate the HEL JTO provided AO technologies with the 10kW device to assess increases to effective range; and begin the integration of ruggedized components on the HELMD platform to support the next phase (25-50kW) of HEL mobile demonstrations.			
Accomplishments/Planned Programs Subtotals	19.162	18.379	13.965

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603004A: *Weapons and Munitions Advanced Technology*	PROJECT L97: *SMOKE AND OBSCURANTS ADVANCED TECHNOLOGY*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
L97: *SMOKE AND OBSCURANTS ADVANCED TECHNOLOGY*	0.960	4.452	3.070	-	3.070	3.280	3.694	4.083	4.645	Continuing	Continuing

A. Mission Description and Budget Item Justification

The project matures and demonstrates obscurant technologies with potential to enhance personnel/platform survivability by degrading threat force surveillance sensors and defeating the enemy's target acquisition devices, missile guidance, and directed energy weapons. Dissemination systems for new and improved obscurants are developed with the goal of providing efficient and safe screening of deployed forces. This project also matures and demonstrates improved detection of explosives and hazardous materials by Soldiers and Small Units.

This project sustains Army science and technology efforts supporting the Ground portfolio.

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan.

Work in this project is performed and managed by the Army Research, Development, and Engineering Command (RDECOM), Edgewood Chemical Biological Center (ECBC), Edgewood, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Obscurant Enabling Technologies	0.960	1.011	0.650
Description: This effort demonstrates the dissemination of new and advanced obscurants. ***FY 2011 Accomplishments:*** Matured, fabricated, and tested grenade concept for bi-spectral obscuration and effective dissemination patterns. ***FY 2012 Plans:*** Optimize and demonstrate bispectral obscurant grenade; mature, fabricate and test grenade concepts for new low hazard visual obscurant/smoke. ***FY 2013 Plans:*** Will optimize new low hazard visual obscurant grenade.			
Title: Forensic Analysis of Explosives	-	1.444	0.906
Description: This effort demonstrates improved point and stand-off detection of explosives and home made explosive (HME) precursors.			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603004A: *Weapons and Munitions Advanced Technology*	PROJECT L97: *SMOKE AND OBSCURANTS ADVANCED TECHNOLOGY*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
FY 2012 Plans: Mature and evaluate colorimetric homemade explosives kit and integrate improved signature information for explosives and precursor materials into chemical point and stand-off detection systems. ***FY 2013 Plans:*** Will optimize, mature and demonstrate a HME detection kit for the dismounted soldier.			
Title: Detection Mechanisms for Contaminants ***Description:*** This effort demonstrates improved point and standoff detection of a wide range of hazardous materials. ***FY 2012 Plans:*** Mature innovative technologies based on multiple spectroscopic sensing techniques for the detection and identification of hazardous material; integrate algorithms for improved probability of detection (Pd) and low false alarm rate (FAR) and based on the use of complementary spectroscopic techniques. ***FY 2013 Plans:*** Will optimize and demonstrate recommended spectroscopic approaches for standoff, proximity and point detection of explosives, homemade explosives, and/or homemade explosive precursors; and demonstrate integrated sensing of chemical agents and explosives in a common Ion Mobility Spectroscopy system (IMS) Joint Chemical Detector (JCD).	-	1.997	1.514
Accomplishments/Planned Programs Subtotals	0.960	4.452	3.070

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603005A: *Combat Vehicle and Automotive Advanced Technology*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	125.677	145.914	104.359	-	104.359	103.140	108.757	104.234	109.142	Continuing	Continuing
221: *COMBAT VEH SURVIVABLTY*	29.733	44.205	53.322	-	53.322	51.013	50.617	50.898	51.576	Continuing	Continuing
441: *COMBAT VEHICLE MOBILTY*	39.207	42.441	36.028	-	36.028	36.192	37.003	37.477	39.565	Continuing	Continuing
497: *COMBAT VEHICLE ELECTRO*	7.295	8.645	6.620	-	6.620	7.353	9.850	6.911	7.564	Continuing	Continuing
515: *ROBOTIC GROUND SYSTEMS*	10.263	10.686	8.389	-	8.389	8.582	11.287	8.948	10.437	Continuing	Continuing
53D: *NAC Demonstration Initiatives (CA)*	35.028	39.937	-	-	-	-	-	-	-	Continuing	Continuing
C66: *DC66*	4.151	-	-	-	-	-	-	-	-	Continuing	Continuing

Note

Not applicable for this item.

A. Mission Description and Budget Item Justification

This program element (PE) matures, integrates and demonstrates combat and tactical vehicle automotive technologies that enable a lighter, more mobile and more survivable force. Project 221 matures and demonstrates protection and survivability technologies such as active protection systems (APS), advanced vehicle armors, blast mitigation and safety devices to address both traditional and asymmetric threats to ground vehicles. Project 441 matures and demonstrates advanced ground vehicle power and mobility technologies such as powertrains, power generation and storage, force projection and running gear subsystems for military ground vehicles to enable a more efficient, mobile and deployable force. Project 497 matures, integrates, and demonstrates vehicle electronics hardware (computers, sensors, communications systems, displays, and vehicle command/control/driving mechanisms) and software that result in increased crew efficiencies, vehicle performance, reduced size, weight, and power (SWaP) burdens and vehicle maintenance costs. Project 515 matures and demonstrates unmanned ground vehicle (UGV) technologies with a focus on sensors, perception hardware and software, and robotic control algorithms that enable UGV systems to maneuver on- and off-road at speeds which meet mission requirements with minimal human intervention. Project C66 supports classified activities. Properly accessed individuals can obtain further information from the ASA(ALT) Special Programs Office on C66.

Work in this PE is coordinated with, PEs 0602105A (Materials), 0602120A (Sensors and Electronic Survivability, Robotics Technology), 0602601A (Combat Vehicle and Automotive Technology), 0602618A (Ballistics Technology), 0602624A (Weapons and Munitions Technology), 0602705A (Battery/Ind Power Technology), 0603004A (Weapons and Munitions Advanced Technology), and 0708045A (Manufacturing Technology).

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army	DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603005A: *Combat Vehicle and Automotive Advanced Technology*

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this PE is performed by the Tank Automotive Research, Development, and Engineering Center (TARDEC), Warren, Michigan.

B. Program Change Summary ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
Previous President's Budget	89.499	106.145	107.544	-	107.544
Current President's Budget	125.677	145.914	104.359	-	104.359
Total Adjustments	36.178	39.769	-3.185	-	-3.185
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	39.306	40.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-3.128	-			
• Adjustments to Budget Years	-	-	-3.185	-	-3.185
• Other Adjustments 1	-	-0.231	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603005A: *Combat Vehicle and Automotive Advanced Technology*	PROJECT 221: *COMBAT VEH SURVIVABLTY*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
221: *COMBAT VEH SURVIVABLTY*	29.733	44.205	53.322	-	53.322	51.013	50.617	50.898	51.576	Continuing	Continuing

Note

Not applicable for this item.

A. Mission Description and Budget Item Justification

This project matures, integrates and demonstrates protection and survivability technologies such as active protection systems (APS), advanced vehicle armors, blast mitigation and occupant safety devices to address both conventional and asymmetric threats to ground vehicles. This project integrates complimentary survivability technologies to enable advanced protection suites, providing greater survivability and protection against emerging threats.

Work in this project supports the Army S&T Ground Portfolio.

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Tank Automotive Research, Development, and Engineering Center (TARDEC), Warren, Michigan.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Active Protection Systems (APS) against Kinetic Energy (KE) and Long-Range Threats:	1.509	-	0.400
Description: This effort conducts essential trade studies, technical evaluations, and demonstrations of APS components/ subsystems designed for protection against KE penetrators and long-range threats. Coordinated work is also being conducted under Program Elements (PE) 0602624A, 0603004A, and 0603313A. ***FY 2011 Accomplishments:*** Supported KE APS demonstration including homing, guidance and accurate fuzing with interceptor/system testing, demonstration and analysis; finalized all system interfaces. ***FY 2013 Plans:*** Will support closeout of KE APS program including collection and archiving of documents and artifacts enabling knowledge preservation and transition feasibility.			
Title: Tactical Wheeled Vehicle (TWV) Survivability:	11.187	13.372	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603005A: *Combat Vehicle and Automotive Advanced Technology*	PROJECT 221: *COMBAT VEH SURVIVABLTY*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Description: This effort matures and demonstrates viable integrated survivability suites that can be tailored to meet current and future threats for light, medium, and heavy tactical wheeled vehicles. Coordinated work is also being performed under Program Elements (PE) 0602601A, 0602618A, and 0602105A. ***FY 2011 Accomplishments:*** Utilized requirements analysis, technology assessments, concept integration studies based upon emerging technology, and lessons learned to apply a systems engineering evaluation approach to provide a holistic, platform-level process for the maturation of the integrated survivability suites; matured advanced armor to include: opaque, transparent, and underbody kits; integrated advanced tactical vehicle active protection; and established a concept for an optimized convoy mission focused survivability suite based upon a down selection process. ***FY 2012 Plans:*** Apply the lessons learned from the systems engineering evaluation and survivability suite; begin work on an optimized suite of survivability systems that focus on convoy protection; define, fabricate, integrate and evaluate an advanced active protection system for tactical vehicles.			
Title: Vision Protection: ***Description:*** This effort matures and integrates devices to protect occupant's eyes, vehicle cameras and electro-optic fire control systems against anti-sensor laser devices as well as reduce the sensor's optical signature. Anti-sensor laser devices can deny vision either temporarily or permanently, by flooding the sensor with too much light (jamming) or by damaging the sensor. These jamming or damaging effects can slow our battle tempo, disrupt fire control solutions, or prevent vehicles from completing their mission entirely. This effort focuses on optical systems that protect sensors to maintaining fire control capability, situational awareness and protect Warfighter vision from pulsed, continuous wave and future laser threats. Coordinated work is also being performed in Program Elements (PE) 0602120A, 0602705A, 0602712A, and 0602786A. ***FY 2011 Accomplishments:*** Evaluated and refined an architecture that enables a large focal plane optical switch to be implemented; conducted lab testing of laser protected fire control and driver's cameras; and designed and implemented a liquid optical limiter handling system. ***FY 2012 Plans:*** Fabricate vision protection technologies at TRL 6; explore application of protection techniques to other Heavy Brigade platforms and perform laboratory assessments to address evolving threats. ***FY 2013 Plans:***	4.716	5.163	4.775

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603005A: *Combat Vehicle and Automotive Advanced Technology*	PROJECT 221: *COMBAT VEH SURVIVABLTY*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Will demonstrate a laser-protected optical design for the Abrams Gunner's Primary Sight providing protection for the gunner's eye; design and integrate a laser-protected day camera solution for the gunner.			
Title: Armor Technologies: ***Description:*** This effort designs, fabricates, integrates and evaluates advanced ground vehicle armor systems such as emerging base armor, applique armor, multifunctional armor systems (embedded antennas and health monitoring devices); matures scalable / modular / common armor system integration design standards; creates armor system test & evaluation standards; refines armor modeling and simulation system engineering process; matures armor system manufacturing processes. This effort is done in coordination with efforts in 0602601A, project C05. ***FY 2012 Plans:*** Fabricate and evaluate combat and tactical wheeled vehicle armor recipes and improved mine kit designs against objective threats while reducing armor weights; integrate armors on demonstrator vehicles and begin performance evaluations; validate platform-level mine-blast response modeling and simulation tools to include crew/occupant response to support system level analysis. ***FY 2013 Plans:*** Will evaluate various methods for reducing delamination and rock strike damage of transparent armor and demonstrates improved performance while maintaining armor visual transparency.	-	8.323	0.970
Title: Lighter Weight Armor Solutions ***Description:*** This effort explores new ***FY 2011 Accomplishments:*** Conducted automotive performance, durability, survivability and human factors evaluations on three lightweight tactical research prototype vehicles. (FY11 reprogramming)	5.500	-	-
Title: High Performance Lightweight Track (Blast Mitigation): ***Description:*** This effort improves lightweight track durability and survivability. This effort is done in coordination with PE 0603005A projects 441 and 497. ***FY 2011 Accomplishments:*** Integrated track solutions, fabricated prototypes and demonstrated blast protection. ***FY 2012 Plans:***	2.431	2.975	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Complete validation of track performance in an operational environment and transition design to PM Bradley Block II modernization program.			
Title: Vehicle Integration Laboratory: ***Description:*** This effort provides for continuous improvements to ground vehicles to include technology trades, integration, concepts and configuration management designs and development of a ground system vertical test rig to enable in-house Occupant Centric Survivability evaluations. The system vertical test rig will simulate the vertical forces that occur from an underbelly explosive event (initial vertical and drop-down forces). This test device evaluates the occupant and restraint system (seat, seat belt, floor kits) response to the vertical forces. ***FY 2011 Accomplishments:*** Integrated prototype tactical wheeled vehicle active protection systems onto a surrogate platform and conducted performance testing; evaluated integration techniques and concepts for advanced armor kits that defeat objective and emerging threats for ground and tactical vehicle fleets; and conducted system-level testing of combined fire protection technologies on representative ground vehicle platforms. ***FY 2012 Plans:*** Initial occupant protection suites being analyzed for tradeoff studies, balancing protection against performance and payload; conduct an in -progress review to present analysis results and make recommendations for a program selection of demonstrator platform and occupant protection technologies; design, build, and integrate the selected technologies onto the demonstrator vehicle and optimization of the ideal occupant cab.	4.390	9.047	-
Title: Underbody Blast Methodolgy: ***Description:*** Advancement of modeling and simulation to improve the survivability of ground vehicle occupants to underbody blast threats. Beginning in FY13, this effort is captured in the Blast Mitigation effort. ***FY 2012 Plans:*** Evaluate vehicle and underbody Soldier blast protection and modeling to address information knowledge gaps that include sensitivity of the elements of the blast kill chain, human effects and injury modeling, blast insult to injury mechanisms and optimization of form, fit and performance.	-	5.325	-
Title: Occupant Centric Survivability (OCS): ***Description:*** This effort develops and validates design philosophies, guidelines, military standards, handbooks, etc. that embody a focused, systems engineering approach to occupant-centric protection in vehicle design. This is accomplished using tools such as modeling and simulation (M&S), full vehicle and subsystem demonstrators, evaluations and component optimizations. This	-	-	14.271

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603005A: *Combat Vehicle and Automotive Advanced Technology*	PROJECT 221: *COMBAT VEH SURVIVABLTY*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
effort will address and validate the products from requirements generation through design and build to incorporate occupant centric philosophies. This effort is done in coordination with efforts in 0602601A, project C05. ***FY 2013 Plans:*** Will establish baseline of state-of-the-art commercial occupant protection components such as seats, restraints, and shock absorbing materials; conduct M&S of an OCS design demonstrator as well as legacy vehicles to optimize occupant centric philosophies, guidelines and processes; build physical prototypes, models and proofs of concept to validate M&S and reduce risk; mature and demonstrate technologies such as energy absorbing materials and storage systems for securing equipment/gear for potential transition to tactical and combat vehicle producers.			
Title: Blast Mitigation: ***Description:*** This effort designs, fabricates and matures advanced survivability and protection components, tools and subsystems for enhanced protection against vehicle mines, improvised explosive devices (IEDs) and other underbody threats, and crash events. This effort also integrates and improves occupant protection technologies such as seats and restraints. This effort creates the laboratory capability needed to enable expeditious research and development of blast-mitigating technologies in such areas as active and passive exterior/hull/cab/kits, interior energy absorbing capabilities for seats, floors, restraints, sensors for active technologies and performance evaluation, M&S, experimentation and instrumentation.This effort is done in coordination with efforts in 0602601A, project C05. ***FY 2013 Plans:*** Will fabricate, mature and integrate energy absorbing technologies on the interior and exterior of vehicle systems to mitigate the effects of blast and crash. Technologies include padding for walls and floors, energy absorbing seats, integrated restraints and airbags, and sensors for active components. Exterior technologies include unique hull shaping and energy absorbing materials. Will leverage use of M&S, produce data to validate models and improve modeling capabilities; mature and integrate sensors and instrumentation capabilities to support active technologies as well as collect higher fidelity blast/crash/impact data in live fire, test, and evaluation (LFT&E) and in theater attacks; fabricate and integrate lab evaluation capabilities such as a linear impact sled system to refine experimentation methodologies and standards for occupant protection technologies; design lab devices for simulating fuller effects of blast/crash/impact events; create methodologies and protection standards for crash, rollover and side improvised explosive device (IED) events; conduct component and sub-system level evaluation of occupant protection technologies.	-	-	14.827
Title: Vehicle Fire Protection: ***Description:*** This effort designs, matures, integrates and demonstrates technologies to minimize vehicle and crew vulnerabilities to fires in current and future military ground vehicles. Supporting technologies include M&S, sensor systems, software, chemical	-	-	4.612

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
agents, fire-resistant materials and hardware components. This effort is done in coordination with efforts in 0602601A, project C05. ***FY 2013 Plans:*** Will demonstrate better fire protection for vehicles and crews by improving designs and form/fit/function of existing and new chemical extinguishing agents, sensor systems, and fire-resistant materials in an in-house laboratory; design, fabricate and evaluate common Automatic Fire Extinguishing System (AFES) components for combat and tactical vehicles; enhance modeling and simulation tools optimize system detection and response to vehicle fire events.			
Title: Hit Avoidance: ***Description:*** This effort designs and matures active protection components and systems to a maturity level acceptable for transition to acquisition programs and/or tactical/combat vehicle producers and builds laboratory evaluation capabilities to conduct maturation activities. This effort also seeks to understand and define the process and requirements of fielding active protection systems (APS) including developing safety release criteria, identifying vehicle integration constraints and engaging the user to determine how hit avoidance will change tactics and procedures. In executing the development process, fieldable hard kill and softkill active protection technologies are matured for future transition to tactical and combat vehicle platforms. This effort is done in coordination with efforts in 0602601A, project C05. ***FY 2013 Plans:*** Will conduct evaluation and verification of hardkill and softkill active protection system components and establish component level compliance to the requirements; determine technology gaps in existing APS systems; integrate design of the hardkill APS onto a vehicle platform to determine safety, integration, test, and fielding requirements for APS on military platforms; develop open software architecture for future component and system development.	-	-	13.467
Accomplishments/Planned Programs Subtotals	29.733	44.205	53.322

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603005A: *Combat Vehicle and Automotive Advanced Technology*	PROJECT 441: *COMBAT VEHICLE MOBILTY*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
441: *COMBAT VEHICLE MOBILTY*	39.207	42.441	36.028	-	36.028	36.192	37.003	37.477	39.565	Continuing	Continuing

Note

Not applicable for this item.

A. Mission Description and Budget Item Justification

This project matures and demonstrates advanced mobility and electric technologies for advanced propulsion, power, and electrical components and subsystems to enable lightweight, agile, deployable, fuel efficient, and survivable ground vehicles. This project will also mature and demonstrate advanced mechanical and electrical power generation systems to ensure that future capabilities such as next generation communications and networking, improvised explosive device (IED) jamming systems and next generation sensor devices that can be integrated onto combat and tactical vehicles.

Work in this project supports the Army S&T Ground Portfolio.

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this project is performed by Tank Automotive Research, Development, and Engineering Center (TARDEC), Warren, MI, in conjunction with Army Research Laboratory (ARL), Adelphi, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Hybrid Electric Vehicle (HEV) Propulsion and Power & Energy (P&E) System Integration Lab (SIL): ***Description:*** This effort matures and demonstrates power and energy component technologies and assesses HEV performance benefits and burdens. Information transitions to PEO Combat Support and Combat Service Support. ***FY 2011 Accomplishments:*** Matured and demonstrated HEV components and system integration capabilities in simulated field conditions to solve user identified-technical issues and evaluated high temperature/high power electronic devices.	1.407	-	-
Title: Ground Systems Power Evaluation: ***Description:*** This effort matures and demonstrates power and energy components for propulsion, control systems, communications, life support, electric weapons, and protection systems. Work under this effort is continued in Hybrid Electric Component Development bullet for FY12 and beyond. ***FY 2011 Accomplishments:***	2.320	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Continued optimization of higher temperature power electronics for use in wheeled vehicle platforms; and continued the optimization of hybrid electric (HE) systems for wheeled vehicle system upgrades, as well as advanced motors and generators that offer onboard and export power generation.			
Title: Hybrid Electric Component Development: ***Description:*** This effort focuses on meeting the Army's demand for more onboard vehicle electric power to enable technologies such as advanced survivability systems, situational awareness systems and the Army network. This effort matures and integrates and demonstrates electrical power generation machines and their associated power conversion boxes such as inverters and converters, advanced control algorithms, and high efficiency power conversion (mechanical to electrical) components. Additionally, it matures and integrates advanced electric machines such as integrated starter generators and their controls for mild hybrid electric propulsion and high power electric generation. Coordinated work is also being conducted under Program Elements (PE) 0602601A, project H91 and PE 0603005A, project 497. ***FY 2012 Plans:*** Demonstrate SiC power conversion components, such as SiC DC-DC converter, DC/AC motor inverter and AC/DC generator inverter to evaluate their performance at higher inlet coolant temperatures, to assess their impact on the total system efficiency and cooling burden, and the effect on total system reliability; mature thermal systems to increase HVAC efficiency; and demonstrate electronics cooling technologies for increased performance. ***FY 2013 Plans:*** This effort will mature and demonstrate on board vehicle power (OBVP) components, high temperature inverters, and controls development for Integrated Starter Generator (ISG) and mild hybrid capabilities. These demonstration efforts will be used to validate combat vehicle OBVP component models and the effectiveness of high power / high temperature inverters to reduce high power electronics cooling burden. These activities will validate high voltage architecture to support growing combat vehicle electric power requirements.	-	5.994	5.439
Title: Advanced Running Gear: ***Description:*** This effort matures and demonstrates running gear components and advanced suspension technologies to increase vehicle mobility and durability in response to increased ground vehicle platform weights. Components and subsystems include new elastomer compounds, lightweight, survivable track systems and road wheels, advanced compensating track tensioners, advanced damping suspension technologies, energy regenerative suspension systems, Electronic Stability Control (ESC) systems, and preview sensing technologies linked to advanced suspension designs. Coordinated work is also being conducted under Program Elements (PE) 0602601A, project H91 and PE 0603005A, projects 221 and 497. ***FY 2011 Accomplishments:***	4.183	6.730	5.860

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Refined, fabricated, and conducted vehicle performance and durability testing of the advanced lightweight track systems, which demonstrated greater than 1,000 lbs weight savings over the legacy track system; tested over 3,000 durability miles on advanced lightweight track design for T-161, durability improvements were demonstrated with new fire-resistant elastomer compounds; successfully demonstrated over 5,000 miles on semi-active suspension technologies for the Stryker, and Family of Medium Tactical Vehicle (FMTV) platforms, which reduced vehicle shock and vibration by up to 60%, and reduced vehicle roll rates by up to 30%. ***FY 2012 Plans:*** Evaluate reformulated track elastomer improvements through on-vehicle evaluation to determine effectiveness in increasing track system durability and survivability. Construct and complete demonstration of material improvements to the T-161 track system with the goal to reduce the track system weight by over 1,000 lbs. Mature advanced suspension systems such as energy regenerative suspensions, for integration on-vehicle platforms. Establish components necessary to increase vehicle stability in conjunction with on-board vehicle braking systems. ***FY 2013 Plans:*** This effort will integrate and demonstrate performance of an energy regenerative suspension system for a large combat wheeled vehicle platform in a controlled environment; install, tune, and evaluate (ESC) systems for tactical vehicles to mitigate vehicle rollover events; mature lightweight materials for track systems to reduce platform weight; demonstrate high durability, fire resistant elastomers for combat tracked vehicle systems; develop an extensive evaluation suite to characterize running gear rolling resistance in order to inform future fuel efficiency improvement efforts of legacy track systems.			
Title: Power Management: ***Description:*** This effort demonstrates power management components to meet objective tactical and combat vehicle power requirements. ***FY 2012 Plans:*** Validate and integrate advanced intelligent (learning and adaptive) control architecture to control multiple vehicular power sources and loads and validate the modeling and simulation toolset.	-	2.300	-
Title: Energy Storage Systems Development: ***Description:*** This effort matures and demonstrates advanced ground vehicle energy storage devices such as advanced chemistry batteries and ultra capacitors, as well as, leverages commercial industry battery development efforts to reduce battery volume and weight while improving their energy and power densities. It also develops a common specification for battery management systems to improve the battery state of charge indicator accuracy and battery state of health information, to reduce the frequency of battery replacement, optimize starting, lighting, and ignition functions; The goal of this work it to enable silent	-	3.054	3.569

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
watch capability and improve survivability through energy storage components for electromagnetic armor. Coordinated work is also being conducted under Program Elements (PE) 0602601A , project H91. ***FY 2012 Plans:*** Improve battery energy density resulting in reduced battery size and weight thereby minimizing component footprint on vehicle platform for pulse power electromagnetic armor applications. ***FY 2013 Plans:*** Will demonstrate and integrate a battery monitoring and battery management system for accurate state of charge and state of health information. This effort will also mature and demonstrate a second generation power brick battery to provide energy storage for advanced armors by optimizing volume, power density and extreme temperature performance.			
Title: Pulse Power: ***Description:*** This effort matures and demonstrates high energy, compact pulse power components, subsystems and systems that enable significantly improved survivability and lethality applications comprising of elements such as DC to DC chargers, high energy batteries, pulse chargers, high density capacitors, solid state switches, control systems and electro-magnetic armor panels. Coordinated work is also being conducted under Program Elements 0602601A, 0603005A and 0602705A. ***FY 2011 Accomplishments:*** Demonstrated Advanced Pulse forming card for the programmable pulse power supply at objective metrics for ground combat systems; and demonstrated SiC switch at objective metrics defined by ground combat systems. ***FY 2012 Plans:*** Start integration of power brick based electro-magnetic armor components for ground combat systems schedule, and start build of generation 2 Programmable Pulse Power supply for the High Energy Laser (HEL) Technology Demonstrator at Space and Missile Defense Center (SMDC). ***FY 2013 Plans:*** Demonstrate first generation power brick based electro-magnetic armor system, begin development of a second generation power brick based electro-magnetic armor system (reduced form factor) and continue development of the second generation high energy laser programmable pulse power supply.	10.014	3.679	2.235
Title: JP-8 Fuel Cell Reformer System: ***Description:*** This effort identifies and demonstrates fuel cell technology, that when integrated with a JP-8 reformer, creates an Auxiliary Power Unit (APU). This effort is done in coordination with efforts in PE 0602601A.	3.785	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603005A: *Combat Vehicle and Automotive Advanced Technology*	PROJECT 441: *COMBAT VEHICLE MOBILTY*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
FY 2011 Accomplishments: Began integration demonstration of essential reformer components; characterized performance of components when integrated in complete reformer system and showed that component performance matched predicted performance; and began physical assembly of a JP-8 reformation system.			
Title: Non-Primary Power Systems: ***Description:*** This effort will exploit, mature, and demonstrate Auxiliary Power Unit (APU) technologies such as a small modular/ scalable engine based APUs, fuel cell reformer system to convert JP8 to hydrogen, sulfur tolerant JP8 fuel cell APU, and novel engine based APUs for military ground vehicles and unmanned ground systems. This effort will also create interface control documents for simplified integration of current and future APUs, improve reliability to reduce logistic burden, as well as reduce acoustic signature for silent operation. Additionally, this effort will exploit JP8 fuel cell and engine APUs to optimize prime power in unmanned ground systems. Coordinated work is also being conducted under Program Elements (PE) 0602601A , Project H91. ***FY 2012 Plans:*** Begin integrating JP-8 reformer/fuel cell system into a relevant Abrams space claim; finalize JP-8 reformer/fuel cell system design; begin testing engine based auxiliary power units in a relevant environment; integrate small engine technologies for use on small unmanned ground vehicles. ***FY 2013 Plans:*** Will demonstrate a JP8 fuel cell APU system in a laboratory environment; improve small engine based APU performance for operational environments (shock, vibration and cooling); reduce acoustic signature through laboratory demonstrations; perform vehicle integration and demonstration of small engine APUs.	-	3.531	4.374
Title: Fuel Efficiency ground vehicle Demonstrator (FED): ***Description:*** This effort focuses on demonstrating the viability of achieving significant decreases in fuel consumption without sacrificing tactical vehicle performance or capability. ***FY 2011 Accomplishments:*** Completed fabrication of demonstrator and began validation of the findings of the FED system modeling and simulation.	4.673	-	-
Title: Propulsion and Thermal Systems: ***Description:*** This effort researches, designs and evaluates high power density engines and transmission systems needed to offset increasing combat vehicle weights (armor), increased electrical power generation needs (onboard communications, surveillance and exportable power), improved fuel economy (fuel cost & range), enhanced mobility (survivability), and reduced cooling system burden (size, heat rejection). Currently, less than 1/3 of the total available energy from the fuel is converted into	7.397	10.122	10.256

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603005A: *Combat Vehicle and Automotive Advanced Technology*	PROJECT 441: *COMBAT VEHICLE MOBILTY*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
usable mechanical work (propulsion). This effort also researches and matures thermal management technologies and systems including heat energy recovery, propulsion and cabin thermal management sub-systems to utilize waste heat energy and meet objective power and mobility requirements on all ground vehicles. Lastly, this effort maximizes efficiencies within propulsion and thermal systems to reduce burden on the vehicle while providing the same or greater performance capability. ***FY 2011 Accomplishments:*** Completed testing of the magneto-rheological (MR) suspension on a Stryker vehicle; performed advanced development and integration of sensors and control algorithms for closed- loop control of diesel engines; performed vehicle noise analysis; improved control strategy for powertrain; evaluated and selected power generation components. ***FY 2012 Plans:*** Advance powertrain technologies by increasing thermal efficiency and reducing heat rejection of diesel engines; improve the development and integration of sensors and control algorithms for closed-loop control of diesel engines; validate advanced high efficiency transmissions; evaluate and mature control strategies for powertrain systems; adapt power generation components through powertrain analysis; improve and mature components to reduce engine cooling burden. ***FY 2013 Plans:*** Will finalize the design, fabricate and integrate components for high output, power-dense combat and tactical vehicle powertrain systems; conduct evaluation of advanced powertrain systems utilizing highly efficient transmissions and advanced algorithms and control strategies; evaluate the integration of energy recovery components onto powertrain subsystems to determine system performance characteristics and engine issues associated with integration; evaluate advanced Heating, Ventilation and Cooling system against existing system and vehicle requirements.			
Title: Power and Thermal Management: ***Description:*** This effort demonstrates power and thermal management components and control strategies to meet objective tactical and combat vehicle power requirements. This effort is done in coordination with efforts in PE 0602601A. ***FY 2011 Accomplishments:*** Investigated optimal strategy for combining power and thermal management components into a system architecture.	1.249	-	-
Title: Non-primary Power Sources (NPS): ***Description:*** This effort demonstrates component technologies for energy storage and generation. This effort is done in coordination with efforts in PE 0602601A. ***FY 2011 Accomplishments:***	0.889	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603005A: *Combat Vehicle and Automotive Advanced Technology*	PROJECT 441: *COMBAT VEHICLE MOBILTY*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Completed maturation of electrochemical cells, modules, and batteries; demonstrated and refined hybrid battery systems.			
Title: Force Projection: ***Description:*** This effort focuses on reducing the logistics footprint, improving fuel efficiency, and ensuring mobility by maturing and demonstrating technologies in areas such as, water purification, wastewater treatment and reuse, water generation, water quality monitoring, water storage and distribution, petroleum quality monitoring, petroleum storage and distribution, fuel filtration, lightweight bridging materials, new bridging design concepts, bridge health monitoring, military load classification, mine roller concepts, mine roller materials, mine roller integration, hybrid hydraulic technology, efficient hydraulic technology, semi autonomous safety and effectiveness advances, alternative fuels, fuel additives, lubricants, power train fluids, coolants, and petroleum, oil, and lubricant products to support new military technology requirements (i.e. anti-lock brakes, semi-active suspension, etc.). This effort is done in coordination with efforts in PE 0602601A, project H91. ***FY 2011 Accomplishments:*** Conducted field evaluation and military utility assessment of water from air demonstrators; integrated basic in-line water quality monitoring demonstration technology into purification systems and designed and fabricated advanced hand held monitoring technology for water treatment process monitoring; developed water reuse technology; completed laboratory and engine testing and initiated field evaluation of the single powertrain lubricant. ***FY 2012 Plans:*** Complete field evaluation, military utility assessment and refurbishment of water from air demonstrators, fabricate hand held and in-line monitoring technology for water treatment process monitoring, develop wastewater treatment and recycle technology, develop nanofluid technology that suspends nanoparticles in coolants and lubricants to improve thermal, friction, and wear properties and evaluate alternative fuels for use in ground systems. ***FY 2013 Plans:*** Will mature wastewater treatment and recycling technology for demonstration in a field environment; demonstrate successful in-line water quality and processes monitoring capability from previous development; characterize alternative fuels and fuel additives that improve performance and diversify energy sources; assess the impact of using emerging alternative fuels in tactical equipment to identify and address potential changes needed in fuel specifications; create and evaluate Petrolium, Oils and Lubricants to meet new military technology requirements (i.e. anti-lock brakes and semi-active suspension) while exceeding future and legacy equipment performance and technical requirements; evaluate nanocoolants, gear oils and hydraulic fluids which promote improved energy efficiencies and are longer lasting.	3.290	7.031	4.295
Accomplishments/Planned Programs Subtotals	39.207	42.441	36.028

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603005A: *Combat Vehicle and Automotive Advanced Technology*	PROJECT 441: *COMBAT VEHICLE MOBILTY*

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603005A: *Combat Vehicle and Automotive Advanced Technology*	PROJECT 497: *COMBAT VEHICLE ELECTRO*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
497: *COMBAT VEHICLE ELECTRO*	7.295	8.645	6.620	-	6.620	7.353	9.850	6.911	7.564	Continuing	Continuing

Note

Not applicable for this item.

A. Mission Description and Budget Item Justification

This project matures, integrates, and demonstrates vehicle electronics hardware such as computers, sensors, communications systems, displays, and vehicle command/control/driving mechanisms as well as vehicle software to enhance crew performance, increase vehicle fuel efficiency, reduced Size, Weight, and Power (SWAP) burdens and reduce vehicle maintenance costs. This project also advances open system architectures (power and data) for military ground vehicles to enable common interfaces, standards and hardware implementations. Additionally this project matures integrated condition based maintenance technologies that reduce the operation and sustainment costs of vehicle electronics and electrical power devices. Technical challenges include: increased levels of automation for both manned and unmanned systems, secure data networks, interoperability of intra-vehicle systems, and advanced user interfaces. Overcoming these technical challenges enables improved and increased span of collaborative vehicle operations, efficient workload management, commander's decision aids, embedded simulation for battlefield visualization and fully integrated virtual test/evaluation.

Work in this project supports the Army S&T Ground Portfolio.

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Tank Automotive Research, Development, and Engineering Center (TARDEC), Warren, MI.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Improved Mobility and Operations Performance through Autonomous Technologies:	6.350	2.930	-
Description: This effort matures indirect vision technologies to provide the Soldier with full hemispherical situational awareness in closed hatched vehicle operations. ***FY 2011 Accomplishments:*** Integrated driver assist technologies and mounted Soldier monitoring, along with the local situational awareness system for dismounting Soldiers; integrated motion based cueing, video capture with closed hatch 360/90 Electro-Optic Indirect Vision (EOIV) system; and conducted Warfighter assessment and engineering evaluations to collect enhanced quantitative performance level			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603005A: *Combat Vehicle and Automotive Advanced Technology*	PROJECT 497: *COMBAT VEHICLE ELECTRO*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
understanding of future EOIV operations; conducted testing of data distribution system software for inter-process communication between software applications. ***FY 2012 Plans:*** Integrate advanced crew stations with state of the art EOIV (high resolution threat interrogation and driving sensors, digital video recording and displays), assisted mobility aids, mounted Soldier assessment and dismounting Soldier local situational awareness technologies; conduct the final experiment to quantify system performance.			
Title: Enhanced Vehicle Technologies to Improve Lightweight Track Reliability: ***Description:*** This effort will improve/optimize lightweight segmented band track technology through utilization of high performance elastomers and design with the goal of improving track durability. This effort is done in coordination with related efforts in PE 0603005A projects 221 and 441. ***FY 2011 Accomplishments:*** In FY11, identified and demonstrated health monitoring systems for track applications. Developed diagnostic and prognostic algorithms to report health predictions and future failures on track system components. ***FY 2012 Plans:*** Integrate and evaluate the optimized track health monitoring system design performance including wear gauges, damage algorithms, and diagnostic/prognostics algorithms.	0.945	1.928	-
Title: Vehicle Electronics Integration and Power Architecture: ***Description:*** This effort matures and demonstrates military ground vehicle electronics, electrical power architectures and technologies such as video/data networking and computing equipment, Silicon Carbide (SiC) high voltage power electronics, low voltage power distribution, and crew station controls/displays. This effort is coordinated with efforts in 0602601A, project H91 and PE 0603005, project 441. ***FY 2012 Plans:*** Support technical standards development or modification to existing standards for military ground vehicle electrical systems. Perform trade analyses of existing and future combat and tactical vehicle electrical systems and develop architectural design concepts for intra-vehicle data and video networks, general purpose computing resources, input/output devices, and associated software architectures. Also, support technical standards development or modification to existing standards for low, medium, and high voltage power systems for military ground vehicles. ***FY 2013 Plans:***	-	3.787	4.220

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603005A: *Combat Vehicle and Automotive Advanced Technology*	PROJECT 497: *COMBAT VEHICLE ELECTRO*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Will demonstrate the use of a high voltage and 28V power distribution system within the Vehicle Electronic Architecture (VEA) Research System Integration Laboratory (SIL); establish the hardware architecture of the VEA SIL; evaluate displays and control technologies along with networking and computing equipment with a goal of assessing the performance and size, weight, and power - cooling (SWaP-C) impacts of these technologies			
Title: Vehicle Electronics Architecture and Standards: ***Description:*** This effort matures and integrates new electronic and electrical power architectures, technologies and standards for existing and future combat and tactical vehicle ground vehicles. Technical standards such as Vehicular Integration for C4ISR/EW Interoperability (VICTORY), Institute of Electrical and Electronics Engineers (IEEE) 1588, Display Port will be identified, evaluated or modified for military ground vehicle electrical systems. This effort also analyzes and designs electronic, and electrical power architectures to support the efficient integration of systems such as intra-vehicle data and video networks, general purpose computing resources, input/output devices, low, medium, and high voltage power systems, and associated software architectures. This effort is coordinated with 0602601A, project H91 and PE 0603005, project 441. ***FY 2013 Plans:*** Will support technical standards writing and modification of existing standards for low, medium, and high voltage power systems for military ground vehicles; initiate new open vehicle electronics architectures to address future requirements for military ground vehicles in compliance with VICTORY; perform trade analyses of existing and future combat and tactical vehicle electrical systems to create architectural design concepts; begin VICTORY SIL development and interoperability evaluation; finalize Vehicle Electronic Architecture (VEA) Research SIL designs; begin SIL subsystem integration, fabrication, verification and validation activities.	-	-	2.400
Accomplishments/Planned Programs Subtotals	7.295	8.645	6.620

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603005A: *Combat Vehicle and Automotive Advanced Technology*	PROJECT 515: *ROBOTIC GROUND SYSTEMS*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
515: *ROBOTIC GROUND SYSTEMS*	10.263	10.686	8.389	-	8.389	8.582	11.287	8.948	10.437	Continuing	Continuing

Note

Not applicable for this item.

A. Mission Description and Budget Item Justification

This project matures and demonstrates Unmanned Ground Vehicle (UGV) technologies including sensor technologies, perception hardware and software, and robotic control technologies that enable UGV systems to maneuver on- and off-road at militarily significant speeds with minimal human intervention, thereby enabling the Soldier to perform other mission tasks. Challenges addressed include: obstacle avoidance, overcoming perception limitations, intelligent situational behaviors, command and control by Soldier operators, frequency of human intervention, operations in adverse weather, and robots protecting themselves and their surroundings from intruders. Mature technologies are incorporated in UGV technology demonstrators so that performance can be evaluated for tactical maneuver and sustainment applications.

The approach builds upon, complements, and does not duplicate previous and ongoing investments conducted under the Joint Robotics Program Office, in program element (PE) 0602601A, project H91 (Ground Vehicle Technology) and by the Army Research Laboratory (ARL) PE 0602120A (Sensors and Electronic Survivability).

Work in this project supports the Army S&T Ground Portfolio.

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this project is performed by Tank Automotive Research, Development, and Engineering Center (TARDEC), Warren, MI, in collaboration with the Army Research Laboratory (ARL), Adelphi and Aberdeen Proving Ground, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Safe Operations of Unmanned systems for Reconnaissance:	10.263	10.686	-
Description: This effort demonstrates perception, control and tactical behavior technologies to safely conduct unmanned urban operations.			
FY 2011 Accomplishments: Integrated and evaluated behaviors that enable UGVs to navigate safely around people and other vehicles in a realistic military testing environment; integrated situational awareness and operational procedures to assure safe UGV employment across anticipated missions; demonstrated tactical behaviors focused on mission execution; integrated specialized classification			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603005A: *Combat Vehicle and Automotive Advanced Technology*	PROJECT 515: *ROBOTIC GROUND SYSTEMS*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
algorithms for sensor and algorithm fusion; increased capabilities of M&S tools to evaluate perception/control algorithms and human-robot interaction; and evaluated sensors and tactical behaviors that enable the use of UGVs to assist in the security of maneuver elements (i.e., Convoy Operations). ***FY 2012 Plans:*** Perform integration of all developed technologies on relevant test bed platforms and conduct a final Warfighter evaluation designed to examine resultant capabilities for a group of heterogeneous unmanned systems to conduct urban operations; collect and provide performance data that will be validated through M&S and live experimentation to support transition into future systems; Ensure interoperability and begin integration of subsystems, assess system design through modeling and simulation; Mature relevant technologies for systems integration, gain safety approval for testing, and mature robotic control station.			
Title: Unmanned Ground Systems Technology: ***Description:*** This project leverages perception, control and tactical behavior technologies created for the Safe Unmanned Operations for Reconnaissance (SOURCE) effort and matures, integrates and demonstrates advanced robotic and autonomous technologies to the tactical and combat vehicle fleets. Unmanned ground systems technologies will be employed to overcome critical Army challenges to include automated resupply and sustainment, improved tactical intelligence, and reduced physical and cognitive burden. Challenges will be met by utilizing relevant technologies such as maneuver and tactical behavior algorithms, autonomy kits, sensor and weapons integration, advanced navigation and planning, vehicle self-protection, manipulation, local situational awareness, advanced perception, vehicle and pedestrian safety, and robotic command and control. This effort is coordinated with efforts in 0602601A, project H91 and PE 0603005, projects 441 and 497. ***FY 2013 Plans:*** Will integrate autonomous maneuver hardware, software, algorithms and control interfaces, as well as weapon and sensor payloads onto a robotic demonstrator vehicle to provide demonstrations of armed unmanned vehicle missions, validate emerging safety methodology and tactics, techniques and procedures for armed robotic operations; finalize integration of scalable autonomy kits and control interfaces into tactical wheeled vehicles to increase soldier safety, operational efficiency and effectiveness and culminate with technical demonstrations of this technology in a relevant environment; begin integration of scalable autonomy kits and control interfaces onto tracked and wheeled combat vehicles to increase soldier and system performance, operational tempo and mission effectiveness.	-	-	8.389
Accomplishments/Planned Programs Subtotals	10.263	10.686	8.389

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603005A: *Combat Vehicle and Automotive Advanced Technology*	PROJECT 515: *ROBOTIC GROUND SYSTEMS*

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603005A: *Combat Vehicle and Automotive Advanced Technology*	PROJECT 53D: *NAC Demonstration Initiatives (CA)*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
53D: *NAC Demonstration Initiatives (CA)*	35.028	39.937	-	-	-	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

These are Congressional Interest Items

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Alternative Energy Research	35.028	39.937	-
Description: This is a Congressional Interest Item.			
FY 2011 Accomplishments: Alternative Energy Research			
FY 2012 Plans: Alternative Energy Research			
Accomplishments/Planned Programs Subtotals	35.028	39.937	-

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603005A: *Combat Vehicle and Automotive Advanced Technology*	PROJECT C66: *DC66*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
C66: *DC66*	4.151	-	-	-	-	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Classified Efforts	4.151	-	-
Description: Funding is provided for the following effort ***FY 2011 Accomplishments:*** Classified Efforts			
Accomplishments/Planned Programs Subtotals	4.151	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*					R-1 ITEM NOMENCLATURE PE 0603006A: *Command, Control, Communications Advanced Technology*						
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	7.823	5.304	4.157	-	4.157	5.866	5.879	6.086	6.188	Continuing	Continuing
592: *SPACE APPLICATION TECH*	4.292	5.304	4.157	-	4.157	5.866	5.879	6.086	6.188	Continuing	Continuing
DF7: *DF7*	3.531	-	-	-	-	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program element (PE) matures and demonstrates advanced space technologies that support the Army's ability to control and exploit space assets that contribute to current and future military operations as defined in the national, DoD, and Army space policies. This PE provides applications for enhanced intelligence, reconnaissance, surveillance, target acquisition, position/navigation, missile warning, ground-to-space surveillance, and command and control capabilities. Project 592 matures and demonstrates networked and integrated surveillance, communications, and command and control capabilities for high altitude and tactically responsive space payloads to enable information superiority, enhanced situational awareness, and support for distributed operations. Project DF7 supports classified activities. Properly accessed individuals can obtain further information from the Assistant Secretary of the Army for Acquisition Logistics & Technology (ASAALT) Special Programs Office.

Work in this PE complements the work in PE 0602120A (Sensors and Electronic Survivability) and PE 0603008A (Electronic Warfare Advanced Technology).

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work in this PE is performed by the US Army Space and Missile Defense Technical Center in Huntsville, AL.

B. Program Change Summary ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
Previous President's Budget	8.102	5.312	4.118	-	4.118
Current President's Budget	7.823	5.304	4.157	-	4.157
Total Adjustments	-0.279	-0.008	0.039	-	0.039
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.225	-			
• Adjustments to Budget Years	-	-	0.039	-	0.039
• Other Adjustments 1	-0.054	-0.008	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603006A: *Command, Control, Communications Advanced Technology*	PROJECT 592: *SPACE APPLICATION TECH*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
592: *SPACE APPLICATION TECH*	4.292	5.304	4.157	-	4.157	5.866	5.879	6.086	6.188	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates payloads, sensors, and data down link systems for tactically responsive space and high altitude platforms supporting Army ground forces. This project matures, demonstrates, and integrates light weight materials, hardware components with reduced power consumption, and advanced data collection, processing, and dissemination capabilities. This project also develops algorithms that process space and near space sensor data in real and near real time for integration into battlefield operating systems. These efforts support the Army's ability to control and exploit space assets that contribute to current and future military operations as defined in the national, DoD, and Army space policies.

Efforts in this project support the Army S&T Command, Control, and Communications (C3) Portfolio.

This project sustains Army science and technology efforts supporting the Command Control and Communications portfolio. Work in this Project is coordinated with PE 0602120A (Sensors and Electronic Survivability) and PE 0603008A (Electronic Warfare Advanced Technology).

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work in this PE is performed by the US Army Space and Missile Defense Technical Center in Huntsville, AL. This program is designated as a DoD Space Program.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Payload Technology Development	2.056	5.304	4.157
Description: This effort matures technologies for smaller, Warfighter-responsive sensor and communication payloads for use in both space and high altitude environments; it also matures and integrates forensic analysis and modeling and simulation tools for evaluation of integrated weapon systems cyber attack risks and vulnerabilities.			
FY 2011 Accomplishments: Matured high speed data relays for use in data links of high altitude and space-based assets; continued the development of a flight- ready Electro-Optical/Infrared (EO/IR) imaging space sensor; prepared, launched, and demonstrated a small satellite with data exfiltration capability for launch integration.			
FY 2012 Plans: Begin development and building of data exfiltration mission small satellite using a software defined radio for increased communications bands to receive data from Unattended Ground Sensors; conduct systems engineering analysis and			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603006A: *Command, Control, Communications Advanced Technology*	PROJECT 592: *SPACE APPLICATION TECH*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
assessments of enhanced EO/IR imaging satellite technologies and select and mature technologies to support constellation architectures; support launch integration and operational demonstration of EO/IR imaging space senor and data exfiltration small satellites. ***FY 2013 Plans:*** Will demonstrate data exfiltration and EO/IR imaging small satellites on-orbit; integrate propulsion enhanced imaging small satellite with advanced small satellite deployment capability; mature and demonstrate small satellite tasking and command and control functions in a hand-held device.			
Title: Vertical/Horizontal Integration of Space Technology and Applications (VISTA) ***Description:*** This effort matures and demonstrates algorithms and intelligent agent based software applications to provide missile threat warning for Warfighters on-the-move. ***FY 2011 Accomplishments:*** Further matured the intelligent agent technology in cooperation with complementary network-centric intelligent agent technology being developed by US Army Communications Electronics Research, Development, and Engineering Center (CERDEC); demonstrated seamless missile warning and situational awareness automated information dissemination for tactical On-the-Move (OTM) forces at the Brigade and below level.	2.236	-	-
Accomplishments/Planned Programs Subtotals	4.292	5.304	4.157

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603006A: *Command, Control, Communications Advanced Technology*	PROJECT DF7: *DF7*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
DF7: *DF7*	3.531	-	-	-	-	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program is reported in accordance with Title 10, United States Code, Section 119(1)(1) in the Special Access Program (SAP) Annual Report to Congress.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: DF7 Classified efforts	3.531	-	-
Description: Classified efforts ***FY 2011 Accomplishments:*** Classified efforts			
Accomplishments/Planned Programs Subtotals	3.531	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603007A: *Manpower, Personnel and Training Advanced Technology*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	7.694	10.282	9.856	-	9.856	10.892	11.929	11.058	11.245	Continuing	Continuing
792: *Personnel Performance & Training*	7.694	10.282	9.856	-	9.856	10.892	11.929	11.058	11.245	Continuing	Continuing

Note

FY 13 funding realigned to higher priority efforts

A. Mission Description and Budget Item Justification

This project element (PE) matures and demonstrates advanced behavioral and social science technologies that enhance performance to ensure that the Warfighter keeps pace with the transformations in systems, weapons, equipment, and mission requirements to meet the goals of the future force. These technologies provide key capabilities through training methods and techniques that prepare Soldiers and leaders to effectively operate in complex digitized, networked environments; enable the use of embedded training technologies envisioned for future command and control (C2) systems; as well as foster cognitive, behavioral, and psychological flexibility, adaptability, and mission readiness. Project 792 evaluates new selection measures, refines performance metrics, assesses innovative training techniques, and analyzes methods and tools to better adapt training to meet goals and requirements. Increased funding in FY12 for this PE is based on work shifted from PE 0602785A due to need for increased focus on maturation and demonstration of selection techniques and tools as well as training methods.

Work in this project complements and is fully coordinated with 0603015A (Next Generation Training & Simulation Systems), 0602308A (Advanced Concepts and Simulation), PE 0602716A (Human Factors Engineering Technology) and PE 0602785A (Manpower/Personnel/Training Technology.)
The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy

Work in this PE is performed by the US Army Research Institute (ARI) for the Behavioral and Social Sciences in Arlington, VA.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army					DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*		R-1 ITEM NOMENCLATURE PE 0603007A: *Manpower, Personnel and Training Advanced Technology*			
B. Program Change Summary ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**
Previous President's Budget	7.921	10.298	11.516	-	11.516
Current President's Budget	7.694	10.282	9.856	-	9.856
Total Adjustments	-0.227	-0.016	-1.660	-	-1.660
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.133	-			
• Adjustments to Budget Years	-	-	-1.660	-	-1.660
• Other Adjustments 1	-0.094	-0.016	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603007A: *Manpower, Personnel and Training Advanced Technology*	PROJECT 792: *Personnel Performance & Training*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
792: *Personnel Performance & Training*	7.694	10.282	9.856	-	9.856	10.892	11.929	11.058	11.245	Continuing	Continuing

Note

Not applicable for this item.

A. Mission Description and Budget Item Justification

This project matures and demonstrates advanced behavioral and social science technologies that enhance performance to ensure that the Warfighter keeps pace with the transformations in systems, weapons, equipment, and mission requirements to meet the goals of the operational force. These technologies provide key capabilities through training methods and techniques that prepare Soldiers and leaders to be effective in complex operational environments ; training methods to meet emerging skill requirements for institutional and unit training; as well as foster cognitive, behavioral, and psychological flexibility, adaptability, and mission readiness. Efforts include the evaluation of selection measures, the refinement of survey methodologies and performance metrics, the assessment of innovative training techniques, and the analysis of methods and tools to better adapt training to meet goals and requirements. Increased funding in FY12 for this project is based on work shifted from PE 0602785A due to need for increased focus on maturation and demonstration of selection techniques and tools as well as training methods.

Efforts in this program element support the Army science and technology Soldier portfolio.

Work in this project complements and is fully coordinated with 0603015A (Next Generation Training & Simulation Systems), 0602308A (Advanced Concepts and Simulation), PE 0602716A (Human Factors Engineering Technology) and PE 0602785A (Manpower/Personnel/Training Technology.)

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the US Army Research Institute (ARI) for the Behavioral and Social Sciences in Arlington, VA.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Personnel Technology	1.473	3.288	2.125
Description: This effort matures and assesses Soldier selection measures, techniques and tools to better predict behavior and performance to provide the Army the flexibility to adapt to changing recruiting environments. The Army's current selection measures primarily focus on a candidate's cognitive (e.g., technical and analytical) ability which does not predict attrition, discipline, and motivation.			
FY 2011 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603007A: *Manpower, Personnel and Training Advanced Technology*	PROJECT 792: *Personnel Performance & Training*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Demonstrated and validated FY10 methods and technologies to streamline data collections and more rapidly assess attitudes and opinions across the Army; and evaluated trends of Soldier satisfaction, especially in regard to deployment length and dwell time (i.e., back home), and the Army's care and concern for Soldiers and their families. ***FY 2012 Plans:*** Evaluating capability of non-cognitive measures such as motivation, cooperation, and achievement to predict performance of enlisted personnel while in initial training environments; evaluating the capability of non-cognitive measures to augment existing measures to better predict an individual's potential; analyzing the use of non-cognitive measures to provide flexibility for selection methods that can accommodate changes in force size. ***FY 2013 Plans:*** Will mature and assess improved non-cognitive measures for enlisted selection and classification; perform validation checks and update enlisted longitudinal databases.			
Title: Training and Leader Development ***Description:*** This effort matures and demonstrates training techniques and tools that will enable Soldiers to take full advantage of advances in technology and systems and helps the Army attain its training goals for future missions and operations. Knowledge products, tools, methods and techniques transition to US Army Training and Doctrine Command (TRADOC) and operational units. ***FY 2011 Accomplishments:*** Refined guidelines for training effectiveness based on operational relevance of training outcomes in TRADOC courses; demonstrated effectiveness of training tools/methods in simulated learning environments; demonstrated adaptive leadership and negotiation skills and techniques as well as measurement methods for leader development; and developed and refined methods and models for maintaining training relevance to operational units. ***FY 2012 Plans:*** Developing methods to more readily assess whether training can be adapted to account for individual differences and experience levels; developing strategies to tailor training based on Soldiers' learning progress for basic Soldier skills and for Advanced Individual Training; and analyzing the use of prototype training tools to refine training strategies in institutional and unit-based training environments. ***FY 2013 Plans:*** Will mature methods to assess the effectiveness of training tools to develop adaptive Soldiers and leaders (e.g., tactical decision making and judgment proficiency); mature training applications for operational units (e.g., visual threat detection, human terrain mapping) and design methods for training instructors to leverage emerging learning technologies.	6.221	6.994	7.731
Accomplishments/Planned Programs Subtotals	7.694	10.282	9.856

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603007A: *Manpower, Personnel and Training Advanced Technology*	PROJECT 792: *Personnel Performance & Training*

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603008A: *Electronic Warfare Advanced Technology*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	48.698	69.852	50.661	-	50.661	52.353	54.335	53.590	54.747	Continuing	Continuing
TR1: *TAC C4 TECHNOLOGY INT*	36.578	36.615	30.939	-	30.939	32.266	33.712	32.766	33.582	Continuing	Continuing
TR2: *Secure Tactical Information Integration*	12.120	21.256	19.722	-	19.722	20.087	20.623	20.824	21.165	Continuing	Continuing
TR8: *C3 DEMONSTRATIONS (CA)*	-	11.981	-	-	-	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program element (PE) matures and demonstrates technologies to address the seamless integrated tactical communications challenge with distributed, secure, mobile, wireless, and self-organizing communications networks that will operate reliably in diverse and complex terrains, in all environments. Efforts demonstrate seamlessly integrated communications and information security technologies across all network tiers, ranging from unattended networks and sensors through maneuver elements using airborne and space assets. Project TR1 investigates and leverages antennas; wireless networking devices, protocols, and software; information assurance techniques and software; and network operations tools and techniques; and combines these and other technology options in a series of Command, Control, Communications, and Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) On-The-Move (OTM) demonstrations to measure their potential battlefield effectiveness. Project TR2 researches information security devices, techniques and software to protect tactical wireless networks against modern network attacks; and improves collaborative software, techniques and devices for information sharing between battlefield functional communities.

Work in this PE is complimentary of PE 0602782A (Command, Control, Communications Technology), and fully coordinated with PE 0602120A (Sensors and Electronic Survivability), PE 0602270A (Electronic Warfare Technology), PE 0602783 (Computer and Software Technology), and PE 0603772A (Advanced Tactical Computer Science and Sensor Technology).

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work is performed by the Army Research, Development, and Engineering Command (RDECOM), Communications-Electronics Research, Development, and Engineering Center (CERDEC), Aberdeen Proving Ground, MD.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army					DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*		R-1 ITEM NOMENCLATURE PE 0603008A: *Electronic Warfare Advanced Technology*			
B. Program Change Summary ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**
Previous President's Budget	50.359	57.963	54.882	-	54.882
Current President's Budget	48.698	69.852	50.661	-	50.661
Total Adjustments	-1.661	11.889	-4.221	-	-4.221
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	12.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.256	-			
• Adjustments to Budget Years	-	-	-4.221	-	-4.221
• Other Adjustments 1	-0.405	-0.111	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603008A: *Electronic Warfare Advanced Technology*	PROJECT TR1: *TAC C4 TECHNOLOGY INT*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
TR1: *TAC C4 TECHNOLOGY INT*	36.578	36.615	30.939	-	30.939	32.266	33.712	32.766	33.582	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates key communications and mobile networking technologies, such as antennas, radio components, networking software and novel techniques that provide secure, reliable, mobile network solutions that function in complex and diverse terrains. This project concentrates on three major goals: to provide a series of technology demonstrations of new and emerging Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) technology enabled capabilities to significantly reduce risk associated with the network-of-networks concept; to provide critical improvements in the ability to communicate and move large amounts of information across the force structure in a seamless, integrated manner supporting the Army's highly mobile manned and unmanned force structure; and to assess the Technology Readiness Level (TRL) of emerging network technologies in an operationally relevant environment.

This project supports Army science and technology efforts in the Command, Control and Communications, Ground, Air and Soldier portfolios.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Army Research, Development, and Engineering Command (RDECOM), Communications-Electronics Research, Development, and Engineering Center (CERDEC), Aberdeen Proving Ground, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Antenna Technologies	9.962	11.276	4.513
Description: This effort matures and demonstrates low cost, power efficient, antenna technologies for terrestrial and tactical satellite ground terminals. The focus is to reduce the visual signature and cost of antennas and reduce the number of antennas required on platforms by proving the capability to transmit and receive on multiple frequency bands, such as X/K/KA/Q for SATCOM and ultra-high frequency/very-high frequency (UHF/VHF) and L for terrestrial communications on the same antennas. Work accomplished under PE 0602782A/project H92 compliments this effort.			
FY 2011 Accomplishments: Matured and demonstrated K/Ka/Q band low profile electronically steered SATCOM antenna components and aperture with integrated drive and tracking system; demonstrated BFT SATCOM antenna, modem architecture and preliminary network design; matured conformal and embedded antenna design; conducted sub-system compatibility testing for a selected platform using electromagnetic modeling and simulation (M&S); and developed mockup brassboard for validation.			
FY 2012 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603008A: *Electronic Warfare Advanced Technology*	PROJECT TR1: *TAC C4 TECHNOLOGY INT*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Investigate and refine embedded armor antennas; fabricate internet protocol based antenna feed demonstrators; integrate antenna apertures and feed systems into vehicle armor; support the Tank and Automotive Research Development and Engineering Center during ballistic assessments of embedded armor antennas; demonstrate integrated K/Ka/Q band low profile electronically steered SATCOM antenna; integrate single package Ka/Q band integrated power amplifier (PA) into the K/Ka/Q band SATCOM antenna; refine BFT SATCOM antenna network concepts and demonstrate medium scale performance. ***FY 2013 Plans:*** Will fabricate and demonstrate multifunctional armor-embedded and conformal antennas that support both communications and counter IED missions by allowing multiple radios and jammers to use a single integrated antenna system; demonstrate K/Ka/Q band antenna integrated with the Ka/Q band PA in a relevant environment; design and fabricate artificial impedance surfaces to cover unmanned aerial system (UAS) components such as rudders, stabilizers and struts to mitigate radio frequency blockage of antennas mounted on the UAS.			
Title: Applied Commercial Communications and Information Networking technologies, formerly known as Applied Communications and Information Networking (ACIN) ***Description:*** This effort adapts, matures and assesses emerging commercially available wireless, networked communications and antenna technologies for military use. Work accomplished under PE 0602270A/project 906 and PE 0603270A/K15 compliments this effort. ***FY 2011 Accomplishments:*** Adapted and assessed emerging cognitive and commercial networking technologies for wireless networks including cognitive radios and cross layer network protocols; investigated associated communications architectures and hardware components; developed digitized SATCOM technologies to reduce size, weight, power and cost (SWAP-C) for strategic ground terminals. ***FY 2012 Plans:*** Assess emerging commercial wireless communications technologies for suitability in military wireless communications networks; adapt, mature and demonstrate commercial wireless network operations control and visualization solutions in Army tactical environments; assess emerging 4G commercial cellular technologies (e.g., long term evolution) for future adaptation to military networks.	1.367	1.943	-
Title: C4ISR On-The-Move (OTM) ***Description:*** This effort provides a venue for the demonstration of new and emerging C4ISR technology-enabled capabilities. This venue performs risk mitigation and candidate assessment/selection for Army Network Integration Exercise (NIE) events by assessing the TRL of Army science and technology (S&T) and best of Industry efforts. ***FY 2011 Accomplishments:***	7.857	9.552	9.097

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603008A: *Electronic Warfare Advanced Technology*	PROJECT TR1: *TAC C4 TECHNOLOGY INT*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Assessed the capability, functionality, and performance of network integrated architectures and emerging capabilities that support the Army Brigade Combat Team Modernization Plan; assessed the FY11 programmed increments of Joint Tactical Radio System (JTRS) for mounted and dismounted Soldiers and platforms, unmanned ground and aerial sensors, and intelligent munitions systems in support of the Army Brigade Combat Team Modernization Plan; assessed Warfighter Information Network Tactical (WIN-T) functionality, including enhanced quality of service architecture, information assurance solutions to enable network security across a wide area network using multiple encryption devices with minimal loss of data, and selected network operations management functions; assessed the TRL of Army S&T efforts maturing in the FY11 timeframe in an operationally relevant environment to facilitate technology transition; continued to support research and development (R&D) of capability sets and accelerate such capabilities to enhance the current force. ***FY 2012 Plans:*** Assess the capability, functionality, and performance of network integrated architectures and emerging capabilities that support the Army Brigade Combat Team Modernization Plan and Network Modernization Strategy; assess the FY12 programmed increments of JTRS for mounted and dismounted Soldiers and platforms, unmanned ground and aerial sensors, and intelligent munitions systems in support of the Army Brigade Combat Team Modernization Plan; assess WIN-T increment 2 and 3 functionality including enhanced quality of service architecture, information assurance solutions to enable network security across a wide area network using multiple encryption devices with minimal loss of data, and selected network operations management functions; assess the TRL of Army S&T efforts maturing in the FY12 timeframe in a operationally relevant environment to facilitate technology transition. ***FY 2013 Plans:*** Will assess the capability, functionality, and performance of network integrated architectures and emerging capabilities that support the Army Brigade Combat Team Modernization Plan and Network Modernization Strategy; finalize the evaluation of Capability Sets 13/14, hybrid/bridging architectures and conduct initial assessments of Capability Sets 15/16 and the associated programmed increments of JTRS (Mounted & Dismounted), WIN-T Inc 3, and NETT Warrior programs of record; provide a system of systems environment/venue to evaluate technical progress, assess the next generation of technologies, facilitate technology transition, and perform risk mitigation and candidate assessment/selection for future Army NIE events by assessing the TRL of Army S&T and best of Industry efforts maturing in the FY13 timeframe; continue to support R&D of enabling Future Force capabilities and accelerate such capabilities to enhance and modernize the current force.			
Title: C4ISR Network Mining ***Description:*** This effort matures data mining that provides the link between the transactions to be analyzed and analytical systems on large-scale information technology. Data mining consists of five major elements: 1. extract, transform, and load transaction data onto the data warehouse system; 2. store and manage the data in a multidimensional database system; 3. provide data access; 4. analyze the data using application software; and 5. present the data in a useful format.	5.163	3.517	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603008A: *Electronic Warfare Advanced Technology*	PROJECT TR1: *TAC C4 TECHNOLOGY INT*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
FY 2011 Accomplishments: Applied network mining software to analyze emerging protocols and standards for use over military networks; assess commercial technologies for potential transition into systems and develop architecture to decrease stovepipe and proprietary network implementations. ***FY 2012 Plans:*** Apply network mining software to determine how a military software applications (Apps) store can be efficiently deployed on the network; code and assess advanced spectrum management software tools to facilitate network operations where various types of networks converge using multiple transmission media.			
Title: Wireless Mobile Networking, formerly known as Cognitive Networking	3.248	5.976	12.954
Description: This effort matures and demonstrates components, software, algorithms and services that enable wireless networks to operate more efficiently in both the use of RF spectrum and networking resources for terrestrial and SATCOM systems. Efforts include composing and coding algorithms and protocols that sense network and spectrum conditions, and automatically adapt network node behaviors to make more efficient use of available resources. Efforts also include adapting commercial wireless technology for use in the tactical environment. Work accomplished under PE 0602782A/project H92 and 0603008A TR2 compliments this effort. ***FY 2011 Accomplishments:*** Matured the cognitive network tools developed under PE 0602782A/project H92 to assess and analyze networks with and without cognitive capabilities; adapted and matured commercial RF cellular based technologies. ***FY 2012 Plans:*** Mature all-digital strategic ground terminal architecture to enable improved tactical responsiveness to changing network needs and enable SATCOM to be responsive to cognitive ground networks; mature digital transmitter and receiver interfaces and subsystem integration; mature and demonstrate all-digital receiver; demonstrate configurable baseband processor for increased SATCOM throughput and integrate with digital receiver for proof of concept; define requirements and architecture for digital transmitter; demonstrate government off-the-shelf (GOTS) applique to enable operation of commercial wireless third generation (3G) communications in Army tactical environments with the addition of WiFi mesh, multicast routing and automated frequency, sensing and control. ***FY 2013 Plans:*** Will mature, integrate and assess all-digital strategic ground terminal, consisting of digital transmitter and receiver interfaces, all-digital receiver and baseband signal processor; fabricate all-digital transmitter; integrate and mature GOTS applique with commercial-off-the-shelf (COTS) 3G network software applications and algorithms to apply enhanced, military grade security			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603008A: *Electronic Warfare Advanced Technology*	PROJECT TR1: *TAC C4 TECHNOLOGY INT*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
and network management functionality that enables tactical use of COTS hand held computing devices such as smart phones and tablets, and enables the Soldier to manage these devices as an edge extension for voice, data and video on existing and emerging tactical networks; demonstrate militarized smart devices in a field relevant environment.			
Title: Network Operations (NetOps) ***Description:*** This effort matures network operations tools (network management, information dissemination management and cyber security) to simplify the planning, management and troubleshooting of complex tactical communications networks. Focus is on network visualization, incident correlation and decision aids that assist soldiers with managing the complexity inherent with wireless, On-the-Move communications networks. ***FY 2012 Plans:*** Demonstrate interoperability among disparate NetOps tools and technologies, leveraging existing GOTS/COTS tools being used in the field; take advantage of NetOps tools that make sense while reducing the overall number of tools to significantly improve the network planning, management, configuring and monitoring of tactical networks; research and improve tactical NetOps visualization capabilities and techniques based on how the Warfighter can best interpret the information; consolidate and demonstrate NetOps tools (network management, information assurance, information dissemination management and signals management) into an intuitive multi-touch (touch screen) user environment to produce a more collaborative and centralized NetOps management capability. ***FY 2013 Plans:*** Will mature and code software that integrates network visualization tools on touch-screen environments with network information correlation tools that enhance interoperability among disparate NetOps tools; assess the accuracy and usability of visualization and correlation tools in the laboratory and through user feedback, and modify the software to improve the effectiveness of the new tool set; mature a software engine that translates network information sources to any format for use by network correlation tools.	-	4.351	4.375
Title: Wireless Information Assurance (IA) ***Description:*** This effort matures and demonstrates software to protect wireless tactical networks against computer network attacks with an emphasis on defending against attack methods not previously seen. Work accomplished under PE 0602782A/ project H92 and PE 0603008A/project TR2 compliments this effort. ***FY 2011 Accomplishments:*** Developed and matured the mission generation engine to allow for dynamic reconfiguration of a subset of network parameters (e.g., topology) based on mission specifications; demonstrated computer network protection using mission to policy translation engine and adaptive middleware, tactical public key infrastructure, and cross domain solutions in a relevant environment.	8.981	-	-
Accomplishments/Planned Programs Subtotals	36.578	36.615	30.939

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603008A: *Electronic Warfare Advanced Technology*	PROJECT TR1: *TAC C4 TECHNOLOGY INT*

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603008A: *Electronic Warfare Advanced Technology*	PROJECT TR2: *Secure Tactical Information Integration*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
TR2: *Secure Tactical Information Integration*	12.120	21.256	19.722	-	19.722	20.087	20.623	20.824	21.165	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates software, algorithms and services with enhanced capabilities to analyze, plan, execute, and assess operations, at tactical and strategic levels, by integrating decision support and intelligence based software to provide a more comprehensive understanding of adversaries and environments. Efforts mature and demonstrate collaboration and decision support software to potentially improve mission execution success by more tightly coupling operations and intelligence functions, and better facilitate collaboration between individuals and teams. This project codes, optimizes and demonstrates software-based tactical cross domain solutions that enable operations and intelligence information sharing across security domains to replace current application-specific hardware solutions. This project also codes, optimizes and demonstrates cyber security software to proactively defend wireless networks against cyber attack using nontraditional methodologies.

This project supports Army science and technology efforts in the Command, Control and Communications, Ground, Air and Soldier portfolios.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Army Research, Development, and Engineering Command, Communications (RDECOM)-Electronics Research Development and Engineering Center (CERDEC), Aberdeen Proving Ground, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Collaborative Battle Management	6.737	6.973	6.563
Description: This effort matures and demonstrates mission command (MC) software to improve sharing and understanding of data between the intelligence and operations communities.			
FY 2011 Accomplishments: Supported limited distribution of the universal collaboration bridge (UCB); matured and demonstrated software (SW) to associate Intel requirements, Geospacial (Geo) data needs and collection opportunities with mission tasks for Intel and Battle Command (BC) and allow Warfighter modification of system information to adapt to dynamic enemy tactics; matured Integrated Intelligence (Intel)/Operations (Ops) services for collaboration/visualization across SW environments; demonstrated integrated Intel/Ops			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603008A: *Electronic Warfare Advanced Technology*	PROJECT TR2: *Secure Tactical Information Integration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
decision support tools for planning and execution, priority information requests management, and collection/sensor management; matured and demonstrated multi-touch (MT) based mission collaboration. ***FY 2012 Plans:*** Develop collaboration services to include browser-based components for visualization of strategic battle command data feeds and communications status; develop SW environment permitting applications to execute on different operating systems (e.g., Windows, LINUX); complete MT-based mission collaboration SW including information link analysis tools and Tactical Ground Reporting System (TiGR)-compatible MT display; develop and mature general device-independent MT application framework; complete Geo terrain analytical tools and transition these efforts to PM Battle Command and PM Commercial Joint Mapping Toolkit. ***FY 2013 Plans:*** Will code, assess and demonstrate collaboration and interoperability services such as the ability to interface Joint Battle Command Platform (JBC-P) vehicle VMF chat with DISA-standard XMPP text chat in support of the Army Common Operating Environment; fabricate/code and assess multi-touch MC applications such as an electronic sand table that streamline and improve the ability to plan, wargame and monitor Army missions; code, assess and integrate software information assurance techniques into MC software to reduce vulnerabilities; mature and validate software design techniques that present information to users more intuitively and easier to understand to help cognitively unburden the Soldier using MC applications at all echelons.			
Title: Tactical Cross Domain Solutions ***Description:*** This effort matures and demonstrates service oriented architecture (SOA) cross domain solutions (CDS) to enable assured sharing of information across multiple security domains. ***FY 2011 Accomplishments:*** Demonstrated one-way position location information (PLI) transfer from unclassified to classified networks, and further matured guard to process two-way digital data flow; matured and demonstrated a general tool to be used by any program to identify malicious code in a developed application or on the network. ***FY 2012 Plans:*** Improve the one-way PLI data transfer and two-way digital data flow cross-domain software, integrate it with a military-hardened, tactical (small size, weight, and power) hardware platform complete with the necessary embedded security features to undergo NSA security certification and accreditation and demonstrate it on Ground Soldier equipment in a field environment.	5.383	5.824	-
Title: Information Assurance	-	8.459	13.159

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603008A: *Electronic Warfare Advanced Technology*	PROJECT TR2: *Secure Tactical Information Integration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Description: This effort matures and demonstrates cyber security technologies that create new methods for proactively defending wireless networks against cyber attack using nontraditional methodologies. Work being performed under PE /project 0602782/H92 and PE/project 0603008 TR1 complement this effort. ***FY 2012 Plans:*** Integrate improved detection and automated response capabilities into Intrusion Detection System (IDS) that resides on tactical host platforms, providing maximum protection to the host system with minimal resource usage; design an IDS response component that collaborates with an Information Operations (IO) response component to use intelligence threat information to ascertain exactly who or what is causing the cyber threat; integrate the IDS agents monitoring host platforms and the network into a common architecture; evaluate the IDS components in a lab environment to ascertain the maturity of the functionality of each component of the architecture; analyze and assess models of cyber attack behaviors to determine adversary objectives, attack vectors, and classes of attack to effect computer network defense (CND); code and integrate a cyber toolkit for CND including dynamic protocols, a dynamic decentralized network remapping framework, and obfuscation (confusion) software for masking network role, system identity, and cyber security protection from potential attackers. ***FY 2013 Plans:*** Will demonstrate improved detection and automated response software and algorithms that reside on tactical host platforms and provide maximum protection to the host system against cyber threats with minimal platform resource usage; code and demonstrate an IDS response component that collaborates with an IO response component to ascertain the source of a network attack; demonstrate IDS software agents operating on host platforms and across the network using a common network protection architecture; demonstrate a cyber toolkit for CND including dynamic protocols, a dynamic decentralized network remapping framework and software for concealing network role and system identity for cyber security protection from potential attackers; adapt and demonstrate military grade security for use on commercial smart devices like smartphones and tablets; optimize and implement security software standards on military networks to provide a trustworthy operating environment for commercial smart devices; code and mature automated analysis functionalities to assure software is clean of malicious content and vulnerabilities introduced by poor software coding techniques; validate the feasibility of employing network morphing software that dynamically modifies aspects of networks in order to prevent potential cyber attackers from accurately mapping networks in preparation for a cyber attack.			
Accomplishments/Planned Programs Subtotals	12.120	21.256	19.722

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603008A: *Electronic Warfare Advanced Technology*	PROJECT TR2: *Secure Tactical Information Integration*

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603008A: *Electronic Warfare Advanced Technology*	PROJECT TR8: *C3 DEMONSTRATIONS (CA)*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
TR8: *C3 DEMONSTRATIONS (CA)*	-	11.981	-	-	-	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for C3 Demonstrations.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Cyber Security/Information Assurance Research	-	11.981	-
Description: This is a Congressional Interest Item.			
FY 2012 Plans: Cyber Security/Information Assurance Research			
Accomplishments/Planned Programs Subtotals	-	11.981	-

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603009A: *TRACTOR HIKE*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	7.761	8.142	9.126	-	9.126	9.166	9.033	9.166	9.321	Continuing	Continuing
B18: *DB18*	4.093	4.139	4.257	-	4.257	4.325	4.386	4.449	4.524	Continuing	Continuing
B31: *DB31*	3.668	4.003	4.869	-	4.869	4.841	4.647	4.717	4.797	Continuing	Continuing

A. Mission Description and Budget Item Justification

The details of this program are reported in accordance with Title 10, United States Code, Section 119(a)(1).

B. Program Change Summary ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
Previous President's Budget	8.015	8.155	9.049	-	9.049
Current President's Budget	7.761	8.142	9.126	-	9.126
Total Adjustments	-0.254	-0.013	0.077	-	0.077
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.181	-			
• Adjustments to Budget Years	-	-	0.077	-	0.077
• Other Adjustments 1	-0.073	-0.013	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603009A: *TRACTOR HIKE*	PROJECT B18: *DB18*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
B18: *DB18*	4.093	4.139	4.257	-	4.257	4.325	4.386	4.449	4.524	Continuing	Continuing

Note

The details of this program are reported in accordance with Title 10, United States Code, Section 119(a)(l).

A. Mission Description and Budget Item Justification

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: The details of this program are reported in accordance with Title 10, United States Code, Section 119(a)(1). ***Description:*** . ***FY 2011 Accomplishments:*** . ***FY 2012 Plans:*** . ***FY 2013 Plans:*** .	4.093	4.139	4.257
Accomplishments/Planned Programs Subtotals	4.093	4.139	4.257

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603009A: *TRACTOR HIKE*	PROJECT B31: *DB31*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
B31: *DB31*	3.668	4.003	4.869	-	4.869	4.841	4.647	4.717	4.797	Continuing	Continuing

A. Mission Description and Budget Item Justification

This details of this program are reported in accordance with Title 10, United States Code, Section 119(a)(1).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: DB31 ***Description:*** . ***FY 2011 Accomplishments:*** . ***FY 2012 Plans:*** . ***FY 2013 Plans:*** .	3.668	4.003	4.869
Accomplishments/Planned Programs Subtotals	3.668	4.003	4.869

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603015A: *Next Generation Training & Simulation Systems*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	14.788	17.907	17.257	-	17.257	19.462	19.734	20.070	20.409	Continuing	Continuing
S28: *Immersive Learning Environments*	2.946	3.149	2.799	-	2.799	3.391	3.483	3.543	3.603	Continuing	Continuing
S29: *MODELING & SIMULATION - Adv Tech Dev*	7.116	6.042	4.367	-	4.367	5.944	5.486	5.580	5.674	Continuing	Continuing
S31: *Modeling and Simulation Infrastructure Technology*	4.726	8.716	10.091	-	10.091	10.127	10.765	10.947	11.132	Continuing	Continuing

Note

FY 13 funding realigned to higher priority efforts

A. Mission Description and Budget Item Justification

This program element (PE) matures and demonstrates tools to enable effective training capability for the Warfighter. Project S28 matures and demonstrates simulation technologies developed by the Institute for Creative Technology. Project S29 incorporates advanced modeling and simulation (M&S), training, and leader development technology into immersive training demonstrations as well as demonstrates a framework for future embedded training and simulation systems for future force combat and tactical vehicles, and dismounted Soldier systems. Project S31 develops, integrates and demonstrates an overarching M&S architecture that incorporates multi-resolution entity-based models, simulations, and tools to enable Network-Centric Warfare M&S capability.

Work in this PE complements and is fully coordinated with efforts in PE 0602308A (Advanced Concepts and Simulation), PE 0602785 (Manpower/Personnel/Training Technology), PE 0602787A (Medical Technology) and PE 0603007A (Manpower, Personnel and Training Advanced Technology).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy

Work in this PE is performed by the Army Research Laboratory, Human Research and Engineering Directorate, Simulation and Training Technology Center (STTC), Orlando, FL.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army					DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*		R-1 ITEM NOMENCLATURE PE 0603015A: *Next Generation Training & Simulation Systems*			
B. Program Change Summary ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**
Previous President's Budget	15.334	17.936	20.120	-	20.120
Current President's Budget	14.788	17.907	17.257	-	17.257
Total Adjustments	-0.546	-0.029	-2.863	-	-2.863
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.457	-			
• Adjustments to Budget Years	-	-	-2.863	-	-2.863
• Other Adjustments 1	-0.089	-0.029	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603015A: *Next Generation Training & Simulation Systems*	PROJECT S28: *Immersive Learning Environments*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
S28: *Immersive Learning Environments*	2.946	3.149	2.799	-	2.799	3.391	3.483	3.543	3.603	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates immersive technologies that include the application of photorealistic synthetic environments, multi-sensory interfaces, virtual humans, and training applications on low-cost game platforms for Soldier training applications using simulation technologies. This project uses advanced modeling, simulation, and leadership development techniques to leverage the emerging immersive technologies that are created at the Institute of Creative Technologies (ICT) University Affiliated Research Center (UARC) at the University of Southern California under PE0601104/Proj J08 to formulate training demonstrations with an emphasis on urban operations and asymmetric warfare. The ICT's collaboration with its entertainment partners creates a true synthesis of creativity and technology that harnesses the capabilities of industry, and the research and development community to advance the Army's ability to train and practice military skills across the full spectrum of conflict.

Efforts in this program element support the Army science and technology Soldier portfolio.

Work in this PE complements and is fully coordinated with efforts in PE 0602308A (Advanced Concepts and Simulation), PE 0602785 (Manpower/Personnel/Training Technology), PE 0602787A (Medical Technology) and PE 0603007A (Manpower, Personnel and Training Advanced Technology).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Army Research Laboratory (ARL), Weapons and Materials Research Directorate, Aberdeen Proving Ground, Maryland and Human Research and Engineering Directorate, Simulation and Training Technology Center (STTC), Orlando, Florida.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Immersive Techniques for Training Applications	2.946	3.149	2.799
Description: This effort demonstrates and matures technological advancements from PE 0602308A/Project D02 into complex state-of-the-art simulation environments in support of multi-student and team training applications.			
FY 2011 Accomplishments: Matured and refined software tools that rapidly author automated tutoring systems for specific training applications; matured methods to implement training applications on portable and mobile devices.			
FY 2012 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603015A: *Next Generation Training & Simulation Systems*	PROJECT S28: *Immersive Learning Environments*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Develop virtual mission rehearsal trainers encompassing complex team, interpersonal actions as well as conflicts and is supported by interactive learning technologies; complete study that examines the measurement and impact of the sense of presence on learning in virtual environments. ***FY 2013 Plans:*** Will develop technologies to fully immerse Soldiers in environment without obstructions; assess the use of distributed mobile platforms for the delivery of training software and applications to training subjects and validate the effectiveness relative to fixed platforms.			
Accomplishments/Planned Programs Subtotals	2.946	3.149	2.799

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603015A: *Next Generation Training & Simulation Systems*	PROJECT S29: *MODELING & SIMULATION - Adv Tech Dev*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
S29: *MODELING & SIMULATION - Adv Tech Dev*	7.116	6.042	4.367	-	4.367	5.944	5.486	5.580	5.674	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates next generation training and simulation systems that integrate virtual threats, asymmetric warfare concepts, network-centric operations, and embedding training capabilities as well as technologies into operational go-to-war future force systems to include dismounted warrior systems. The synergy between these embedded training capabilities and the immersive training advanced technology development in PE 060315/project S28 provides Army units with a set of complementary embedded as well as deploy-on-demand systems that provide just-in-time, dynamic, realistic training, and mission rehearsal capabilities. Demonstrations include technologies that form a framework for future training applications for the range of future force operations such as robotic control and other sensor operations; mission planning and rehearsal; command, control, and maneuver; Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) network analysis to support distributed simulations; and vehicle system interface requirements. This project creates a joint environment by synchronizing virtual and constructive simulated forces with the next generation and current training systems from the Army, Navy, Air Force, and Marine forces.

Efforts in this program element support the Army science and technology Soldier portfolio.

Work in this PE complements and is fully coordinated with efforts in PE 0602308A (Advanced Concepts and Simulation), PE 0602785 (Manpower/Personnel/Training Technology), PE 0602787A (Medical Technology) and PE 0603007A (Manpower, Personnel and Training Advanced Technology).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Army Research Laboratory (ARL), Weapons and Materials Research Directorate, Aberdeen Proving Ground, Maryland and Human Research and Engineering Directorate, Simulation and Training Technology Center (STTC), Orlando, Florida.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Embedded Techniques	5.670	5.252	4.367
Description: This effort matures and demonstrates capabilities (most provided from PE 0602308A/project C90) built into or added onto operational systems, subsystems, or equipment, to enhance as well as maintain the skill proficiency of Soldiers, and maximizes component commonality among combat vehicles and Soldier computer systems.			
FY 2011 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603015A: *Next Generation Training & Simulation Systems*	PROJECT S29: *MODELING & SIMULATION - Adv Tech Dev*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Demonstrated immersive training on portable and mobile devices such as mobile hand-held devices as well as militarized personal computers; assessed and demonstrated software authoring tools for real-time creation and delivery of automated tutoring systems to distributed multi-student teams. ***FY 2012 Plans:*** Continue advanced technology demonstrator maturity improvements from PE 0602308A/project C90 Live, Virtual, Constructive (LVC) technologies such as real-time physics-based rendering of asymmetric forces in urban environments and prepare future experiments for FY13. Will continue to evaluate, demonstrate and quantify the immersive simulation treatment effects and the long term results of treatment, and transition results as well as lessons learned to Army/DoD medical community ***FY 2013 Plans:*** Will integrate component level sensors for tracking Soldier movement, and augmented reality for dismounted Soldier immersive training environments. Will commence planning for technology experiments, demonstrations and evaluations in FY14 of enhanced embedded training environments.			
Title: Advanced simulation to treat Post Traumatic Stress Disorder (PTSD) ***Description:*** This effort matures and demonstrates advanced simulation technologies developed at the Institute for Creative Technology (ICT) to treat the effects of PTSD. ***FY 2011 Accomplishments:*** Evaluated, demonstrated and quantified the immersive simulation treatment effects and the long term results of the treatment.	1.446	-	-
Title: Blast Modeling and Simulation (M&S) ***Description:*** This effort advances M&S to improve the survivability of ground vehicle occupants and dismounted soldiers to blast threats. Current blast M&S is limited to replicating finite blast-soil loading conditions, vehicle structure responses to the blast load, and the resulting biofidelic based injuries to the Soldier. To significantly improve designs, engineering, and assessment of existing and future blast protection technologies, Blast M&S needs to be more dynamic and predictive and the models must be verified, validated and accredited (VV&A). ***FY 2012 Plans:*** Verify and Validate (V&V) blast M&S loading conditions to account for model variability due to soil conditions (type/composition, moisture content, overburden, and soil bed preparation); quantify M&S sub-vehicle system models for deviations in vehicle structural materials models for metals, composites, and elastomers accounting for variations in strength and fracture material properties.	-	0.790	-
Accomplishments/Planned Programs Subtotals	7.116	6.042	4.367

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603015A: *Next Generation Training & Simulation Systems*	PROJECT S29: *MODELING & SIMULATION - Adv Tech Dev*

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603015A: *Next Generation Training & Simulation Systems*	PROJECT S31: *Modeling and Simulation Infrastructure Technology*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
S31: *Modeling and Simulation Infrastructure Technology*	4.726	8.716	10.091	-	10.091	10.127	10.765	10.947	11.132	Continuing	Continuing

Note

Not applicable for this item.

A. Mission Description and Budget Item Justification

This project researches, matures, and demonstrates a distributed Modeling and Simulation (M&S) environment referred to as the Modeling Architecture for Technology, Research, and Experimentation (MATREX). MATREX researches and develops a robust M&S environment wherein a collection of multi-fidelity models, simulations and tools can be integrated as well as mapped to an evolving architecture for conducting multi-scale (time and spatial resolution) M&S activities to provide M&S data and information to multiple users for decision-making. MATREX provides a unifying M&S architecture and supporting structure that synchronize and integrate multi-resolution (time and space) modeling applications such as Live, Virtual, and Constructive experimentation. It also exploits applications, operational studies of Network-Centric Operations concepts and technologies, or the modeling of Battle Command operations with elements of advanced communications, information flow, data fusion, decision-making, and information warfare. MATREX also works to address M&S issues of model scalability, network design, enterprise services, and third party software compatibility issues. MATREX ultimately comprises a portfolio of one or more year's efforts focused on researching cutting edge M&S methods to enable the Army and DoD to perform critical System of Systems (SoS) analysis, experimentation, technology tradeoffs, capability assessments, concept development, testing, and training.

Funding increase in FY13 reflects the use of MATREX to support development of enterprise architectures for holistic modeling and simulation of dismounted soldier protection, lethality with cognitive and physical performance.

Efforts in this program element support the Army science and technology Soldier portfolio.

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Army Research Laboratory (ARL), Weapons and Materials Research Directorate, Aberdeen Proving Ground, Maryland and Human Research and Engineering Directorate, Simulation and Training Technology Center (STTC), Orlando, Florida.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: MATREX	4.726	8.716	10.091

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603015A: *Next Generation Training & Simulation Systems*	PROJECT S31: *Modeling and Simulation Infrastructure Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Description: Matures and demonstrates modeling and simulation technologies and techniques that support Army experimentation and test events to assess and support system acquisition and military planning decision-making through the use of multi-fidelity models, simulations and tools as well as analysis activities, such as System of Systems, technology tradeoffs, etc. ***FY 2011 Accomplishments:*** Demonstrated cross-command data collection and analysis tools for integrated acquisition support capability; matured integrated M&S representation of Battle Command (future force network planning, pre-operation checkout, and integration with tactical command and control devices); integrated M&S support architectures for cross-domain M&S environment interoperability; and fused multi-resolution capabilities for modeling weather, terrain, chemical-biological effects and human behavior/human decision-making, networked sensor fusion, and tactical network to meet future analysis needs. ***FY 2012 Plans:*** Demonstrate simulation and systems engineering tools for distributed integration and M&S reuse focused on System of Systems (SoS); research and demonstrate emerging simulation methods to enable short turn around, critical analyses for the Army and DoD to include models for soldier protection and performance trade space; demonstrate executable architectures for analysis, event management, and simulation initialization, on the RDECOM Virtual Testbed; research and identify hardware and software technology solutions for current and future M&S challenges, concentrating on distributed execution of M&S. ***FY 2013 Plans:*** Will mature the executable SoS architecture concept for analysis, event management, and simulation initialization for use throughout the Army and DoD to save time and money across a wider scope of SoS. Will exploit and refine next generation architecture(s) that demonstrates advances in computer science to support future training, experimentation, and acquisition decisions tools and; demonstrate computer cloud technologies to increase the ability to better use and distribute M&S application services to users; will investigate capabilities to demonstrate the use of data from a central authoritative source maintained by other DoD agencies to expanded distributed capabilities beyond Army data sources; and refine Soldier protection and performance M&S representations to identify tradeoff analysis tools and future virtual training applications for commanders to optimize protection with Soldier load and performance.			
Accomplishments/Planned Programs Subtotals	4.726	8.716	10.091

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603015A: *Next Generation Training & Simulation Systems*	PROJECT S31: *Modeling and Simulation Infrastructure Technology*

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603020A: *Tractor rose*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	11.872	12.577	9.925	-	9.925	10.667	17.483	16.245	16.520	Continuing	Continuing
B84: *DB84*	2.583	2.692	2.455	-	2.455	2.500	2.540	2.583	2.627	Continuing	Continuing
DB1: *DDB1*	9.289	9.885	7.470	-	7.470	8.167	14.943	13.662	13.893	Continuing	Continuing

Note

FY 13 funding realigned to higher priority efforts.

A. Mission Description and Budget Item Justification

B. Program Change Summary ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
Previous President's Budget	12.309	12.597	13.261	-	13.261
Current President's Budget	11.872	12.577	9.925	-	9.925
Total Adjustments	-0.437	-0.020	-3.336	-	-3.336
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.366	-			
• Adjustments to Budget Years	-	-	-3.336	-	-3.336
• Other Adjustments 1	-0.071	-0.020	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603020A: *Tractor rose*	PROJECT B84: *DB84*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
B84: *DB84*	2.583	2.692	2.455	-	2.455	2.500	2.540	2.583	2.627	Continuing	Continuing

Note

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A. Mission Description and Budget Item Justification

The details of this program are reported in accordance with Title 10, United States Code, Section 119(a)(1).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: . ***Description:*** DB84 ***FY 2011 Accomplishments:*** . ***FY 2012 Plans:*** . ***FY 2013 Plans:*** .	2.583	2.692	2.455
Accomplishments/Planned Programs Subtotals	2.583	2.692	2.455

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603020A: *Tractor rose*	PROJECT DB1: *DDB1*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
DB1: *DDB1*	9.289	9.885	7.470	-	7.470	8.167	14.943	13.662	13.893	Continuing	Continuing

A. Mission Description and Budget Item Justification

The details of this program are reported in accordance with Title 10, United States Code, Section 119(a)(l).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: The details of this program are reported in accordance with Title 10, United States Code, Section 119(a)(l). ***Description:*** DB1 ***FY 2011 Accomplishments:*** . ***FY 2012 Plans:*** . ***FY 2013 Plans:*** .	9.289	9.885	7.470
Accomplishments/Planned Programs Subtotals	9.289	9.885	7.470

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603105A: *MILITARY HIV RESEARCH*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	25.738	22.760	6.984	-	6.984	7.111	7.216	7.321	7.445	Continuing	Continuing
H29: *MED PROTECT AGNST HIV*	6.450	6.785	6.984	-	6.984	7.111	7.216	7.321	7.445	Continuing	Continuing
T16: *MILITARY HIV INITIATIVES CA*	19.288	15.975	-	-	-	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program element (PE) matures and demonstrates advanced technology of candidate human immunodeficiency virus (HIV) vaccines, prepares and conducts human clinical studies to assess safety and efficacy of candidate HIV vaccines, conducts research to control HIV infection in military environments, protects the military blood supply from HIV, and protects military personnel from risks associated with the HIV infection. All HIV technology development activities are conducted in compliance with U.S. Food and Drug Administration (FDA) regulations. FDA requires thorough testing in animal models (preclinical testing) to ensure safety and efficacy prior to approving controlled clinical evaluation of drugs, vaccines, and medical devices in humans. Normally, clinical trials are conducted in three phases to prove safety and effectiveness of the drug, vaccine, and device for the targeted disease or condition. An increasing number of test subjects are used in each subsequent phase. All results are submitted to FDA for evaluation to ultimately obtain approval (licensure) for routine medical use. This program is jointly managed through an Interagency Agreement by the U.S. Army Medical Research and Materiel Command (MRMC), the National Institutes of Health, and the National Institute of Allergy and Infectious Diseases (NIAID).

This project contains no duplication with any effort within the Military Departments or other government organizations.

Work is fully coordinated with work funded in program element PE 0602787A, project 873 (HIV Exploratory Research).

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Work in this PE is performed by the Walter Reed Army Institute of Research (WRAIR), Silver Spring, MD, and its overseas laboratories; and the Naval Medical Research Center (NMRC), Silver Spring, MD, and its overseas laboratories. The Henry M. Jackson Foundation, located in Rockville, MD, provides support for FDA testing and other research under cooperative agreement.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army					DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*		R-1 ITEM NOMENCLATURE PE 0603105A: *MILITARY HIV RESEARCH*			
B. Program Change Summary ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**
Previous President's Budget	6.688	6.796	6.909	-	6.909
Current President's Budget	25.738	22.760	6.984	-	6.984
Total Adjustments	19.050	15.964	0.075	-	0.075
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	19.844	16.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.794	-			
• Adjustments to Budget Years	-	-	0.075	-	0.075
• Other Adjustments 1	-	-0.036	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603105A: *MILITARY HIV RESEARCH*	PROJECT H29: *MED PROTECT AGNST HIV*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
H29: *MED PROTECT AGNST HIV*	6.450	6.785	6.984	-	6.984	7.111	7.216	7.321	7.445	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project funds research to develop candidate human immunodeficiency virus (HIV) vaccines, assess their safety and effectiveness in evaluation with human subjects, and protect the military personnel from risks associated with HIV infection. In addition, it is designed to find ways to protect the blood supply from contamination with the virus. All HIV technology development is conducted in compliance with U.S. Food and Drug Administration (FDA) regulations. Evaluations in human subjects are conducted to demonstrate safety and effectiveness of candidate vaccines, as required by FDA regulation. Studies are conducted stepwise: first, to prove safety; second, to demonstrate the desired effectiveness of the drug, vaccine, or device for the targeted disease or condition in a small study; and third, to demonstrate effectiveness in large, diverse human population trials. All results are submitted to the FDA for evaluation to ultimately obtain approval (licensure) for medical use. This project supports studies for effectiveness testing on small study groups after which they transition to the next phase of development for completion of effectiveness testing in larger populations.

This program is jointly managed through an Interagency Agreement by the U.S. Army Medical Research and Materiel Command (MRMC) and the National Institute of Allergy and Infectious Diseases (NIAID). This project contains no duplication with any effort within the Military Departments or other government organizations.

Work is fully coordinated with work funded in program element PE 0602787A, project 873 (HIV Exploratory Research) are further matured under PE 0603807A, project 811.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Work in this PE is performed by the Walter Reed Army Institute of Research (WRAIR), Silver Spring, MD, and its overseas laboratories. Significant work is conducted under a cooperative agreement with the Henry M. Jackson Foundation, Rockville, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: HIV Program	6.450	6.785	6.984
Description: This project funds research to develop candidate HIV vaccines, assess their safety and effectiveness in evaluations with human subjects, and protect military personnel from risks associated with HIV infection.			
FY 2011 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603105A: *MILITARY HIV RESEARCH*	PROJECT H29: *MED PROTECT AGNST HIV*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Expanded evaluations in human volunteers in Africa and Asia to assess the safety and effectiveness of a vaccine combination designed for more than one HIV subtype. ***FY 2012 Plans:*** Perform tests under Good Laboratory Practice FDA guidelines to assess performance and ability of HIV vaccine candidates to provoke an immune response in human trials. Prepare and conduct safety studies in human volunteers with new vaccine candidates at multiple sites worldwide. ***FY 2013 Plans:*** Will conduct initial safety studies in humans with candidate vaccines consisting of multiple subtypes in clinical trial sites in Asia and Africa; conduct studies in humans to assess performance and ability of HIV vaccine candidates to provoke an immune response that can protect against HIV.			
Accomplishments/Planned Programs Subtotals	6.450	6.785	6.984

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603105A: *MILITARY HIV RESEARCH*	PROJECT T16: *MILITARY HIV INITIATIVES CA*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
T16: *MILITARY HIV INITIATIVES CA*	19.288	15.975	-	-	-	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

Congressional Interest Item projects for HIV Research.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: HIV Research	19.288	15.975	-
Description: This is a Congressional Interest Item. ***FY 2011 Accomplishments:*** Program Increase ***FY 2012 Plans:*** Program Increase			
Accomplishments/Planned Programs Subtotals	19.288	15.975	-

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603125A: *Combating Terrorism - Technology Development*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	9.424	22.172	9.716	-	9.716	10.054	10.136	10.222	10.394	Continuing	Continuing
DF5: *AGILE INTEGRATION & DEMONSTRATION*	9.424	22.172	9.716	-	9.716	10.054	10.136	10.222	10.394	Continuing	Continuing

Note

FY 11 reduction due to realignment of funding to higher priority efforts.

A. Mission Description and Budget Item Justification

This program element (PE) demonstrates technologies with high payoff potential to address current technology shortfalls or future force capability gaps.

Work in this PE complements and is fully coordinated with PE 0602105A (Materials Technology), PE 0602303A (Missile Technology), PE 0602601A (Combat Vehicle and Automotive Technology), PE 0602618A (Ballistics Technology), PE 0602705A (Electronics and Electronic Devices), PE 0602784A (Military Engineering Technology), PE 0603005A (Combat Vehicle and Automotive Advanced Technology, PE 0603734A (Military Engineering Advanced Technology), and PE 0603710A (Night Vision Advanced Technology).

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work in this PE is performed by the Army Research, Development, and Engineering Command (RDECOM) and the Army Engineer Research and Development Center.

B. Program Change Summary ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
Previous President's Budget	10.550	12.191	9.611	-	9.611
Current President's Budget	9.424	22.172	9.716	-	9.716
Total Adjustments	-1.126	9.981	0.105	-	0.105
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	9.981			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.314	-			
• Adjustments to Budget Years	-	-	0.105	-	0.105
• Other Adjustments 1	-0.812	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603125A: *Combating Terrorism - Technology Development*	PROJECT DF5: *AGILE INTEGRATION & DEMONSTRATION*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
DF5: *AGILE INTEGRATION & DEMONSTRATION*	9.424	22.172	9.716	-	9.716	10.054	10.136	10.222	10.394	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project demonstrates technologies with high payoff potential to address current technology shortfalls or future force capability gaps. Efforts include hybrid electric power technologies to reduce use of fossil fuel generators and identifying, accelerating, and improving rapidly deployable force protection technologies to enable troops at small, remote bases or integrated in with local communities (e.g., villages) to detect, assess,and defend against a range of enemy threats since they generally do not have the organic assetts or levels of protection like that at larger bases.

This project supports the Command Control and Communications and Ground portfolios. Work in this project is complementary to and is fully coordinated with PE 0602105A (Materials Technology), PE 0602303A (Missile Technology), PE 0602601A (Combat Vehicle and Automotive Technology), PE 0602618A (Ballistics Technology), PE 0602705A (Electronics and Electronic Devices), PE 0602784A (Military Engineering Technology), 0603005A (Combat Vehicle and Automotive Advanced Technology), PE 0603710A (Night Vision Advanced Technology), and PE 0603734A (Military Engineering Advanced Technology).

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Army Research, Development, and Engineering Command (RDECOM) and the Army Engineer Research and Development Center.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Hybrid Intelligent Power (HI Power) (previously titled Transportable Hybrid Electric Power Station (THEPS))	4.332	4.691	4.859
Description: This effort matures and demonstrates intelligent power management hardware and software to reduce the use of fossil fuel in tactical generators while increasing energy security. The intelligent power management technologies will be plug-and-play to enable faster power grid setup times and to eliminate human error as well as to reduce soldier planning burden.			
FY 2011 Accomplishments: Matured and demonstrated Hybrid Intelligent (HI) Power technologies for an intelligent power grid that allowed for the most efficient use of the tactical power sources available in support of remote operations and tactical command posts; demonstrated a 30 kilowatt HI Power grid; conducted efficiency testing on demonstrators; matured and demonstrated a direct current distribution architecture and associated power electronics.			
FY 2012 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603125A: *Combating Terrorism - Technology Development*	PROJECT DF5: *AGILE INTEGRATION & DEMONSTRATION*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Develop and demonstrate an autonomous hybrid power grid architecture for the power range of 3 to 60 kilowatt capable of accepting direct current (DC) input from 20 volts DC to 32 volts DC, and be scalable to 500 kilowatts; develop and demonstrate advance control hardware and software; develop and assess a standard secure communication protocol; continue development of a draft system specification. ***FY 2013 Plans:*** Will validate performance of autonomous hybrid power grid architectures and advanced control hardware and software; fabricate and demonstrate a universal generator and Environmental Control Unit (ECU) modification kit to enable automatic start/stop controls; fabricate microgrid power management hardware representative Brigade tactical operations center and integrate for user assessments; complete a draft performance specification.			
Title: Rapidly Deployable Force Protection Technologies	5.092	7.500	4.857
Description: This effort improves design, development and employment of force protection technologies that are rapidly deployable to support troops operating in forward areas. These technologies must be readily transportable; require minimal set up, take down, and operational effort; and easily adaptable across a variety of missions, environments, and threats. This effort is coordinated with PE 0602784A, PE 0602786A, PE 0603734A,, and PE 0603313A. ***FY 2011 Accomplishments:*** Identified force protection technologies that meet the rapidly deployable construct; developed criteria for initial selection and criteria for assessments of candidate force protection technologies based on stakeholder prioritized needs for force protection functions and system characteristics; designed and conducted a series of demonstrations to baseline performance of selected force protection technologies, such as passive protection and/or non line-of-sight sensing, and to identify improvements in design, development and implementation; coordinated proposed improvements with designers, developers, and stakeholders. Scope included assessing systems vulnerabilities regarding the ability to conduct force protection effectively. ***FY 2012 Plans:*** Refine and update criteria for deployable force protection technologies in order to meet capability gaps based on stakeholder input; mature and evolve promising technologies identified and assessed in prior year's effort; identify new and emerging force protection technologies that meet the rapidly deployable construct; select and assess candidate force protection technologies to support a system of systems design for force protection based on prioritized needs from stakeholders; include advanced assessments of technology improvements based on prior year's efforts; design and conduct a series of demonstrations and experiments to assess performance of selected force protection technologies and to identify improvements in design, development and implementation; include assessing systems vulnerabilities regarding the ability to conduct force protection effectively; and coordinate improvements with designers, developers, and stakeholders. ***FY 2013 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603125A: *Combating Terrorism - Technology Development*	PROJECT DF5: *AGILE INTEGRATION & DEMONSTRATION*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Will design and conduct a series of experiments, including live scenarios, and coordinated demonstrations to identify the most promising new and emerging technologies for remaining high-priority gaps in deployable force protection; to stress and assess developing systems for both individual and collective systems performance in operationally relevant environments and realistic scenarios that include adaptive enemies; and to provide feedback to developers so that they can improve systems and make them more robust for operational use. Will expand experiments across a range of realistic, relevant environments that represent current and future areas of operations and adaptive threats and incorporate complimentary sets of experimental designs. Will mature and evolve high-payoff technologies by improving deployability; by increasing systems of systems integration and interoperability; and by identifying and reducing systems and systems of systems vulnerabilities through deliberate methodologies.			
Title: Alternative Energy for Deployed Forces ***Description:*** This is a Congressional Interest Item. ***FY 2012 Plans:*** Congressional add funding for Alternative Energy for Deployed Forces	-	9.981	-
Accomplishments/Planned Programs Subtotals	9.424	22.172	9.716

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603130A: *TRACTOR NAIL*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	-	4.271	3.487	-	3.487	3.194	3.440	3.498	3.557	Continuing	Continuing
DS8: *TRACTOR NAIL*	-	4.271	3.487	-	3.487	3.194	3.440	3.498	3.557	Continuing	Continuing

Note

Not Applicable for this Item

A. Mission Description and Budget Item Justification

The details of this program are reported in accordance with Title 10, United States Code, Section 119(a)(1).

B. Program Change Summary ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
Previous President's Budget	-	4.278	3.450	-	3.450
Current President's Budget	-	4.271	3.487	-	3.487
Total Adjustments	-	-0.007	0.037	-	0.037
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	0.037	-	0.037
• Other Adjustments 1	-	-0.007	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603130A: *TRACTOR NAIL*	PROJECT DS8: *TRACTOR NAIL*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
DS8: *TRACTOR NAIL*	-	4.271	3.487	-	3.487	3.194	3.440	3.498	3.557	Continuing	Continuing

Note

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A. Mission Description and Budget Item Justification

The details of this program are reported in accordance with Title 10, United States Code, Section 119(a)(l).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: . ***Description:*** DS8 ***FY 2012 Plans:*** Not applicable ***FY 2013 Plans:*** Not applicable	-	4.271	3.487
Accomplishments/Planned Programs Subtotals	-	4.271	3.487

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

Not Applicable SAP

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603131A: *TRACTOR EGGS*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	-	2.257	2.323	-	2.323	2.367	2.404	2.444	2.485	Continuing	Continuing
DS9: *TRACTOR EGGS*	-	2.257	2.323	-	2.323	2.367	2.404	2.444	2.485	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1).

B. Program Change Summary ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
Previous President's Budget	-	2.261	2.298	-	2.298
Current President's Budget	-	2.257	2.323	-	2.323
Total Adjustments	-	-0.004	0.025	-	0.025
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	0.025	-	0.025
• Other Adjustments 1	-	-0.004	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603131A: *TRACTOR EGGS*	PROJECT DS9: *TRACTOR EGGS*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
DS9: *TRACTOR EGGS*	-	2.257	2.323	-	2.323	2.367	2.404	2.444	2.485	Continuing	Continuing

A. Mission Description and Budget Item Justification

The details of this program are reported in accordance with Title 10, United States Code, Section 119(a)(1)

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Not applicable ***Description:*** Not applicable ***FY 2012 Plans:*** Not applicable ***FY 2013 Plans:*** Not applicable	-	2.257	2.323
Accomplishments/Planned Programs Subtotals	-	2.257	2.323

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

Not Applicable

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603270A: *Electronic Warfare Technology*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	18.973	23.640	21.683	-	21.683	22.598	22.788	23.319	23.632	Continuing	Continuing
K15: *ADVANCED COMM ECM DEMO*	9.103	12.029	9.799	-	9.799	9.951	9.797	9.977	10.145	Continuing	Continuing
K16: *NON-COMMO ECM TECH DEM*	9.870	11.611	11.884	-	11.884	12.647	12.991	13.342	13.487	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program element (PE) matures and demonstrates electronic warfare (EW) sensors and software intended to deny, disrupt, locate or destroy the enemy's command, control, and communications (C3) systems and intelligence, surveillance and reconnaissance assets. This PE matures both countermeasures (CM) and counter-countermeasures (CCM) to deny the enemy the use of their systems while protecting US assets from enemy deception and jamming. Project K15 matures and demonstrates capabilities to locate and exploit enemy communication systems including computer networks. Project K16 matures and demonstrates multifunctional EW capabilities (jamming) to enhance platform survivability and provide near real-time situational awareness to the commander through the detection, identification and geo-location of emitters of interest.

Work in this PE is complimentary of PE 0602120A (Sensors and Electronic Survivability), PE 0602270A (Electronic Warfare Technology), and PE 0603772A (Advanced Tactical Computer Science), and fully coordinated with PE 0603003A (Aviation Advanced Technology) and PE 0603313A (Missile and Rocket Advanced Technology).

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work in this PE is performed by the Army Research, Development, and Engineering Command (RDECOM), Communications-Electronics Research, Development, and Engineering Center (CERDEC), Aberdeen Proving Ground, MD.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army					DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*		R-1 ITEM NOMENCLATURE PE 0603270A: *Electronic Warfare Technology*			
B. Program Change Summary ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**
Previous President's Budget	18.350	23.677	21.501	-	21.501
Current President's Budget	18.973	23.640	21.683	-	21.683
Total Adjustments	0.623	-0.037	0.182	-	0.182
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	1.200	-			
• SBIR/STTR Transfer	-0.406	-			
• Adjustments to Budget Years	-	-	0.182	-	0.182
• Other Adjustments 1	-0.171	-0.037	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603270A: *Electronic Warfare Technology*	PROJECT K15: *ADVANCED COMM ECM DEMO*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
K15: *ADVANCED COMM ECM DEMO*	9.103	12.029	9.799	-	9.799	9.951	9.797	9.977	10.145	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates sensor and software technologies to locate and identify modern tactical enemy and blue force (friendly) radio frequency (RF) communications, radars and computer networks and nodes. This project enables uninterrupted air and ground based intelligence collection and long range targeting operations in a hostile electromagnetic and cyber environment, and enables communications countermeasures (CM) and counter-countermeasures (CCM) to first intercept, identify, and locate tactical communications, then degrade threat-computer networks and their components.

This project supports Army science and technology efforts in the Command, Control and Communications, Soldier, Ground and Air portfolios.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Army Research, Development, and Engineering Command (RDECOM), Communications - Electronics Research, Development, and Engineering Center (CERDEC), Aberdeen Proving Ground, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Offensive Operations	4.551	7.296	4.900
Description: This effort matures and demonstrates integrated electronic attack (EA) and computer network operations (CNO) hardware and software to execute force protection (FP), EA, electronic surveillance (ES) and signals intelligence (SIGINT) missions in a dynamic, distributed and coordinated fashion. This results in the capability to engage a multitude of diverse multi-node, multi-waveform, multi-platform and cyber (internetworked computers) targets while maximizing overall network efficiency and effectiveness, and preserving blue force/non-combatant communications. Work being accomplished under PE 0603270A/ project K16 and PE 0602270/project 906 compliment this effort.			
FY 2011 Accomplishments: Enhanced system baseline for distributed operation; focused techniques development on threat priorities; identified and implemented EW asset and network load balancing techniques to ensure effective and efficient operation; developed techniques to ensure coordination and interoperability with Counter Remote Control Improvised Explosive Device (RCIED) Electronic Warfare (CREW) systems.			
FY 2012 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603270A: *Electronic Warfare Technology*	PROJECT K15: *ADVANCED COMM ECM DEMO*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Continue fabrication and coding of integrated networked EW technologies and techniques to address current and emerging threat priorities; complete network load balancing and resource management techniques to aid in this integration; refine and integrate real-time, On-The-Move (OTM) direction finding / Geolocation technologies; demonstrate EW technologies in a distributed Comms-EW mission at various levels of interoperability with network registered assets (e.g., coexistence, interoperation, and fully integrated) in conjunction with an existing FP mission. Possible demonstration scenario: an individual EW asset acquires three threat signals but is only able to address and defeat one of them due to constraints (e.g., power, bandwidth, or etc.). Because all three detections are reported to the network, other EW assets can address and defeat the two outstanding signals. ***FY 2013 Plans:*** Will develop and demonstrate supporting messaging structures and human-machine interfaces to enable remote users to coordinate the planning and management of EW assets; finalize specifications and protocols to support the collaborative OTM EW functionality of future tactical EW systems; develop CYBER situation awareness functionality for non-traditional tactical EW/Cyber assets.			
Title: Stand-off Non-Cooperative Multi-Intelligence Technologies	4.552	4.733	4.899
Description: This effort matures and demonstrates hardware and software to conduct standoff intelligence, surveillance and reconnaissance in a three dimensional urban battlespace. The goal is to detect, identify, map and display personnel, RF devices and other anomalies located within structures and complex terrain to provide dismounted and remote users with real-time, immediate-area situational awareness. ***FY 2011 Accomplishments:*** Improved and implemented new algorithms and techniques for detection of slow-moving and stationary personnel inside structures and reduce false positives due to multipath signal propagation in urban environments; leveraged data from IED efforts to develop algorithms that would allow through-the-wall detection of personnel carrying weapons and explosive devices; assessed/leveraged recent developments in 3-D visualization and mapping efforts and apply radio frequency detection techniques as necessary to selected ground radars and/or their ground stations. ***FY 2012 Plans:*** Integrate and demonstrate software, algorithms and techniques that provide stand-off sense-through-the-wall, counter-cover/ concealment/camouflage, and denial-and-deception as pre-planned product improvement increments into PEO Soldier/PM Soldier Sensors & Lasers hand held devices; demonstrate target identification and discrimination technologies (e.g., RF measures and signals intelligence appliques, personnel detection and fused reporting) against select modern RF emitter threats, RCIEDs and other targets with low or indistinct emissions for both airborne and ground based platforms. ***FY 2013 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603270A: *Electronic Warfare Technology*	PROJECT K15: *ADVANCED COMM ECM DEMO*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Will examine current and emerging RF threat discrimination and neutralization algorithms and hardware suites of disparate RF measurement and signals intelligence (MASINT) systems to design an integrated MASINT/Multi-INT vehicle-mounted detection system that is fully interoperable with current electronic countermeasures; analyze and identify new waveforms, techniques and common hardware components needed to facilitate integration and modularity of an integrated multi-INT system; compose sensor cross cueing algorithms to increase the probability of detection of threat devices with low or indistinct emissions at greater standoff distances; extend detection capability to monitor multiple threat device emissions/transmissions simultaneously.			
Accomplishments/Planned Programs Subtotals	9.103	12.029	9.799

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603270A: *Electronic Warfare Technology*	PROJECT K16: *NON-COMMO ECM TECH DEM*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
K16: *NON-COMMO ECM TECH DEM*	9.870	11.611	11.884	-	11.884	12.647	12.991	13.342	13.487	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates non-communication, multi-functional electronic warfare (EW) capabilities that enhance the survivability of Army air and ground platforms and dismounted Soldiers. This project matures and demonstrates radio frequency (RF), infrared (IR) and electro-optical (EO) sensors and jamming sources to detect, locate, deceive, and neutralize (jam) booby traps, radar-directed target acquisition systems, target-tracking sensors, surface-to-air missiles (SAMs), air-to-air missiles (AAMs), and top-attack and electronically-fuzed munitions. This project also enables electronic support (ES) hardware and software to detect, identify and geolocate emitters of interest from an effective standoff distance to provide near real-time situational awareness.

This project supports Army science and technology efforts in the Command Control and Communications, Ground, Air and Soldier portfolios.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Army Research, Development, and Engineering Command (RDECOM), Communications-Electronic Research, Development, and Engineering Center (CERDEC), Aberdeen Proving Ground, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Distributed Aperture Infrared Countermeasures (DAIRCM) Technologies	4.861	4.444	5.193
Description: This effort matures and demonstrates countermeasure technologies that provide platform protection and integrated cueing against electro-optically (EO) and infra-red (IR) guided threats.			
FY 2011 Accomplishments: Completed design of closed loop IRCM techniques and multi-band laser demonstrator; integrated advanced two color IR missile warning capability to improve overall demonstrator performance with high probability of detection/low false alarm, while the pointer-tracker expands the mission profile by increasing pointer-tracker reliability and permits simultaneous multiple threat engagement; developed target identification database for mission post analysis; finalized digital threat-warning hardware design; performed assessment on correlation algorithms and architecture.			
FY 2012 Plans: Conduct field demonstration of single modular, compact pointer tracker capability with a multiband laser jammer and an advanced 2-color missile warner capable of searching and defeating multiple engagements of enemy EO/IR threats; demonstrate capability			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603270A: *Electronic Warfare Technology*	PROJECT K16: *NON-COMMO ECM TECH DEM*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
against a representative advanced infrared man-portable air defense system design; perform assessment on correlation algorithms and architecture. ***FY 2013 Plans:*** Will modify the pointer tracker optics to broaden the wavelength coverage from near to mid-IR to allow for simultaneous jam and receive capability; integrate modified optics and design, code and integrate jam/receive deconfliction algorithms into pointer tracker system; demonstrate closed-loop interrogation techniques against seekers in a hardware-in-the-loop laboratory environment; conduct limited field assessment of closed-loop interrogation techniques against simulated IR missiles.			
Title: Advanced Tactical Radio Frequency Countermeasures (ATRFCM) Technologies ***Description:*** This effort matures and demonstrates integrated EW/direction finding technologies that provide protection of air, ground and dismounts from emerging RF threats at standoff distances. Work accomplished under PE 0602120A/project H15, PE 0602270A/project 906, and PE 0603270A/project K15 complements this effort. ***FY 2011 Accomplishments:*** Optimized platform protection capabilities through the coordination of real-time dynamic antenna selection; demonstrated real time on-the-move direction finding and geolocation capabilities that complement targeting and cueing activities of overarching force protection and Comms EW missions to support a common operating picture. ***FY 2012 Plans:*** Demonstrate a distributed, networked, multi-platform (air and ground) EW framework enabling the coordinated detection, geolocation, reporting, and engagement of multiple diverse threat waveforms; demonstrate automatic synchronization of EW framework with blue force communications to deconflict threats from friendly forces for improved survivability and situational awareness. ***FY 2013 Plans:*** Will enhance software and firmware of advanced EW demonstration platform to implement and demonstrate coordinated detect/defeat capability; demonstrate increased threat coverage and protection range offered by distributed, cooperative jamming capability for protection of convoys; develop dynamic, local area timing schemes to support simultaneous/multi-function EW/defensive electronic attack (EA) capabilities; design logic circuitry and associated software code to integrate electronic support (ES) and EA functionalities in a coordinated ES/EA capability.	5.009	4.667	4.191
Title: Combat ID Technology Demonstrations ***Description:*** This effort augments and enhances existing light weight dismount and tactical vehicles systems to add real-time Combat Identification (CID) capabilities, along with embedded training, without significantly altering size, weight and power of current and emerging equipment packages. The focus is on making current systems and capabilities (weapon sites, radios,	-	2.500	2.500

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603270A: *Electronic Warfare Technology*	PROJECT K16: *NON-COMMO ECM TECH DEM*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
sensors, and etc.) multifunctional rather than adding stand-alone CID systems that would increase the burden on the Soldier. Work accomplished under PE 0602120A/project H15 compliments this effort. ***FY 2012 Plans:*** Leverage light vehicle demonstration to complete final waveform modifications and select Software Radio Waveform interrogation approach for coding onto Joint Tactical Radio System platform. ***FY 2013 Plans:*** Will integrate duel interrogation (laser/RF with weapons orientation sensors) capability to increase probability of positive friend, enemy, neutral, non-combatant identification at increased ranges; modify wireless personal area network waveforms and soldier radio waveform to transmit RF position location information to existing mobile/handheld displays; modify existing weapons system software to add audible, tactile and visual cues into weapon sight for display; improve CID training mode with electronic bullet capability for existing hardware to support both mission execution and training functions; exploit multiple sensor (infrared, RF, etc.) integration to support non-cooperative CID.			
Accomplishments/Planned Programs Subtotals	9.870	11.611	11.884

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603313A: *Missile and Rocket Advanced Technology*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	76.272	90.458	71.111	-	71.111	68.230	53.353	54.737	57.074	Continuing	Continuing
206: *MISSILE SIMULATION*	3.379	3.548	2.271	-	2.271	2.299	2.265	2.143	2.202	Continuing	Continuing
263: *FUTURE MSL TECH INTEGR(FMTI)*	40.526	60.620	58.907	-	58.907	59.166	38.527	35.194	35.785	Continuing	Continuing
550: *COUNTER ACTIVE PROTECTION*	8.255	7.510	-	-	-	-	-	-	-	Continuing	Continuing
704: *Advanced Missile Demo*	12.458	8.796	4.879	-	4.879	6.765	12.561	17.400	19.087	Continuing	Continuing
G03: *Area Defense Advanced Technology*	11.654	9.984	5.054	-	5.054	-	-	-	-	Continuing	Continuing

Note

Not applicable for this item.

A. Mission Description and Budget Item Justification

This program element (PE) matures, fabricates, and demonstrates advanced rocket, missile, interceptor, and guided munition technologies to enhance weapon system lethality, survivability, agility, deployability, and affordability. Project 206 develops high fidelity simulations for advanced tactical missiles and interceptors. Project 263 demonstrates missile and interceptor systems with capabilities to provide protection against rockets, artillery, and mortars; provide precision weapons for small units in close combat; and provide minimum smoke propulsion for aviation missiles. Project 550 demonstrates guided interceptors for ground combat vehicle active protection systems and evaluates the countering of threat active protection systems ensuring missile lethality. Project 704 demonstrates the capability to detect and track rocket, artillery, mortar, and unmanned air vehicles threats. Project G03 demonstrates missile-based deployable force protection and fire control systems as well as defense against unmanned aerial vehicles and rotary wing aircraft.

Work in this PE is complimentary to PE 0602303A (Missile Technology), and is fully coordinated with PE 0602618 (Ballistics Technology), PE 0602624A (Weapons and Munitions Technology), PE 0603003A (Aviation Advanced Technology), PE 0603004A (Weapons and Munitions Advanced Technology), PE 0603005A (Combat Vehicle and Automotive Advanced Technology), PE 0603125 (Combating Terrorism ? Technology Development), PE 0603270A (Electronic Warfare Technology), PE 0603734A (Combat Engineering Systems), and PE 0708045A (Manufacturing Technology).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work in this PE is performed by the Aviation and Missile Research, Development, and Engineering Center (AMRDEC) located at Huntsville, AL.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army					DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*		R-1 ITEM NOMENCLATURE PE 0603313A: *Missile and Rocket Advanced Technology*			
B. Program Change Summary ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**
Previous President's Budget	84.553	90.602	77.540	-	77.540
Current President's Budget	76.272	90.458	71.111	-	71.111
Total Adjustments	-8.281	-0.144	-6.429	-	-6.429
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.294	-			
• Adjustments to Budget Years	-	-	-6.429	-	-6.429
• Other Adjustments 1	-5.500	-	-	-	-
• Other Adjustments 2	-0.487	-0.144	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603313A: *Missile and Rocket Advanced Technology*	PROJECT 206: *MISSILE SIMULATION*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
206: *MISSILE SIMULATION*	3.379	3.548	2.271	-	2.271	2.299	2.265	2.143	2.202	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates advanced modeling and simulation technologies for missile design and analysis. Evaluation of missile technology by means of modeling and simulation provides a cost-effective method that supports missile maturation throughout the weapon system life cycle. This effort permits a reduction in the number of flight tests required for programs of record as well as improves the confidence of flight test readiness and probability of flight test success.

This project support efforts in the Army science and technology Ground portfolio.

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Aviation and Missile Research, Development, and Engineering Center, (AMRDEC) Huntsville, AL.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Missile Simulation	3.379	3.548	2.271
Description: This effort designs, matures, and demonstrates advanced simulation technologies to support missile design, analysis, and evaluation including Hardware-in-the-Loop (HWIL) simulation, missile component and system simulations.			
FY 2011 Accomplishments: Enhanced the common HWIL computing capability to support data-intensive laser radar (LADAR) and radar projection seeker simulations; continued maturation of seeker signal injection for active radar and LADAR seekers; continued improvements to the solar simulator; continued design of a visualization environment capability to parametrically evaluate missile system performance.			
FY 2012 Plans: Continue simulation maturation to improve run-time performance of scene generators; improve HWIL multi-mode scene generation capabilities; increase standardization of HWIL interfaces to reduce integration time of different guidance systems; increase fidelity of real-time technical and programmatic modeling and simulation tools (visualization and fast-running models); and leverage advancements in computer processing capabilities to improve fidelity and runtime of simulations.			
FY 2013 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603313A: *Missile and Rocket Advanced Technology*	PROJECT 206: *MISSILE SIMULATION*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Will improve simulation fidelity, run-time, integration time, and visualization capabilities including: reuse and validate of HWIL simulation modules to reduce integration time and cost; design reduce the run-time required for higher fidelity scene generation, and complete HWIL modifications to allow for varying radio frequency waveforms.			
Accomplishments/Planned Programs Subtotals	3.379	3.548	2.271

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603313A: *Missile and Rocket Advanced Technology*	PROJECT 263: *FUTURE MSL TECH INTEGR(FMTI)*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
263: *FUTURE MSL TECH INTEGR(FMTI)*	40.526	60.620	58.907	-	58.907	59.166	38.527	35.194	35.785	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures, fabricates, and demonstrates advanced missile and interceptor technologies, such as seekers, guidance and controls, propulsion, and airframes. The project goal is to reduce the life-cycle cost per kill of precision guided missiles and interceptors.

This project support efforts in the Army science and technology Ground portfolio.

This project matures technologies from PE 0602303A and directly supports systems managed by the Program Executive Officer for Missiles and Space. Work in this project is in collaboration with PE 0602618 (Ballistics Technology), PE 0602624A (Weapons and Munitions Technologies), PE 0603004A (Weapons and Munitions Advanced Technology), PE 0603005A (Combat Vehicle and Automotive Advanced Technology) and PE 0708045A (Manufacturing Technology)..

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Aviation and Missile Research, Development, and Engineering Center (AMRDEC), Huntsville, AL.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Technology for Guided Missiles and Interceptors	6.965	5.665	-
Description: This effort designs technologies for highly responsive missiles and interceptors. This effort matures and demonstrates guidance and control, seeker, propulsion, and airframe technologies. This effort compliments the: Enhanced Precision Interceptor Technology, Guided Interceptor Technology for Defense against RAM, Hit-to-Kill Interceptor Technology for Defense against RAM (PE 0603313, Project 263) and Kinetic Energy Active Protection System Guided Interceptor (PE 0603313, Project 550).			
FY 2011 Accomplishments: Designed and demonstrated guidance, control, seeker, propulsion, and aerodynamic technologies in support of missile-based interceptor designs for force protection systems; designed technologies to support highly responsive guidance of tactical interceptors to defeat high velocity threats.			
FY 2012 Plans:			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Continue efforts to design and demonstrate guidance, control, propulsion, and airframe technologies to enable a highly responsive interceptor to defeat incoming RAM threats; design small radar frequency seeker technologies capable of guiding an interceptor to incoming RAM threats; integrate these technologies with guided interceptor designs for flight demonstration; and update designs based on flight demonstration results.			
Title: Applied Smaller, Lighter, and Cheaper (SLC) Munition Components ***Description:*** This effort designs, fabricates, and demonstrates technology for increasingly smaller, lighter, and cheaper munition components to enhance current system capabilities against asymmetric threats. These technologies will transition to current and next generation small precision munitions. This effort matures and transitions technologies developed in PE602303A. ***FY 2011 Accomplishments:*** Demonstrated image-based stabilization/tracking algorithms using captive flight; conducted static and dynamic evaluations of high performance insensitive munition propulsion systems; performed functional and environmental evaluation of composite JAGM sample GEU housing; demonstrated advanced interconnections in a representative small precision munition processor; and fabricated and field demonstrated form factored small semi-active laser seeker for small precision munitions. ***FY 2012 Plans:*** Complete design of composite missile propulsion casing and perform static performance evaluation; complete design of common ESAD in Javelin configuration; and design uncooled state-of-the-art infrared seeker design and conduct captive flight demonstration in support of Javelin upgrades.	11.246	7.987	-
Title: Small Organic Precision Munition Integrated Technology ***Description:*** This effort designs, fabricates, integrates, and flight demonstrates critical components to enhance system-level performance of a small precision munition organic to the Battalion. The effort provides a soldier portable, 5.5 pound, precision guided munition to enable small units to organically dominate asymmetric threats in complex terrain. The goals include improved: target tracking, effects against soft targets, communication with munition in flight, and power sources for increased flight and storage time. This effort matures and demonstrates technology from PE 0602303A, PE 0602624 Project H28, and the Applied Smaller, Lighter, and Cheaper Munition Components effort. ***FY 2012 Plans:*** Integrate and flight demonstrate image stabilization and people tracking on a surrogate munition platform; complete the design, fabricate, and conduct dynamic evaluations of a small height of burst sensor package to provide warhead effects against soft targets; fabricate, integrate, and demonstrate a small warhead with improved effects against asymmetric threats; and characterize	-	10.983	10.107

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
the performance of the state-of-the-art in small seekers for guidance to targets in high clutter environments, digital data-links to enable the Warfighter to communicate with the munition while in flight, and power sources to enable longer operation. ***FY 2013 Plans:*** Will continue to integrate image stabilization and people tracking algorithms with small seeker, conduct flight demonstration in surrogate munition to demonstrate improved tracking performance, then complete algorithm optimization based on demonstration results; integrate small form-factored laser ranging height of burst sensor, less sensitive omni-directional warhead, and fuze optimized for lethal effects against personnel and soft targets, then evaluate effectiveness in obscured environments; integrate secure digital data link in surrogate munition and conduct hardware-in-the-loop evaluation and flight demonstrations; evaluate form-factored power source over operating temperature range to demonstrate increased shelf-life.			
Title: Multi-Mission/Multi-Purpose Single Missile Propulsion ***Description:*** This effort matures and demonstrates advanced missile propulsion technology that provides longer ranges, increased mission flexibility, and shorter flight times while increasing system insensitive munitions capability in air-to-ground, ground-to-ground, and ground-to-air roles for transition to PEO Missiles & Space. ***FY 2011 Accomplishments:*** Completed static demonstrations of missile motors over operational temperature range; began fabrication of flight-weight hardware assets for the best technical approach in order to conduct flight demonstrations. ***FY 2012 Plans:*** Complete fabrication of best technical approach for demonstration; and integrate the propulsion system in a controlled flight vehicle for demonstration of improved insensitive munition capabilities.	3.264	4.356	-
Title: Defense against Rockets, Artillery, and Mortars (RAM) ***Description:*** This effort demonstrates an integrated launch system capable of 360 degree hemispherical protection from RAM threats. This effort is complementary to Enhanced Precision Interceptor Technology and Technical Fire Control Technology. Beginning in FY12, this effort will be captured in the Guided Interceptor Technology for Defense against RAM and Hit-to-Kill Interceptor Technology for Defense against RAM efforts. ***FY 2011 Accomplishments:*** Continued system-level HWIL evaluation to verify required performance; fabricated components and integrated for guided flight demonstrations against single RAM targets; updated the vertical launch and pitch over designs and system simulation based on evaluation results.	4.719	-	-
Title: Enhanced Precision Interceptor Technology	7.644	-	-

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Description: This effort demonstrates two technically different missile-based interceptor concepts with the required accuracy and lethality to defeat rocket, artillery, and mortar (RAM) threats. This effort conducts flight demonstrations of a guided missile-based interceptor with a high explosive warhead and a hit-to-kill guided missile-based interceptor against single and multiple simultaneous RAM threats in the required timeline to protect ground forces. This effort is complementary to the Defense against RAM effort and integrates technology developed in the Technology for Guided Missiles and Interceptors. Beginning in FY12, this effort will be captured in the Guided Interceptor Technology for Defense against RAM and Hit-to-Kill Interceptor Technology for Defense against RAM efforts. ***FY 2011 Accomplishments:*** Fabricated interceptors for guided flight demonstrations against single RAM targets and performed pre-flight HWIL evaluation on each interceptor; continued system-level HWIL evaluation and prepared interceptors for guided flight demonstrations; and updated the interceptor design and system simulation based HWIL evaluation results.			
Title: Technical Fire Control Technology ***Description:*** This effort demonstrates Technical Fire Control technology necessary to generate and execute a firing solution for defeat of rocket, artillery, and mortar (RAM) threats in the required timeline to protect ground forces. This effort develops Technical Fire Control technology to compliment the interceptor development performed in the Guided Interceptor Technology for Defense against RAM, Hit-to-Kill Interceptor Technology for Defense against RAM, and Counter RAM Tracking and Fire Control (PE 0603313 Project 704) efforts. These combined efforts will conduct 4-8 interceptor flight demonstrations each year beginning in FY12. The technologies demonstrated will be applicable to the Indirect Fire Protection Capability (IFPC), which began the Material Solution Analysis Phase in 4QFY11. ***FY 2011 Accomplishments:*** Fabricated one technical fire control node for guided flight demonstration against single RAM targets; matured technical fire control software and integrated technical fire control node with the interceptor components to support system-level hardware-in-the-loop (HWIL) evaluation to verify correct fire control solution and launch command are generated; and updated the technical fire control design and system simulation based on HWIL evaluation results. ***FY 2012 Plans:*** Complete fabrication of a technical fire control node for each interceptor flight demonstration; integrate technical fire control components with interceptor guidance section and tracking and fire control system components for pre-flight evaluation in HWIL; fully integrate technical fire control hardware and software with the tracking and fire control sensor to obtain incoming RAM threat state information; integrate technical fire control with interceptors to provide interceptor control for guided flight demonstrations; conduct guided flight demonstrations using technical fire control nodes to control each counter RAM interceptor through live-fire	6.688	6.824	7.882

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
shoot down of single RAM threats; and update technical fire control design and system simulation based on HWIL evaluation and flight demonstration results. ***FY 2013 Plans:*** Will increase the software capability and update the Technical Fire Control nodes based on analysis from the guided flight demonstrations of single RAM threats and support multiple flight demonstrations for both interceptor concepts; integrate updated Technical Fire Control components with interceptor guidance sections and Tracking and Fire Control system components for pre-flight evaluation in HWIL; conduct additional guided flight demonstrations using Technical Fire Control nodes to control each of the counter RAM interceptors through live-fire shoot down of single and dual RAM threats; and update system simulation based on HWIL evaluation and flight demonstration results.			
Title: Guided Interceptor Concept Technology for defense against Rockets, Artillery, and Mortars (RAM) ***Description:*** This effort demonstrates a Guided missile-based Interceptor concept with a high explosive warhead initially focused to defeat RAM threats with the potential for precision ground-to-ground applications. This effort designs, fabricates, evaluates, and flight demonstrates a guided missile-based interceptor and launch system. Complementary efforts include: Technical Fire Control Technology provides the interceptor with a firing solution and launch command and Counter RAM Tracking and Fire Control, in PE 0603313A Project 704, tracks the RAM threat. This effort will support the design, fabrication, integration, and flight demonstration of 2-4 guided interceptors each year beginning in FY 2012. Beginning in FY12, this effort combines the Defense against RAM and Enhanced Precision Interceptor Technology efforts to provide more detail on the two technically different missile-based counter-RAM systems that are being flight demonstrated. The technologies demonstrated will be applicable to the Indirect Fire Protection Capability (IFPC), which began the Material Solution Analysis Phase in 4QFY11. ***FY 2012 Plans:*** Update Guided Interceptor and launch system designs based on hardware-in-the-loop (HWIL) evaluation; integrate components and fabricate interceptors and a launch system for flight demonstration against single RAM threat; conduct pre-flight HWIL evaluation of each Guided Interceptor to ensure successful flight demonstration; integrate the interceptor and launch system with the technical fire control node and tracking and fire control system; flight demonstrate integrated interceptors, launch system, technical fire control node, and tracking and fire control system capability to defeat single RAM threats in flight within the required timeline; update designs and system simulation based on flight demonstration results. ***FY 2013 Plans:*** Will continue the fabrication and integration of command Guided Interceptors for flight demonstration; integrate with the Technical Fire Control node and Tracking and Fire Control System; perform pre-flight HWIL evaluation on each interceptor to ensure	-	11.957	20.810

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
successful flight demonstration and prepare for controlled and guided flight demonstrations of live-fire shoot down of single RAM threat targets; and update the interceptor design and system simulation based on HWIL evaluation and flight test results.			
Title: Hit-to-Kill Interceptor Concept Technology for Defense against Rockets, Artillery, and Mortars (RAM) ***Description:*** This effort demonstrates a compact, very light weight, radar frequency guided Hit-to-Kill missile-based Interceptor concept initially focused to defeat RAM threats in flight with the potential for use on air launched platforms, small weapons platforms, and ground-to-ground applications. This effort designs, fabricates, evaluates, and flight demonstrates a Hit-to-Kill counter RAM system consisting of interceptors and a launch system. Complementary efforts include: Technical Fire Control Technology provides the firing solution and launch command and Counter RAM Tracking and Fire Control, PE 0603313A Project 704, provides tracking of the RAM threat for intercept. This effort will support the design, fabrication, integration, and flight demonstration of 2-4 hit-to-kill interceptors each year beginning in FY12. Beginning in FY12, this effort combines the Defense against RAM and Enhanced Precision Interceptor Technology efforts to provide more detail on the two technically different missile-based counter-RAM systems that are being flight demonstrated. The technologies demonstrated will be applicable to the Indirect Fire Protection Capability (IFPC), which began the Material Solution Analysis Phase in 4QFY11. ***FY 2012 Plans:*** Update the Hit-to-Kill interceptor and launch system designs based on hardware-in-the-loop (HWIL) evaluation; integrate components and fabricate interceptors and launch system for flight demonstration; conduct pre-flight HWIL evaluation of each Hit-to-Kill interceptor to ensure successful flight demonstration; integrate the interceptor and launch system with the Technical Fire Control node and Tracking and Fire Control system; flight demonstrate the ability of the integrated interceptors, launch system, Technical Fire Control node, and Tracking and Fire Control system to defeat single RAM threats in flight within the required timeline; update designs and system simulation based on flight demonstration results. ***FY 2013 Plans:*** Will continue fabrication and integration of Hit-to-Kill Interceptors and launch systems; integrate with the Technical Fire Control and Tracking and Fire Control system; conduct pre-flight HWIL evaluation of each Hit-to-Kill interceptor to ensure successful flight demonstration; perform 2-4 guided flight demonstrations of live-fire shoot down of single and dual RAM threat targets; and update the system simulation based on HWIL evaluation and flight demonstration results.	-	12.848	20.108
Accomplishments/Planned Programs Subtotals	40.526	60.620	58.907

C. Other Program Funding Summary ($ in Millions)

N/A

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D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

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COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
550: *COUNTER ACTIVE PROTECTION*	8.255	7.510	-	-	-	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates integrated survivability technologies and techniques for lightweight combat platforms including light armored vehicles, tactical wheeled vehicles, and helicopters. Focus is on guided interceptors for active protection systems capable of defeating tank-fired large caliber anti-armor threats, anti-tank guided missiles and long range rocket propelled grenades. This project also matures and demonstrates technologies for countering threat active protection systems to maintain missile lethality against vehicles.

This project support efforts in the Army science and technology Ground portfolio.

Work in this project is in collaboration with PE 0602624A (Weapons and Munitions Technologies) Project H28, PE 0603004 (Advanced Munitions Demonstration), and PE 0603005A (Combat Vehicle and Automotive Advanced Technology) Project 221, as well as complements work done on adaptive infrared suppressor and acoustic signature technologies matured in the PE 0603003A (Aviation Advanced Technology) Project 313.

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Aviation and Missile Research, Development, and Engineering Center (AMRDEC), Huntsville, AL.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Kinetic Energy Active Protection System (KEAPS) Guided Interceptor	8.255	7.510	-
Description: This effort designs, fabricates, and flight demonstrates an interceptor to defeat threats to combat vehicle survivability focusing on tank fired kinetic energy threats. This effort demonstrates interceptor performance against kinetic energy tank rounds through a series of guided flight demonstrations incrementally integrating key components as their designs mature.			
FY 2011 Accomplishments: Conducted guided flight demonstrations against live threats to evaluate TDD performance limits; integrated interceptor and conducted guided flight demonstrations to verify the interceptor can navigate to the intercept point; and integrated warhead into interceptor.			
FY 2012 Plans:			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Continue flight demonstration of interceptors with the TDD integrated; fabricate interceptors with seeker, ESAD, TDD, and warhead integrated to demonstrate the capability to defeat tank fired kinetic energy rounds in flight; and complete full horizontal launch end-to-end flight demonstrations with an integrated warhead demonstrating guidance to the intercept point of tank fired kinetic energy round.			
Accomplishments/Planned Programs Subtotals	8.255	7.510	-

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

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COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
704: *Advanced Missile Demo*	12.458	8.796	4.879	-	4.879	6.765	12.561	17.400	19.087	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures advanced missile system concepts and related hardware to enhance weapon system lethality, survivability, agility, versatility, deployability, and affordability for defense against the future air and ground, armored and non-armored threats.

This project support efforts in the Army science and technology Ground portfolio.

Work in this project is in collaboration with PE 0602624A (Weapons and Munitions Technologies).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Aviation and Missile Research, Development, and Engineering Center (AMRDEC), Huntsville, AL.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Counter Rockets, Artillery, Mortars (RAM) Tracking and Fire Control	11.956	8.796	4.879
Description: This effort matures and demonstrates system technology to provide 360 degree, near hemispherical coverage for tracking and intercept of RAM threats. This effort determines the trajectory and location of the incoming RAM threat and feeds that information to the technical fire control node to generate a firing solution provided to the guidance section of each of the missile interceptors. Complementary work is conducted in the Technical Fire Control Technology, Guided Interceptor Technology for defense against Rockets, Artillery, and Mortars, and Hit-to-Kill Interceptor Technology for Defense against Rockets, Artillery, and Mortars efforts in PE 0603313A Project 263. These combined efforts will perform 4-8 interceptor flight demonstrations each year beginning in FY12. The technologies demonstrated will be applicable to the Indirect Fire Protection Capability (IFPC), which began the Material Solution Analysis Phase in 4QFY11.			
FY 2011 Accomplishments: Completed fabrication of the fire control system hardware and software for guided flight demonstrations of interceptors; evaluated tracking and fire control system accuracy through modeling and simulation to verify it meets the required performance; and updated the tracking and fire control system designs and system simulations based on evaluation results.			
FY 2012 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Update tracking and fire control system hardware and software designs; integrate tracking and fire control systems with technical fire control nodes to provide RAM threat state information to support live-fire guided flight demonstrations of interceptors to shoot down a single RAM threat; conduct demonstrations to verify the tracking and fire control system can detect incoming RAM threats and provide the technical fire control node with a firing solution; and update the system simulation based on flight demonstration results. ***FY 2013 Plans:*** Will finalize tracking and fire control system designs based on initial tracking testing and flight demonstrations; modify component hardware to optimize integrated performance against full range of target types; integrate updated tracking and fire control systems with technical fire control nodes to provide RAM threat state information; support multiple flight demonstrations of live-fire shoot down of single and dual RAM threat targets; and verify the system simulation based on HWIL evaluation and flight demonstration results.			
Title: Counter Rocket, Artillery, and Mortar (RAM) Interceptor Integration ***Description:*** This effort integrates technologies from Defense against RAM, PE 0603313A Project 263 and performs system-level Hardware-in-the-Loop (HWIL) evaluation to verify system performance. ***FY 2011 Accomplishments:*** Supported system-level HWIL evaluation. Integrated technologies for two missile concept designs to perform guided flight demonstrations against single RAM threats.	0.502	-	-
Accomplishments/Planned Programs Subtotals	12.458	8.796	4.879

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

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COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
G03: *Area Defense Advanced Technology*	11.654	9.984	5.054	-	5.054	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates Deployable Force Protection missile technology for small command outposts and air defense missile technology to protect against: unmanned aerial vehicles, rotary wing aircraft large caliber rockets, and cruise missiles as well as expands the protection envelope to a division/corps area.

This project support efforts in the Army science and technology Ground portfolio.

Work in this project is in collaboration with PE 0603734A (Combat Engineering Systems) and PE 0603125 (Combating Terrorism - Technology Development).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Aviation and Missile Research, Development, and Engineering Center (AMRDEC), Huntsville, AL.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Air Defense Advanced Technology	2.010	-	-
Description: This effort matures and demonstrates missile technology to provide capability for Warfighter force protection against low and slow flying air vehicle threats in all environments without increasing the force structure. This effort leverages activities from PE 0602303A, project 214. ***FY 2011 Accomplishments:*** Continued design and demonstration of critical components; and integrated and demonstrated an air defense system capability in a relevant environment.			
Title: Deployable Force Protection Missile Technology	9.644	9.984	5.054
Description: This effort demonstrates affordable missile technology to provide force protection for smaller forward operating bases (FOBs). This effort will integrate existing and developmental missile technology and design novel fire control, guidance, and control systems to use missiles in a force protection role. ***FY 2011 Accomplishments:***			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Demonstrated missile system technologies for affordable effects to provide area protection for smaller FOBs; designed guidance, control, actuation, and propulsion technology to enable 360 degree protection; and designed fire control systems to provide 360 degree protection to a re-configurable protected area using multiple missiles and launchers. ***FY 2012 Plans:*** Integrate missile component technologies into missile systems; integrate missile system with the fire control systems; demonstrate missile and fire control systems individually and evaluate performance of the combined systems. ***FY 2013 Plans:*** Will complete integration of missile systems with fire control technologies to demonstrate an integrated base protection system; and conduct demonstration of integrated fire control, missile systems, sensor systems, and other systems in a base protection role.			
Accomplishments/Planned Programs Subtotals	11.654	9.984	5.054

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603322A: *TRACTOR CAGE*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	9.661	10.299	10.902	-	10.902	11.083	11.099	11.271	11.381	Continuing	Continuing
B92: *DB92*	9.661	10.299	10.902	-	10.902	11.083	11.099	11.271	11.381	Continuing	Continuing

A. Mission Description and Budget Item Justification

The details of this program are reported in accordance with Title 10, United States Code, Section 119(a)(1).

B. Program Change Summary ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
Previous President's Budget	9.986	10.315	10.806	-	10.806
Current President's Budget	9.661	10.299	10.902	-	10.902
Total Adjustments	-0.325	-0.016	0.096	-	0.096
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	0.096	-	0.096
• Other Adjustments 1	-0.325	-0.016	-	-	-

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APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603322A: *TRACTOR CAGE*	PROJECT B92: *DB92*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
B92: *DB92*	9.661	10.299	10.902	-	10.902	11.083	11.099	11.271	11.381	Continuing	Continuing

Note

Not Applicable

A. Mission Description and Budget Item Justification

The details of this program are reported in accordance with Title 10, United States Code, Section 119(a)(1).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: .	9.661	10.299	10.902
Description: .			
FY 2011 Accomplishments:			
.			
FY 2012 Plans:			
.			
FY 2013 Plans:			
.			
Accomplishments/Planned Programs Subtotals	9.661	10.299	10.902

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603461A: *HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	-	227.790	180.582	-	180.582	180.662	181.609	182.473	183.914	Continuing	Continuing
DS7: *HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM*	-	227.790	180.582	-	180.582	180.662	181.609	182.473	183.914	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program element (PE) demonstrates and provides high performance computing hardware, parallel software, wide area networking services, and expertise that enable the Department of Defense (DoD) Research, Development, Test, and Evaluation (RDT&E) community to investigate and understand physical phenomena and behavior of systems through large scale computational simulation. DoD users of these services work in a diverse variety of science and technology areas including structural mechanics, fluid dynamics, material science, chemistry, biology, electromagnetics and acoustics, weather, ocean modeling, signal/image processing, forces modeling and simulation, environmental quality, electronics/networking/systems/C4I, and space and astrophysical sciences. The computational expertise and resources (massively parallel, networked, multi-core computers, advanced software applications and secure connectivity) provided by this Program enable DoD researchers and engineers to analyze complex problems and phenomena and develop novel solutions using state-of-the-art, physics-based and discrete event simulations. The combined capabilities of the HPC centers and the Defense Research and Engineering Network (DREN) enable massive calculations to be completed more efficiently and at reduced cost than if each DoD research organization were to duplicate the necessary resources. For example, DoD personnel use High Performance Modernization Program (HPCMP) resources to do such things as improve the performance of manned and unmanned aircraft, validate design concepts and establish expected performance of new armor and penetrator designs, speed the development of new ship designs, and demonstrate the viability of weapons systems performance. The HPCMP supports the requirements of DoD scientists and engineers in three major areas of effort: DoD Supercomputing Resource Centers (DSRCs), the Defense Research and Engineering Network (DREN), and support for software applications. Dedicated HPC project investments (DHPIs) augment the DSRCs to form the total HPCMP computational capability. In 2011 the HPCMP provided approximately 1.4 billion processor hours to a user community representing requirements from all three services and the agencies of the DoD. The bulk of this capability is provided via 14 supercomputers (including systems for classified processing) located in the 5 DSRCs across the country providing a total of approximately 180,000 processors and 1.8 quadrillion floating point operations per second (1.8 petaFLOPS). DoD users store their results in 16 petabytes (16,000,000,000,000 bytes) of storage archival distributed across the centers and duplicated for backup (for a total storage capability of 32 petabytes). The DREN interconnects HPCMP resources and users nationwide via a research infrastructure that provides an aggregate network capacity of 25 billion bits per second to 36 user sites, 5 DSRCs, and 4 smaller affiliated resource centers (ARCs). Individual user site speeds range from 45 to 622 million bits per second, ARC speeds range from 155 to 2488 million bits per second, and DSRC speeds range from 622 to 3110 million bits per second. Mission-critical DoD applications across the spectrum of DoD activities are supported by the software component of the Program through training in advanced computational methods, the development of productive application development environments, tools, and methodologies, and through the direct provision of computational scientists and engineers to improve the performance, accuracy, and relevance of physics-based computational models.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army	DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603461A: *HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM*

The HPCMP transferred from the Office Secretary of Defense to the Department of the Army in FY12.

B. Program Change Summary ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
Previous President's Budget	-	183.150	183.150	-	183.150
Current President's Budget	-	227.790	180.582	-	180.582
Total Adjustments	-	44.640	-2.568	-	-2.568
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	45.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-2.568	-	-2.568
• Other Adjustments 1	-	-0.360	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603461A: *HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM*	PROJECT DS7: *HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
DS7: *HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM*	-	227.790	180.582	-	180.582	180.662	181.609	182.473	183.914	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project enables the Defense research, development, test and evaluation (RDT&E) community to resolve critical scientific and engineering problems more quickly, and with more precision, using advanced, physics-based computer simulation supported by high performance computing (HPC) technology. The computational expertise and resources enable DoD personnel to analyze phenomena that are often impossible, not cost effective, too time-consuming, or too dangerous to study any other way. The High Performance Modernization Program (HPCMP) supports the requirements of the DoD's scientists and engineers in three major areas of effort: supercomputing resource centers, the Defense Research and Engineering Network (DREN), and support for software applications. DoD Supercomputing Resource Centers (DSRCs) provide extensive capabilities and demonstrate new technologies that address user requirements for hardware, software, and programming environments. Efforts of the DSRCs are augmented by dedicated HPC project investments (DHPIs) that address near real-time and real-time HPC requirements. The total aggregate computational capability is roughly 1.8 quadrillion floating point operations per second (1.8 petaFLOPS); this capability is expected to double by 2013. All sites in the HPC Modernization Program are interconnected to one another, the user community, and major defense sites via the DREN, a research network which matures and demonstrates state of the art computer network technologies. The DREN interconnects 45 user and center sites at network speeds of up to 3 gigabits per second. The Software Application Support (SAS) effort optimizes and improves the performance of critical common DoD applications programs to run efficiently on advanced HPC systems, matures and demonstrates leading-edge computational technology from academic and commercial partners, and provides collaborative programming environments.

Work in this project supports the Army S&T Enduring Portfolio.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

The HPCMP transferred from the Office Secretary of Defense to the Department of the Army in FY12.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Department of Defense (DoD) Supercomputing Resource Centers (DSRCs)	-	91.395	92.494
Description: The program supports DoD Supercomputing Resource Centers (DSRCs) that are responsible for as large a fraction of DoD's science and technology and test and evaluation computational workload as feasible. Dedicated HPC project investments (DHPIs) support a one-time need and have no legacy within the HPC Modernization Program. DHPIs address critical			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603461A: *HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM*	PROJECT DS7: *HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
HPC requirements that cannot be met at DSRCs, such as real-time, and near real-time computing requirements, and leverage significant HPC and mission expertise located at these remote sites. ***FY 2012 Plans:*** Support five DoD Supercomputing Resource Centers (DSRCs) and will award two to five competitive Dedicated HPC project investments (DHPIs). This effort was formerly under PE 0603755D8Z- HPCMP. ***FY 2013 Plans:*** Will provide advanced storage, supercomputing, and analysis capabilities to DoD S&T community via five DoD Supercomputing Resource Centers (DSRCs) and through the award of one or more competitive dedicated HPC project investments (DHPIs). It is expected that by 2013 program will provide approximately 3.2 billion processor hours and over 3.5 quadrillion floating point operations per second in aggregate. This increase in computing capability will be supported by an expected increase in storage capability to over 60 petabytes (60,000,000,000,000 bytes). This expansion in computational capacity will be supported by advanced computational expertise that will ensure the resources are available and configured to support the DoD's most challenging problems, provide analysis of the massive and complex datasets resulting from the simulations, and develop optimized applications for rapidly evolving computer technology.			
Title: Networking ***Description:*** The Defense Research and Engineering Network (DREN) provides wide area network (WAN) connectivity among the Department's science and technology (S&T) and test and evaluation (T&E) communities via a research network. The DREN matures and demonstrates new communications technologies of relevance to DoD users, and provides the computer and network security for the HPCMP. ***FY 2012 Plans:*** Provide network services to link all elements of the program and operation of security systems and enhancements. Continue collaborative work with the federal networking community and standards associations will continue to assure that the Defense Research and Engineering Network (DREN) will remain compatible with future technology change. This effort was formerly under PE 0603755D8Z- HPCMP. ***FY 2013 Plans:*** Will provide an advanced network platform (DREN) and mature new high performance communications and data security technologies and enable advanced computational simulations and data analysis for users in both the S&T and T&E communities with new capabilities in excess of 3 Gbps network bandwidth provided on the highest bandwidth links. Will lead and partner	-	28.862	31.265

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603461A: *HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM*	PROJECT DS7: *HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
in efforts within the federal networking community to ensure that DoD users remain ready to take advantage of anticipated technology change.			
Title: Software Applications ***Description:*** Software Applications provide for the adaptation of broadband, widely used applications and algorithms to address research, development, test and evaluation (RDT&E) requirements; continued training of users as new system designs and concepts evolve. Continue interaction with the national high performance computing (HPC) infrastructure, including academia, industry, and other government agencies to facilitate the sharing of knowledge, tools, and expertise. ***FY 2012 Plans:*** Computational Research and Engineering Acquisition Tools and Environments (CREATE): will continue development of supercomputer-based engineering design and test tools to improve the acquisition process for major weapons systems across the DoD; will continue development efforts in software programs will continue to mature as other projects are completed, and others begun with a greater emphasis on engineering applications. Software Institutes: will continue to develop shared scalable applications to exploit scalable HPC assets. Academic Outreach Program: will continue be supported to encourage and support computational science in universities across the United States. Programming Environments and Training (PETTT): will continue to provide computational and computer science support to the DoD HPC user community through interaction and collaborative projects with academic and industrial partners; this effort will be adjusted as the program is re-focused. This effort was formerly under PE 0603755D8Z- HPCMP. ***FY 2013 Plans:*** Computational Research for Engineering and Science (CRES): Will provide focused resources to accelerate S&T results in high-priority DoD mission areas through development of advanced software applications, algorithms, and computational technology. Software Institutes: will continue to develop shared scalable applications of critical mission importance to exploit scalable HPC assets; examples include the Blast Protection for Platforms and Personnel effort requested by the Secretary of Defense. New projects will be selected competitively based on then-current DoD needs. Programming Environments and Training (PETTT): will pursue targeted, competitively-selected computational and computer science activities on behalf of the DoD HPC user community with academic and industrial partners that support then-current DoD mission needs. Examples include training in the latest computational technologies and techniques for the DoD scientific computing community as well as focused projects to transition newly-developed technologies out of the university environment into the DoD RDT&E community.	-	62.533	56.823
Title: Congressional Increase ***Description:*** Congressional increase for the High Performance Computing Modernization Program. ***FY 2012 Plans:***	-	45.000	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603461A: *HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM*	PROJECT DS7: *HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Modernizing supercomputing center compute, management, and infrastructure capabilities to expand prior investments in energy efficient computing; Enhancing network security posture and enhanced network architecture through targeted R&D investigations; Expanding activities in support of development of supercomputer-based engineering design and test tools targeted at DoD acquisitions and expanding funding for computational and computer science support to the DoD HPC user community.			
Accomplishments/Planned Programs Subtotals	-	227.790	180.582

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603606A: *Landmine Warfare and Barrier Advanced Technology*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	26.089	31.491	27.204	-	27.204	28.738	30.608	32.306	34.351	Continuing	Continuing
608: *COUNTERMINE & BAR DEV*	21.320	26.488	24.684	-	24.684	26.025	26.518	27.726	28.872	Continuing	Continuing
683: *Area Denial Sensors*	4.769	5.003	2.520	-	2.520	2.713	4.090	4.580	5.479	Continuing	Continuing

Note

FY 13 funding realigned to higher priority efforts

A. Mission Description and Budget Item Justification

This program element (PE) matures components, subsystems and demonstrates sensor and neutralization technologies that can be used by dismounted forces and on ground and/or air platforms to detect, identify and then mitigate the effects of landmines, minefields, other explosive hazards and obstacles. This PE also conducts modeling and simulation activities to assess the effectiveness of detection and neutralization concepts. Project 608 supports the maturation and demonstration of enabling component and subsystems for counter explosive hazards and countermine technologies in the areas of countermine and barrier development, and Project 683 funds efforts on area denial sensors.

Work in this PE is fully coordinated with PE 0602120A (Sensors and Electronic Survivability), PE 0602622A (Chemical, Smoke and Equipment Defeating Technology, PE 0602624A (Weapons and Munitions Technology), PE 0602712A (Countermine Systems), PE 0602784A (Military Engineering Technology), PE 0603004 (Weapons and Munitions Advances Technologies) and PE 0603710A (Night Vision Advanced Technology).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work in this PE is performed by the Army Research, Development, and Engineering Command (RDECOM)/Communications-Electronics Research, Development, and Engineering Center (CERDEC), Fort Belvoir, VA.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army					DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*		R-1 ITEM NOMENCLATURE PE 0603606A: *Landmine Warfare and Barrier Advanced Technology*			
B. Program Change Summary ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**
Previous President's Budget	26.953	31.541	31.566	-	31.566
Current President's Budget	26.089	31.491	27.204	-	27.204
Total Adjustments	-0.864	-0.050	-4.362	-	-4.362
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.629	-			
• Adjustments to Budget Years	-	-	-4.362	-	-4.362
• Other Adjustments 1	-0.235	-0.050	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603606A: *Landmine Warfare and Barrier Advanced Technology*	PROJECT 608: *COUNTERMINE & BAR DEV*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
608: *COUNTERMINE & BAR DEV*	21.320	26.488	24.684	-	24.684	26.025	26.518	27.726	28.872	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates counter explosive hazard technologies for finding and neutralizing surface and buried threats in varying vegetation, soil, weather, and diurnal conditions. Activities include remote/standoff detection of individual explosive hazards and minefields and neutralization of explosive threats, landmines, and minefields. This project also evaluates airborne explosive hazard detection sensors and fabricates them for lightweight plug-and-play use, on manned and Unmanned Aerial Systems (UASs) in mission specific applications. Efforts are supported by modeling and simulation assessments to define potential system effectiveness.

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

This project supports Army science and technology efforts in the Ground, Soldier, Air and Command Control and Communications portfolios.

Work in this project is performed by the Army Research, Development, and Engineering Command (RDECOM)/Communications-Electronics Research, Development, and Engineering Center (CERDEC), Ft. Belvoir, VA. Minefield neutralization efforts are closely coordinated with Navy/US Marine Corps.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Threat Detection and Neutralization for Route Clearance: ***Description:*** This effort demonstrates capabilities to detect and neutralize surface and shallow buried threats on primary and secondary roads from tactical standoff ranges. ***FY 2011 Accomplishments:*** Completed fabrication of prototypes for the standoff detection and standoff neutralization grenade technologies; performed tests and conducted demonstrations of the brassboards for the standoff detection and standoff neutralization grenade technologies as systems-of-systems concepts. ***FY 2012 Plans:*** Conduct trade studies to establish system level options for neutralization of individual explosive devices and for mine fields; validate emerging high energy laser techniques to neutralize individual explosive hazards; substantiate evolving burst laser techniques to neutralize threats detected by primary sensors.	10.035	8.418	-
Title: Explosive Hazard Detection for Manned and Unmanned Aerial Systems (Previously titled: Mine and Minefield Detection Payload for Tactical Unmanned Aerial Systems (TUAS)):	4.886	8.360	8.210

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603606A: *Landmine Warfare and Barrier Advanced Technology*	PROJECT 608: *COUNTERMINE & BAR DEV*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Description: This effort utilizes lessons learned from the Threat/Mine Detection for In Road Obstacles to provide manned and unmanned aerial systems (UASs) the capability to detect explosive threats, threat deployment activities, minefields and Home Made Explosives (HME). ***FY 2011 Accomplishments:*** Completed demonstrator payload build and sensor integration; completed laboratory evaluation of payload; integrated payload on a manned aircraft; conducted initial flight testing in a relevant environment to baseline payload and target detection performance; completed the payload and began testing to verify performance. ***FY 2012 Plans:*** Integrate shortwave infrared (SWIR) into initial payload and integrate the payload on a manned aircraft; complete baseline aided target recognition (AiTR) integration and conduct initial flight testing in a relevant environment to baseline payload and AiTR detection performance; optimize payload from test data, perform final verification testing, specify and initiate build of a 3-band longwave infrared (LWIR) demonstrator; perform system design trade studies; conduct concept evaluation exercise with representative sensors. ***FY 2013 Plans:*** Will fabricate and integrate a specialized sensor meeting size, weight, and power (SWaP) requirements for the Pointer Upgraded Mission Ability (PUMA) small unmanned aerial vehicle (SUAV); mature and integrate baseline algorithm and threat cueing approaches.			
Title: Threat/Mine Detection for In Road Obstacles: ***Description:*** This effort advances ground penetrating radar (GPR) and metal detection (MD) technologies integrated onto vehicles to detect the evolving underbelly threats on primary and secondary roads. This effort leverages the technology results from forward looking radar technology investigations under the Threat Detection and Neutralization for Route Clearance effort. ***FY 2011 Accomplishments:*** Completed fabrication of system demonstrators for the integrated Metal Detection (MD)/Ground Penetrating Radar (GPR) detection technologies; performed tests and conducted demonstrations of a MD/GPR system on a manned ground vehicle. ***FY 2012 Plans:*** Perform SWaP analysis and system tradeoff studies for potential sensor payloads for the Pointer Upgraded Mission Ability Unmanned Aerial Vehicle (PUMA UAV) and evaluate complimentary sensors for a ground-based platform; design a 3-band imaging sensor compatible with a forward motion compensation pointer; evaluate aided target recognition approaches for	6.399	9.710	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603606A: *Landmine Warfare and Barrier Advanced Technology*	PROJECT 608: *COUNTERMINE & BAR DEV*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
compatibility with selected sensors; conduct concept evaluation exercises of representative air and ground-based sensors using mission scenarios in a relative environment.			
Title: Ground Vehicle Explosive Hazard Detection ***Description:*** Current Ground Penetrating Radar (GPR) capabilities for detection of emerging low metal and other low contrast explosive threats in an electronic warfare environment are limited by radar receiver technology and detection latency. This project improves capabilities to detect buried Improvised Explosive Devices (IEDs) and antitank landmines and enhances Rate of Advance (RoA) by improving detection and reducing false alarm rates through improving signal to noise and acquisition rate, which reduce susceptibility to electromagnetic interference, and improving the interoperability with electronic countermeasures. This effort leverages the technology results from forward looking radar technology investigations under the Threat Detection and Neutralization for Route Clearance effort and Threat/Mine Detection for In road Obstacles. ***FY 2013 Plans:*** Will fabricate a ground vehicle based, three-band infrared sensor prototype and integrate onto a representative route clearance patrol vehicle; implement baseline algorithm and threat cueing approaches. Will conduct bench-level tests and collect initial field data with the first multi-channel prototype digital GPR receiver array; incorporate technical improvements into the GPR design; build and begin evaluation of a full size four-panel GPR array; begin maturation of new target detection algorithms.	-	-	13.474
Title: Dismounted Explosive Hazard Detection ***Description:*** This effort matures, fabricates and evaluates lab demonstrators based on two different technologies to improve dismounted forces' capability to detect IEDs and landmines. This effort develops an illumination capability and modifies target detection algorithms for integration into current prototype digital goggles. This will be a helmet mounted capability to aid the dismounted forces as they execute route clearance missions by improving detection of command initiation wires, trip wires, and indicators of IED emplacement such as disturbed earth. A next generation handheld explosive hazard detector technology will also be developed and matured with improved IED detection capabilities and SWaP characteristics. The next generation handheld detector technology may be inserted into the current AN/PSS-14 Mine Detector as an upgrade or may be a new handheld detector. ***FY 2013 Plans:*** Will conduct a forward operational assessment with the modified digital goggle demonstrators integrated during the Threat/ Mine Detection for In Road Obstacles project; collect field data, evaluate performance and address Soldier feedback for additional hardware and detection algorithm development. Will integrate novel hand held GPR and wideband metal detectors into demonstrators for data collections and explosive hazard detection algorithm improvements.	-	-	3.000
Accomplishments/Planned Programs Subtotals	21.320	26.488	24.684

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603606A: *Landmine Warfare and Barrier Advanced Technology*	PROJECT 608: *COUNTERMINE & BAR DEV*

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603606A: *Landmine Warfare and Barrier Advanced Technology*	PROJECT 683: *Area Denial Sensors*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
683: *Area Denial Sensors*	4.769	5.003	2.520	-	2.520	2.713	4.090	4.580	5.479	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates surveillance, command and control technology components for alternative area protection systems that minimize the risk of injury or loss to non-combatants from exposure to anti-personnel landmines (APLs). The technology includes distributed personnel surveillance systems and command and control systems to be used with man-in-the-loop overwatch fires. This project uses modeling and simulation to evaluate new concepts and modify doctrine. This project also fabricates components, as well as system architectures and conducts evaluations at the system level in field settings.

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

This project supports Army science and technology efforts in the Ground and Command Control and Communications portfolios.

Work in this project is performed by the Army Research, Development, and Engineering Command (RDECOM)/Communications-Electronics Research, Development, and Engineering Center (CERDEC), Fort Belvoir, VA.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Area Denial Sensors:	4.769	5.003	2.520
Description: This effort provides demonstration of surveillance technology components for area protection systems that minimize the risk of injury or loss to non-combatants from exposure to anti-personnel landmines (APLs).			
FY 2011 Accomplishments: Fabricated sensor hardware and integrated algorithms into demonstrators; conducted initial laboratory tests in a simulated relevant environment of next generation sensor and discrimination system.			
FY 2012 Plans: Continue the maturation and demonstration of the personnel detection system in an operationally relevant environment; validate the detection system components and sensor algorithm for the sensor detection and discrimination of combatants/non-combatants, and image processing for false alarm reduction.			
FY 2013 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603606A: *Landmine Warfare and Barrier Advanced Technology*	PROJECT 683: *Area Denial Sensors*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Will demonstrate a remote low power infrared system to search and track personnel with 360 degree coverage; extend these algorithms and sensors to vehicle detection and track; develop a cued day/night imaging sensor system with algorithms for automated detection and image capture.			
Accomplishments/Planned Programs Subtotals	4.769	5.003	2.520

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603607A: *JOINT SERVICE SMALL ARMS PROGRAM*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	8.236	7.674	6.095	-	6.095	6.235	7.915	6.500	7.173	Continuing	Continuing
627: *JT SVC SA PROG (JSSAP)*	8.236	7.674	6.095	-	6.095	6.235	7.915	6.500	7.173	Continuing	Continuing

Note

FY 13 funding realigned to higher priority efforts.

A. Mission Description and Budget Item Justification

This program element (PE) matures and demonstrates advanced technologies that integrate into individual and crew served weapons for all Services. All work is done under the Joint Service Small Arms Program (JSSAP) (Project 627) and are based upon the Joint Service Small Arms Master Plan (JSSAMP) and the Joint Capabilities Integration Development System's Small Arms Analyses. This PE also supports the maturation and demonstration of Lightweight Small Arms Technologies (LSAT) which offers significantly reduced weight over the currently fielded weapons and ammunition .

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy.

Work in this PE is performed by the US Army Armament Research, Development, and Engineering Center (ARDEC), Picatinny Arsenal, NJ.

B. Program Change Summary ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total
Previous President's Budget	9.151	7.686	7.576	-	7.576
Current President's Budget	8.236	7.674	6.095	-	6.095
Total Adjustments	-0.915	-0.012	-1.481	-	-1.481
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.236	-			
• Adjustments to Budget Years	-	-	-1.481	-	-1.481
• Other Adjustments 1	-0.679	-0.012	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603607A: *JOINT SERVICE SMALL ARMS PROGRAM*	PROJECT 627: *JT SVC SA PROG (JSSAP)*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
627: *JT SVC SA PROG (JSSAP)*	8.236	7.674	6.095	-	6.095	6.235	7.915	6.500	7.173	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates advanced technologies that provide greater lethality, target acquisition, fire control, training effectiveness and range at a significantly reduced weight. These technologies lighten the Soldier's load, provide improved battlefield mobility, and reduce logistics burden while maintaining or improving current levels of performance.

Efforts in this program element support the Soldier Science and Technology portfolio.

Work in this PE is related to and fully integrated with the efforts funded in PE 0602623A (Joint Service Small Arms Program) and PE 0602624A (Weapons and Munitions Technology).

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the US Army Armament Research, Development, and Engineering Center (ARDEC), Picatinny Arsenal, NJ.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Lightweight Small Arms Systems (LSAS)	6.482	-	-
Description: This effort demonstrates caseless and case telescoped ammunition technologies for specific weapon systems and missions with goals to reduce the weapon and ammo weight, and to reduce training and maintenance costs. Cased telescoped ammunition is a 100% polymer cylindrical shaped case, inside of which are the projectile (i.e., telescoped inward) and the propellant, with a standard mechanical primer located at the base. The caseless cartridge also uses a telescoped bullet arrangement. A specialized High Ignition Temperature Propellant (HITP) provides not only the propulsive energy, but also serves as the cartridge structure and exterior surface. ***FY 2011 Accomplishments:*** Took delivery of lightweight machine guns and cased telescoped ammunition to conduct TRL 6 demonstration of tech maturity and military utility; achieved TRL 6 for cased-telescoped ammunition fired from light machine guns; fabricated and evaluated riflescope demonstrator with adaptive zoom lens on lightweight machine gun; conducted TRL 5 demonstration of lightweight cased telescoped carbine.			
Title: Small Arms Technology Assessment and Effectiveness Modeling	1.754	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603607A: *JOINT SERVICE SMALL ARMS PROGRAM*	PROJECT 627: *JT SVC SA PROG (JSSAP)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Description: This task addresses the application of technology component solutions to mitigate identified capability gaps in the JSSAP strategy. ***FY 2011 Accomplishments:*** Matured and optimized force-on-force simulations based on results of small arms demonstrations.			
Title: Small Arms Weapons and Fire Control Integration ***Description:*** The best breadboard concepts from the Advanced Fire Control Technology for Small Arms (0602623A/H21) will be integrated into lab demonstrators and evaluated on relevant current (M4, M16, M249, M240) and developmental small arms systems to optimize affordability, target acquisition, fire control, weight, and lethality. Project transitions to Project Manager Soldier Weapons (PM SW). ***FY 2012 Plans:*** Mature dynamic target tracking and range finding, as well as adaptive polymer zoom lens technologies; demonstrate power distribution/sourcing technologies in an integrated weapon and fire control prototype; mature and demonstrate integrated thermal management small arms weapon technologies such as graphite foam and heat pipes. ***FY 2013 Plans:*** Will mature and demonstrate improvements to target tracking and range determination component technologies and algorithms; integrate subcomponents into realistic fire control system envelope; use modeling and simulation to evaluate system level effectiveness; will use results to assist in selection of best systems.	-	3.841	2.519
Title: Small Arms Grenade Munitions Integration and Evaluation ***Description:*** The best breadboard concepts from the Advanced Lethality Armament Technology for Small Arms (0602623A/H21) project will be integrated into a 40mm ammunition prototype and evaluated on current (M203, M320, and M32 40mm grenade launchers) small arms systems to optimize affordability, effects and lethality. Project transitions to Project Manager Maneuver Ammunition Systems (PM MAS). ***FY 2012 Plans:*** Demonstrate advanced lethality concepts, including course correction, as well as enhanced fragmentation/directionality technologies; integrate and demonstrate recoil mitigation technologies. ***FY 2013 Plans:*** Will integrate alternate fuze detonation modes into the smaller modified MK550 fuze to improve initiation location and improve Probability of Incapacitation (P(I)) against threat personnel in defilade; integrate smart fuze and sensors into 40mm low velocity	-	3.833	3.576

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603607A: *JOINT SERVICE SMALL ARMS PROGRAM*	PROJECT 627: *JT SVC SA PROG (JSSAP)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
grenades for demonstration; assess performance improvement results to assist in selection of best systems; transition fuze design improvements to PM-MAS.			
Accomplishments/Planned Programs Subtotals	8.236	7.674	6.095

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603710A: *NIGHT VISION ADVANCED TECHNOLOGY*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	71.723	42.348	37.217	-	37.217	39.257	43.136	43.393	44.042	Continuing	Continuing
K70: *NIGHT VISION ADV TECH*	30.790	25.727	21.760	-	21.760	22.901	25.508	25.534	25.882	Continuing	Continuing
K73: *NIGHT VISION SENSOR DEMONSTRATIONS (CA)*	23.100	-	-	-	-	-	-	-	-	Continuing	Continuing
K86: *NIGHT VISION, ABN SYS*	17.833	16.621	15.457	-	15.457	16.356	17.628	17.859	18.160	Continuing	Continuing

Note

FY 11 Increase attributed to Congressional addition of 23.1 million of Overseas Contingency Operations (OCO) funding for Aviation Night and Limited Visibility Sensor Demonstration

A. Mission Description and Budget Item Justification

This program element (PE) matures and demonstrates sensor technologies that increase Warfighter survivability and lethality by providing sensor capabilities to acquire and engage targets at longer ranges in complex environments and operational conditions (e.g. day/night, obscured, smoke, adverse weather). Project K70 pursues technologies that improve the Soldier's ability to see at night, provide rapid wide area search, multispectral aided target detection (AiTD), and enable passive long range target identification (ID beyond threat detection) in both an air and ground test-beds. Project K86 matures and evaluates sensors and algorithms designed to detect targets (vehicles and personnel) in camouflage, concealment and deception from airborne platforms, and provides pilotage and situational awareness imagery to multiple pilots/crew members independently for enhanced crew/aircraft operations in day/night/adverse weather conditions.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work in this PE is fully coordinated with efforts in PE 0602120A (Sensors and Electronic Survivability), PE 0602270A (Electronic Warfare Technology), PE 0602709A (Night Vision and Electro-Optics Technology), PE 0602712A (Countermine Systems), PE 0603001A (Warfighter Advanced Technology), PE 0603003A (Aviation Advanced Technology), PE 0603005A (Combat Vehicle and Automotive Advanced Technology), PE 0603606A (Landmine Warfare and Barrier Advanced Technology), PE 0603774A (Night Vision Systems Advanced Development) and PE 0604710A (Night Vision Systems Engineering Development).

Work in this PE is performed by the Army Research, Development, and Engineering Command (RDECOM)/Communications-Electronics Research, Development, and Engineering Center (CERDEC)/Night Vision and Electronic Sensors Directorate (NVESD), Fort Belvoir, VA.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army					DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*		R-1 ITEM NOMENCLATURE PE 0603710A: *NIGHT VISION ADVANCED TECHNOLOGY*			
B. Program Change Summary ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**
Previous President's Budget	39.912	42.414	40.727	-	40.727
Current President's Budget	71.723	42.348	37.217	-	37.217
Total Adjustments	31.811	-0.066	-3.510	-	-3.510
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	23.100	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	9.997	-			
• SBIR/STTR Transfer	-0.941	-			
• Adjustments to Budget Years	-	-	-3.510	-	-3.510
• Other Adjustments 1	-0.345	-0.066	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603710A: *NIGHT VISION ADVANCED TECHNOLOGY*	PROJECT K70: *NIGHT VISION ADV TECH*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
K70: *NIGHT VISION ADV TECH*	30.790	25.727	21.760	-	21.760	22.901	25.508	25.534	25.882	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates high-performance integrated sensor/multi-sensor technologies to increase target detection range, extend target identification range, and reduce target acquisition (TA) timelines for dismounted Soldiers and tactical vehicles against threats that are beyond today's detection ranges or are partially obscured by terrain, weather or other features.

This project supports Army science and technology efforts in the Command Control and Communications, Ground, Air and Soldier Portfolios.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology focus areas and the Army Modernization Strategy.

Work in this project is performed by the Army Research, Development, and Engineering Command (RDECOM)/Communications-Electronics Research, Development, and Engineering Center (CERDEC) /Night Vision and Electronic Sensors Directorate (NVESD), Fort Belvoir, VA.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Weapon Sight Technology	15.359	7.774	3.000
Description: This effort develops, integrates and demonstrates critical components for the next generation of weapon sight systems for mounted and dismounted Soldier use to provide improved actionable intelligence and the tools to assist in recognizing and identifying friend or foe.			
FY 2011 Accomplishments: Continued Optical Augmentation (OA) hardware prototype integration for demonstration and user evaluation from multiple sources; began phase II weapon sight prototype hardware integration of down-selected configurations for dismounted and crew served applications; matured and demonstrated enhancement in Soldier situational awareness through increased target detection and engagement technologies including small pixel, large format focal plane arrays in the longwave infrared spectrum providing smaller, lower power and better resulotution detectors; conducted laboratory tests and assessments of the weapon sight system from multiple sources.			
FY 2012 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603710A: *NIGHT VISION ADVANCED TECHNOLOGY*	PROJECT K70: *NIGHT VISION ADV TECH*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Complete Counter Surveillance System (CSS) brassboard integration; demonstrate and conduct user evaluation then transition CSS technology to Program Manager-Soldier Sensors and Lasers (PM-SSL) and PM-Stryker; complete weapon sight brassboard integration; demonstrate and conduct user evaluations of the weapon sight technology then transition the technology to PM-SSL. ***FY 2013 Plans:*** Will integrate and demonstrate Optical Augmentation (OA) hardware; complete final weapon sight integration and ruggedization for testing and evaluation; demonstrate sensor fusion integration between ultra violet (UV) and virtual pointer (VP) hardware and weapon sights for greatly enhanced target handoff during both day and night operations.			
Title: Urban Sensor Suite ***Description:*** This effort develops and integrates 360 degree closed hatch vision capability with real time acoustic and non-real time on-the-move (OTM) moving target indicator (MTI) threat detection and cueing sensors and algorithms, high resolution interrogation sensors (for slew to cue identification), improved resolution driving sensors, and high bandwidth video capture capabilities in urban operations for improved survivability, lethality. ***FY 2011 Accomplishments:*** Completed development of system architecture, hardware, and software for integrated processing of video and multiple threat detection alerts (acoustic/Moving Target Indicator (MTI)); completed integration of improved resolution driving cameras, high resolution slew to cue camera, and weapons fire detection sensors; completed maturation of software for graphical user interface with camera and sensors to assess threat detection and discrimination of imagery analysis; completed integration, maturation, and demonstration of detection systems on vehicle platform. ***FY 2012 Plans:*** Demonstrate advanced crew stations with the state of the art electro-optic indirect vision systems (high resolution threat interrogation and driving sensors, autonomous threat detection and cueing, and digital video recording and displays); complete maturation of products to include: sensor interface for target handoff and pointing to/from dismounted Soldiers, high resolution forward looking infrared, image intensified and visual sensors, threat cueing sensors and algorithms for weapons fire detection/location; develop signal processing algorithms for pixel level sensor fusion and information fusion. ***FY 2013 Plans:*** Will validate, mature and optimize hardware designs which provide high resolution persistent surveillance imagery with picture in picture capability in order to identify specific areas of interest.	11.229	8.872	2.637
Title: Tactical Ground Persistent Surveillance and Targeting (previously titled: Unmanned Tactical Ground Persistent Surveillance and Targeting)	-	4.000	5.916

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603710A: *NIGHT VISION ADVANCED TECHNOLOGY*	PROJECT K70: *NIGHT VISION ADV TECH*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Description: This effort matures and demonstrates high-performance integrated sensor/multi-sensor technologies to increase local situational awareness and target discrimination capabilities and reduce target acquisition (TA) timelines for dismounted Soldiers, combat vehicles, tactical robots, ground and urban sensors against threats that are beyond today's ranges or discrimination capabilities or are partially obscured by terrain. ***FY 2012 Plans:*** Initiate development of higher performance, lower cost advanced sensor technology and incorporate new sensors into manned and unmanned vehicles, as well as Soldier borne applications, to acquire targets at extreme ranges while reducing the size and power needs to the platform. ***FY 2013 Plans:*** Will mature large format high definition infrared (IR) focal plane arrays and model their range and resolution performance; evaluate low cost 3 vs. 4 axis stabilization systems required to operate system at 4km-5km; mature components and construct brassboard system to demonstrate radar/IR/laser Slew-to-Cue in an operational environment.			
Title: Advanced Sensors for Precision ***Description:*** This effort matures and demonstrates technologies that allow combat vehicle commanders and crewmen to detect more rapidly, identify and geo-locate threat targets to enable fire control for platform weaponry. The effort leverages advance IR imaging technology, 3-dimensional (3-D) imaging sensor techniques, and precise far target location technology to increase target detection range, extended target and reduce target acquisition timelines. ***FY 2012 Plans:*** Mature a 3-Dimensional (3-D) sensor suite with precise target acquisition technology (target identification and location); demonstrate and validate the performance of precision sensors for combat vehicle target acquisition sighting and fire control system for demonstration onboard a Heavy Brigade Combat Team (HBCT) vehicle. ***FY 2013 Plans:*** Will fabricate, optimize, evaluate and demonstrate in a relevant environment, an affordable, high definition (HD), forward looking infrared (FLIR), multi-purpose sensor for high resolution target discrimination and identification of personnel and weapon/non-weapon scenarios providing a potential upgrade in a commander's independent thermal viewer form factor; mature algorithms and validate multi-purpose sensor performance for hostile fire detection and situational awareness applications; integrate the multi-purpose HD FLIR with an ultra-violet (UV) pointer for day/night targeting handoff between mounted and dismounted personnel enabling cooperative engagement for a user evaluation in a relative environment.	-	5.081	10.207
Title: Laser Designator Technology	4.202	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603710A: *NIGHT VISION ADVANCED TECHNOLOGY*	PROJECT K70: *NIGHT VISION ADV TECH*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Description: This effort leverages US Army investments in low power laser designation technology to provide advanced lightweight target detection and call for fire capability. ***FY 2011 Accomplishments:*** Demonstrated reduced size, weight and power of the Target Location Designation System (TLDS) Azimuth & Vertical Angle Module (AVAM) that matures a far target location (FTL) technology; demonstrated the TLDS technology capabilities simultaneously in a brass-board system; evaluated the small pixel, large format uncooled midwave infrared sensor target acquisition.			
Accomplishments/Planned Programs Subtotals	30.790	25.727	21.760

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603710A: *NIGHT VISION ADVANCED TECHNOLOGY*	PROJECT K73: *NIGHT VISION SENSOR DEMONSTRATIONS (CA)*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
K73: *NIGHT VISION SENSOR DEMONSTRATIONS (CA)*	23.100	-	-	-	-	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

Overseas Contingency Operations (OCO) Congressional Interest Item funding for Night Vision advanced technology development.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Aviation Night and Limited Visibility Sensor Demonstration	23.100	-	-
Description: This is a Congressional Interest Item. ***FY 2011 Accomplishments:*** Incorporated multi-spectral sensors, helmet mounted displays, and brown-out symbology with a miniaturized on-aircraft processing capability. Built and incorporated advancing low cost cooled and uncooled mega-pixel long-wave infrared sensors to meet future affordability goals, as well as information fusion with millimeter wave-radar.			
Accomplishments/Planned Programs Subtotals	23.100	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603710A: *NIGHT VISION ADVANCED TECHNOLOGY*	PROJECT K86: *NIGHT VISION, ABN SYS*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
K86: *NIGHT VISION, ABN SYS*	17.833	16.621	15.457	-	15.457	16.356	17.628	17.859	18.160	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates intelligence, surveillance, reconnaissance, targeting, and pilotage technologies in support of the Army's aviation and networked systems. This effort focuses on improved reconnaissance, surveillance and target acquisition and night pilotage sensors, high-resolution heads-up displays, sensor fusion, and aided target recognition (AiTR) capabilities for attack, scout, cargo, and utility helicopters and unmanned aerial systems (UAS). UAS payload efforts mature and demonstrate small, lightweight, modular, payloads (electro-optical/infrared, laser radar, designator) to support target detection, identification, location, tracking, and targeting of tactical targets for the Brigade Combat Team.

The project supports Army science and technology efforts for the Air and Command Control and Communications portfolios.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Army Research, Development, and Engineering Command (RDECOM)/Communications-Electronics Research, Development, and Engineering Center (CERDEC) /Night Vision and Electronic Sensors Directorate (NVESD), Fort Belvoir, VA.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Airborne Unmanned Persistent Imaging	7.224	10.676	6.464
Description: This effort demonstrates day and night persistent surveillance imaging (PSI) and enhanced reconnaissance, surveillance, and target acquisition (RSTA) capabilities from a single payload on the Extended Range/Multi-Purpose (ER/MP) Grey Eagle, Unmanned Aerial System (UAS). Technology developed will be applied to smaller/lighter UASs as miniaturized large format sensors mature.			
FY 2011 Accomplishments: Completed step-stare and ground-based processing software; demonstrated brassboard for tracking, image compression, and scene segmentation software; and finalized designs for tiered data processing and integrated designs for the 3rd generation focal plane array.			
FY 2012 Plans: Integrate enhanced capabilities (high definition sensors and dual color infrared (midwave/longwave)) into a high definition demonstrator; complete intelligent data compression subsystem to provide persistent wide-area activity monitoring, personnel/ vehicle tracking, and enhanced reconnaissance, surveillance and target acquisition (RSTA) capabilities to include high resolution			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603710A: *NIGHT VISION ADVANCED TECHNOLOGY*	PROJECT K86: *NIGHT VISION, ABN SYS*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
target search; complete and demonstrate the 3rd generation focal plane array turret to provide the optimal infrared imaging band for prevailing battlefield conditions. ***FY 2013 Plans:*** Will conduct flight test and demonstration of enhanced RSTA and targeting capabilities with a high definition, dual-band infrared focal plane array-based turret; collect airborne imagery to support development of processing subsystem; train, test and optimize the image exploitation subsystem for persistent wide area activity monitoring.			
Title: High Definition Aviation Displays ***Description:*** This effort develops and demonstrates an advanced monocular, see-through, high definition, digital, helmet mounted display (HMD) to replace Apache's analog, cathode ray tube-based integrated helmet and display sight system (IHADSS) and provides a baseline for future aviation HMDs. ***FY 2012 Plans:*** Mature the capabilities of waveguide display optics technology; expand field-of-view and resolution through innovative optical designs, materials and advanced display technologies; begin to integrate and demonstrate the system (conduct laboratory and engineering flight tests). ***FY 2013 Plans:*** Will complete fabrication of initial engineering prototype displays with advanced monocular optics and low power miniature liquid crystal displays; demonstrate and assess key head-borne ergonomic parameters such as size and weight, center of gravity, display brightness/contrast and resolution; integrate with HGU-56P helmet; conduct laboratory performance characterization and fabricate five system demonstrators for flight testing.	-	5.945	8.993
Title: Advanced Lasers for Unmanned Aerial System (UAS) Payloads ***Description:*** This effort develops, integrates and demonstrates an advanced target acquisition and designation laser payload to satisfy the RSTA mission requirements for the Class I Unmanned Aerial System (UAS) customized to a 7 lb payload capacity. ***FY 2011 Accomplishments:*** Completed manufacture and integration of the advanced demonstrator payload brassboard sensors; characterized and flight test the payloads in a relevant environment.	5.294	-	-
Title: Multi-mode system Payloads for Enhanced Targeting	5.315	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603710A: *NIGHT VISION ADVANCED TECHNOLOGY*	PROJECT K86: *NIGHT VISION, ABN SYS*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Description: This effort demonstrates improved targeting capabilities, especially against difficult camouflage, concealment, and defilade targets, by combining the wide area search and identification capabilities of hyperspectral imaging with the 3-dimensional target identification and through foliage/camouflage capabilities of laser radar (LADAR) for target range interrogation. ***FY 2011 Accomplishments:*** Leveraged and matured mono-block laser technology to begin the development of a compact multi-function laser capable of providing standard eye-safe range-finding and LADAR laser functions; developed processor for real time hyperspectral imaging for airbourne applications.			
Accomplishments/Planned Programs Subtotals	17.833	16.621	15.457

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603728A: *Environmental Quality Technology Demonstrations*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	15.417	15.934	13.626	-	13.626	13.299	14.157	13.801	13.867	Continuing	Continuing
002: *ENVIRONMENTAL COMPLIANCE TECHNOLOGY*	2.083	4.687	2.314	-	2.314	2.274	2.798	2.313	2.272	Continuing	Continuing
025: *POLLUTION PREVENTION TECHNOLOGY*	3.527	3.712	3.720	-	3.720	3.399	3.853	4.020	4.089	Continuing	Continuing
03E: *ENVIRONMENTAL RESTORATION TECHNOLOGY*	9.807	7.535	7.592	-	7.592	7.626	7.506	7.468	7.506	Continuing	Continuing

Note

Not applicable for this item

A. Mission Description and Budget Item Justification

This program element (PE) matures and demonstrates technologies that assist Army installations in becoming environmentally compatible without compromising readiness or training critical to the success of the future force. Project 002 demonstrates tools and methods for compliance with environmental laws by control, treatment, and disposal of hazardous waste products; and conservation of natural and cultural resources while providing a realistic environment for mission activities. Project 025 demonstrates pollution prevention tools and methods to minimize the Army's use and generation of toxic chemicals and hazardous wastes. Project 03E focuses on restoration of sites contaminated with toxic and/or hazardous materials (such as unexploded ordnance) resulting from Army operations. This program demonstrates technological feasibility, assesses the technology as well as its producibility, and transitions mature technologies from the laboratory to the user. Technologies developed by this program element improve the ability of the Army to achieve environmental restoration and compliance at its installations, at active/ inactive ranges and other training lands, and at its rework as well as production facilities. Technologies demonstrated focus on reducing the cost of treating hazardous effluents and remediating Army sites contaminated by hazardous/toxic material.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy and supports the Army Strategy for the Environment.

This program is fully coordinated and complementary to PE 0602720A (Environmental Quality Technology).

Work in this PE is performed by the US Army Engineer Research and Development Center, Vicksburg, MS, and the US Army Research, Development, and Engineering Command, Aberdeen Proving Ground, MD.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army					DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*		R-1 ITEM NOMENCLATURE PE 0603728A: *Environmental Quality Technology Demonstrations*			
B. Program Change Summary ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**
Previous President's Budget	15.878	15.959	14.027	-	14.027
Current President's Budget	15.417	15.934	13.626	-	13.626
Total Adjustments	-0.461	-0.025	-0.401	-	-0.401
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.279	-			
• Adjustments to Budget Years	-	-	-0.401	-	-0.401
• Other Adjustments 1	-0.182	-0.025	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603728A: *Environmental Quality Technology Demonstrations*	PROJECT 002: *ENVIRONMENTAL COMPLIANCE TECHNOLOGY*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
002: *ENVIRONMENTAL COMPLIANCE TECHNOLOGY*	2.083	4.687	2.314	-	2.314	2.274	2.798	2.313	2.272	Continuing	Continuing

Note

Not applicable for this item

A. Mission Description and Budget Item Justification

This project matures and demonstrates technologies transitioned from PE 0602720A (Environmental Quality Technology), Projects 048 and 896, that assist Army installations in achieving environmental compliance. These technologies reduce the cost of treating hazardous effluents from Army installations, including forward operating bases, to satisfy increasingly stringent waste, wastewater and air pollutant discharge requirements. Army facilities are subject to fines and facility shutdowns for violation of federal, state, and local environmental regulations. This technology is essential to control and reduce the generation of waste to satisfy hazardous waste reduction goals and to avoid future environmental costs as well as liabilities to the Army. Efforts under this project enable the Army to reduce environmental constraints at installations while complying with the myriad of federal, state, and host country environmental regulations and policy. Technologies demonstrated also reduce the cost of resolving training noise compliance issues for the Army, avoid reductions in availability of training facilities, and sustain the viability of testing and training ranges as well as protect the critical resources, i.e., land, air, and waters of the Army.

Work in this project supports the Army S&T Enduring Portfolio.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy, and supports the Army Strategy for the Environment.

Work in this project is performed by the US Army Engineer Research and Development Center, Vicksburg, MS.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Sustainable Ranges and Lands (Previously Titled - Installation Operations)	2.083	4.687	2.314
Description: This effort provides ecosystem vulnerability assessment and ecosystem analysis, monitoring, modeling and mitigation technologies to support sustainable use of the Army's ranges and lands. This effort demonstrates environmentally safe and cost effective technologies to manage and reduce the increase in noise and pollution concerns associated with training ranges.			
FY 2011 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603728A: *Environmental Quality Technology Demonstrations*	PROJECT 002: *ENVIRONMENTAL COMPLIANCE TECHNOLOGY*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Completed integration of cell-based sensor components and initiated performance evaluation phase for field assessment of perchlorate and lead. Initiated demonstration of noise mapping software utilizing real-time meteorology to enable the Army's Operational Noise Program and Sustainable Range Program. ***FY 2012 Plans:*** Mature and demonstrate a cell-based, field portable sensor design for real time analysis to detect and quantify or evaluate toxicity of water; mature noise assessment models corrected to adequately reflect discrete noise events, local community response to training noise metrics, and continuous noise mapping software to ensure compliance. ***FY 2013 Plans:*** Will complete development, demonstration and validation of a field portable sensor for detection of hazardous and toxic compounds in water including heavy metals, perclorate and general toxicity; complete development, testing and demonstration of smart cell sensors for intracellular markers of toxicity and stress, interdigitated electrode arrays (IdEA) for measuring cell membrane integrity, and biomarker detection systems for sensing extracellular signs of damage; test and validate results using real world field samples for incorporation into final portable sensor hardware component and system design specifications.			
Accomplishments/Planned Programs Subtotals	2.083	4.687	2.314

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603728A: *Environmental Quality Technology Demonstrations*	PROJECT 025: *POLLUTION PREVENTION TECHNOLOGY*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
025: *POLLUTION PREVENTION TECHNOLOGY*	3.527	3.712	3.720	-	3.720	3.399	3.853	4.020	4.089	Continuing	Continuing

Note

Not applicable for this item

A. Mission Description and Budget Item Justification

This project matures and demonstrates pollution prevention advanced technologies required for sustainable operation of Army weapon systems, to include compliance with regulations mandated by federal, state, and local environmental and health laws. Technology thrusts under this project include demonstration of advanced technologies to enable sustainment of propellant, explosive and pyrotechnic production and maintenance facilities and training ranges through elimination or significant reduction of environmental impacts. These technologies will ensure that advanced energetic materials required for future force's high performance munitions are developed that meet weapons lethality and survivability goals and that are compliant with environmental and health laws.

Work in this project supports the Army S&T Enduring Technologies Portfolio.

The cited work is consistent with the Assistant Secretary of Defense for Research and Engineering science and technology priority focus areas and the Army Modernization Strategy and supports the Army Strategy for the Environment.

The project is fully coordinated and complementary to PE 0602720A, Project 895. This project transitions technologies developed under that PE.

Work in this project is performed by the Research, Development, and Engineering Command the Army Research Laboratory, Aberdeen Proving Ground, MD, the Armaments Research, Development, and Engineering Center, Picatinny Arsenal, NJ, and the Aviation and Missile Research, Development, and Engineering Center, Redstone Arsenal, AL in conjunction with the Army Public Health Command (Provisional), Aberdeen Proving Ground, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Pollution Prevention Technology	3.527	3.712	3.720
Description: This effort demonstrates pollution prevention advanced technologies required to sustain operation of Army weapons systems to comply with state, federal, and local environmental and health laws and regulations.			
FY 2011 Accomplishments: Rocket and Missile Propellants: developed flight-scale hardware for hydrazine and ammonium perchlorate replacement rocket motors; Conventional Ammunition: performed material qualification evaluation and assessed performance of representative			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603728A: *Environmental Quality Technology Demonstrations*	PROJECT 025: *POLLUTION PREVENTION TECHNOLOGY*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
compositions for eventual transition into an end-item; Pyrotechnics: demonstrated a perchlorate-free countermeasure in a relevant end-item. ***FY 2012 Plans:*** Rocket and Missile Propellants: finalize design of flight-scale hardware and prepare to conduct flight performance evaluation; Conventional Ammunition: refine and optimize compositions in a relevant end item; Pyrotechnics: integrate flare, delay and signal formulations into system prototypes. ***FY 2013 Plans:*** Rocket and Missile Propellants: will qualify and test lead-free propellant in 2.75-inch Hydra rocket system; Conventional Ammunition: will initiate insensitive munitions testing on environmentally benign formulation in relevant end item; Pyrotechnics: will integrate high nitrogen materials into pyrotechnic signal prototypes.			
Accomplishments/Planned Programs Subtotals	3.527	3.712	3.720

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603728A: *Environmental Quality Technology Demonstrations*	PROJECT 03E: *ENVIRONMENTAL RESTORATION TECHNOLOGY*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
03E: *ENVIRONMENTAL RESTORATION TECHNOLOGY*	9.807	7.535	7.592	-	7.592	7.626	7.506	7.468	7.506	Continuing	Continuing

Note

Not applicable for this item

A. Mission Description and Budget Item Justification

This project matures and demonstrates technologies transitioned from PE 0602720A (Environmental Quality Technology), Projects 835 and 896 that improve the Army's ability to achieve cost-effective environmental restoration and management of contamination resulting from Army training or operations at its installations, active and inactive ranges, its rework and production facilities, in operations and on the battlefield. Advanced development activities address the management/mitigation of materials released to the natural environment and residual environmental effects of military training and operations. The emphasis of this effort includes restoration of legacy materials, e.g., traditional explosives energetics, and unexploded ordinance; management of new materials, e.g., nanomaterials and emerging contaminants; and mitigation of residual impacts from implementation of sustainable technologies and processes. Technologies matured within this project enable the Army to cost effectively address current and future environmental liabilities resulting from the use of militarily relevant materials in the environment and implementation of the new family of sustainable technologies for energy production. Current and planned efforts enable the Army to efficiently characterize, evaluate, assess, and remediate soil and water at installations, ranges, facilities, and during operations in the face of changing weather and climatic conditions. Efforts also identify ways to economically comply with the myriad of federal, state, and host country regulations dealing with contaminated soil and water. A key aspect of this work is the enhancement of risk assessment and life cycle analysis techniques that can more accurately display the environmental liabilities associated with fielding new systems and technologies. This program includes pilot scale field studies to establish technological feasibility and assess performance and productivity of the risk assessment techniques.

Work in this project supports the Army S&T Enduring Technologies Portfolio.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy and supports the Army Strategy for the Environment.

Work in this project is performed by the US Army Engineer Research and Development Center, Vicksburg, MS.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Unexploded Ordnance (UXO)	2.362	2.333	1.406
Description: This effort matures and demonstrates an active range ordnance impact assessment and positioning system in relevant environments and provides technologies for automated UXO removal. This effort also develops real time detection and discrimination methodologies for unique and emerging UXO.			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603728A: *Environmental Quality Technology Demonstrations*	PROJECT 03E: *ENVIRONMENTAL RESTORATION TECHNOLOGY*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
FY 2011 Accomplishments: Completed performance characterization of UXO related range maintenance technologies; completed identification and characterization of unique and emerging UXO; completed protocols for implementation of adaptive, real time UXO detection, remediation, ordnance impact and monitoring; developed detection and discrimination methodologies for unique and emerging UXO; continued working on adaptive, real time UXO detection and remediation methodologies. ***FY 2012 Plans:*** Mature and demonstrate the active range ordnance impact assessment and positioning system in a relevant environment; continue development of real time detection and discrimination methodologies for unique and emerging UXO. ***FY 2013 Plans:*** Will mature emergent technology in smart sensors and real time assessment of UXO discrimination for enhanced range maintenance, sustainability and construction support.			
Title: Hazard/Risk Assessment Tools for Toxicity of Munitions Constituents (MCs) ***Description:*** This effort develops tools to assess hazard and risk of munitions constituents. The tools provide rapid screening assessments of existing and future military relevant compounds and allow for improved predictive risk assessment and provide environmental life cycle assessment capability. ***FY 2011 Accomplishments:*** Completed construction of a computational biology tool for predictive toxicology; defined hydraulic, biological, geophysical, and chemical models for integration into a training range environmental evaluation and characterization system; identified approaches for environmental life-cycle assessment of nanomaterials to support advanced Warfighter technologies development. ***FY 2012 Plans:*** Provide a beta-version of computational tool for predictive toxicology for user review that implements ab initio quantum chemical and molecular dynamics approaches to aid in the prediction of sorption properties of MCs and emerging contaminants; mature and demonstrate tools for rapid, standardized, and quantitative measurement of effects and toxicity from current MCs using toxicogenomics and computational biology. ***FY 2013 Plans:*** Will provide novel screening assays for neurotoxicity and reproductive toxicity, and predictive models integrated with toxicology and genomic screening protocols; continue to mature the computational tool for rapid and reliable forensic and predictive assessment of munitions constituents, providing risk evaluation capability designed to meet Army needs for proactive land management.	7.445	2.396	1.306
Title: Green Remediation Technologies	-	2.806	2.941

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603728A: *Environmental Quality Technology Demonstrations*	PROJECT 03E: *ENVIRONMENTAL RESTORATION TECHNOLOGY*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Description: This effort investigates and matures technologies to control contaminant transport in environmental media on training ranges and Army lands as well as assess and demonstrates novel detection, remediation and mitigation capabilities for depleted Uranium and other emerging contaminants on Army lands. ***FY 2012 Plans:*** Assess and mature bioreactor technologies for control of contaminant transport in soil on training ranges; assess and demonstrate novel detection capabilities for depleted Uranium on Army lands. ***FY 2013 Plans:*** Will determine effectiveness of green remediation technologies on munitions constituents and select appropriate field sites for validation; predict the effects of landscape contouring and identify optimal placement of treatment systems to ensure the selection of efficient and cost-effective treatment designs; incorporate terrestrial animal uptake values, contaminant flow in food webs, as well as the effects of stabilization and removal activities on uptake and toxicity of depleted Uranium in ecological risk assessment models.			
Title: Risk Prediction and Mitigation Technologies ***Description:*** This effort develops and demonstrates capabilities to anticipate and adapt to multiple environmental related stressors to military installations and training lands in the face of changing weather and climatic conditions ***FY 2013 Plans:*** Will mature a decision framework and screening assessment tool to evaluate multi-stressor climatic change impacts to vulnerable Army installations based on mission critical criterion.	-	-	1.939
Accomplishments/Planned Programs Subtotals	9.807	7.535	7.592

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603734A: *Military Engineering Advanced Technology*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	23.617	36.458	28.458	-	28.458	24.198	21.354	21.397	21.669	Continuing	Continuing
T08: *COMBAT ENG SYSTEMS*	23.617	36.458	28.458	-	28.458	24.198	21.354	21.397	21.669	Continuing	Continuing

Note

FY 11 decrease attributed to $3 million Congressional reduction for Deployable Force Protection

A. Mission Description and Budget Item Justification

This program element (PE) matures and demonstrates data and information architectures and software applications, as well as sensing systems, that can be used to provide Warfighters with timely, accurate, easily interpretable data and information for the operational and tactical mission environments, focusing physical and human terrain and weather; methodologies, software applications and hardware for improving ground vehicle mobility and countermobility to support ground force operations, including force projection; components, subsystems, and systems to increase the survivability of personnel, critical assets, and facilities through structures, shields, and barriers to combat highly adaptive and increasingly severe threats; and components, systems, and interoperable systems of systems for detecting threats, assessing situations, defending against threats, and communicating information and warnings for deployable force protection.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

This work is fully coordinated with and complementary to PE 0602784A (Military Engineering Technology). Deployable force protection activities are coordinated with research, development and engineering centers and laboratories across the US Army, Navy and Air Force.

Work in this PE is led, managed or performed by the US Army Engineer Research and Development Center, Vicksburg, MS.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army					DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*		R-1 ITEM NOMENCLATURE PE 0603734A: *Military Engineering Advanced Technology*			
B. Program Change Summary ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**
Previous President's Budget	27.393	36.516	30.708	-	30.708
Current President's Budget	23.617	36.458	28.458	-	28.458
Total Adjustments	-3.776	-0.058	-2.250	-	-2.250
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.557	-			
• Adjustments to Budget Years	-	-	-2.250	-	-2.250
• Other Adjustments 1	-3.000	-0.058	-	-	-
• Other Adjustments 2	-0.219	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603734A: *Military Engineering Advanced Technology*	PROJECT T08: *COMBAT ENG SYSTEMS*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
T08: *COMBAT ENG SYSTEMS*	23.617	36.458	28.458	-	28.458	24.198	21.354	21.397	21.669	Continuing	Continuing

Note

not applicable for this item

A. Mission Description and Budget Item Justification

This project matures and demonstrates software and architectures for geospatial mapping applications and decision aids for the Warfighter; components, systems, system of systems and decision aids to enable ground vehicle mobility (freedom of movement), including force projection, countermobility to impede movement of threat forces; survivability and force protection to protect personnel, facilities and assets through design and reinforcement of structures, and deployable force protection to detect, assess, and defend against threats for troops deployed at smaller bases (such as bases being compromised or overrun). Work is in support of current and future ground force operations. Software and architectures for geospatial projects mature and validate geospatial decision tools in support of operations planning and decision making to advance utility for geospatial capability and techniques across the Army, services and coalition and to advance and mature the information architecture that supports the total Army's discovery and access to data, geospatial information and analytical tool suites. Deployable Force Protection (DFP) activities are focused on filling critical gaps in protecting forces operating at smaller, remote bases and include maturation, integration, and demonstration of components, systems and systems of systems for rapidly deployable threat detection in direct line-of-site and non-line-of-site environments; situation assessment to help reduce false alarms and decrease manpower required to monitor the environment; passive protection to mitigate blasts, direct, and indirect fire effects; and active defense to suppress or eliminate threats and threat systems. Work in survivability and force protection also includes maturing and demonstrating software to characterize blast effects generated from explosive events, such as improvised explosive device detonation in soils, and support design and decision aids. Work in mobility and force projection includes maturing and demonstrating software and hardware to assess and improve freedom of movement for ground forces.

Work in this project supports the Army S&T Ground, Command, Control, Communications (C3), and Soldier Portfolios.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

This work is fully coordinated with and complementary to PE 0602784A (Military Engineering Technology). Geospatial activities are coordinated with the National Geospatial Intelligence Agency (NGA).

Work in this project is led, managed or performed by the US Army Engineer Research and Development Center, Vicksburg, MS. The work in Deployable Force Protection (DFP) is coordinated with research, development and engineering centers and laboratories across the US Army, Navy and Air Force.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Collaborative Battlespace Reasoning and Awareness (COBRA)	1.181	4.255	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603734A: *Military Engineering Advanced Technology*	PROJECT T08: *COMBAT ENG SYSTEMS*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Description: This effort develops capabilities including multi-platform, cross-community applications and software services that support the integration and synchronization of intelligence and operations functions. These capabilities enable Battle Command unification and result in faster and higher quality decision cycles through collaboration and real-time sharing, exploitation, and analysis to support the operational mission, tasks, and desired effects. ***FY 2011 Accomplishments:*** Developed multi-platform, cross-community applications and services, collaboration services, decision support tools, and Commercial/Joint Mapping Tool Kit (CJMTK) enhancements. ***FY 2012 Plans:*** Demonstrate, evaluate and validate multi-platform, cross-community applications and services for transition to users, including CJMTK.			
Title: Common Ground JCTD ***Description:*** The effort designs and develops common geospatial enterprise software components that operationally unify and extend current US and Coalition command and control data, information architectures and systems; this effort results in increased quality and agility of Service, Joint and Coalition Battle Command through Common Operating Environment Awareness. ***FY 2011 Accomplishments:*** Created a doctrinally based Coalition Operation Management Language for precision indexing to the Joint Command Control and Communications Information Exchange Data Model and geospatial products, creating commonality between command and control and simulations.	2.944	-	-
Title: Defeat of Emerging Adaptive Threats ***Description:*** This effort investigates, validates, and matures components of protective systems to combat highly adaptable and increasingly severe threats to save lives of warfighters and also increase the survivability of fixed facilities and critical assets. ***FY 2011 Accomplishments:*** Evaluated and validated novel layered protective systems, incorporating multiple defeat mechanisms for the mitigation of blast, ballistic, and debris impact effects. ***FY 2012 Plans:***	2.548	4.247	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603734A: *Military Engineering Advanced Technology*	PROJECT T08: *COMBAT ENG SYSTEMS*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Demonstrate and validate performance of novel layered protective systems under live-fire tests in realistic environments; mature components, fabricate prototypes, optimize implementation, and establish initial fielding of protective systems to defeat large-caliber rockets, vehicle born improvised explosive devices (IED), human-born IEDs, and shoulder-fired rockets.			
Title: Advanced Geospatial Tools and Architectures ***Description:*** This effort matures methods and demonstrates data, information, and software tools and architectures to bring physical and human terrain and effects data into decision frameworks for consistent and accurate implementation in the Army Geospatial Enterprise (AGE). This provides ready-access of low-overhead, light-weight, analytic tools to other services and DoD and increases situational awareness of the operational environment in support of mission planning and operations. ***FY 2013 Plans:*** Will mature and evaluate software algorithms and architectures for humanitarian assistance and disaster response, allowing military support to and incorporation of other nations and organizations into Army and DoD information computing environments; demonstrate appplications of algorithms and architectures with 100% open software and standards; mature and deliver a wiki-like software environment to obtain, authenticate, and share socio-cultural data, information and concepts; develop tools for terrain and cultural feature extraction and begin the data enterprise framework integration; develop a unified sensor coverage framework and adaptive sensor performance assessment for active and passive counter-insurgency defeat tool; mature an optimized, operational pattern analysis tool focusing on physical, social, cultural, adversarial, and friendly datasets.	-	-	3.782
Title: Deployable Force Protection Technology Integration Demonstrations and Red Teaming ***Description:*** This effort matures, integrates and demonstrates rapidly deployable threat detection, situation assessment, passive protection and active defensive technology-enabled capabilities to meet critical capability gaps for troops operating remotely at smaller bases or integrated with local communities. The needs at these smaller bases (less than 300 persons, not all U.S. troops) are unique based on constraints in transportability, manpower, organic resources, lack of hardening of structures, resupply, and training for example. Moreover, lack of interoperability and scaleability consume manpower and take away from time needed to perform missions. Threats include bases being overrun by hostiles; direct fire; rockets, artillery and mortars; and improvised explosive devices. Force protection challenges at these remote, smaller bases include providing increased standoff detection, blast and ballistic protection, and kinetic technologies subject to the constraints mentioned above. This effort begins to fill a significant gap in force protection capabilities. This work is fully coordinated with PE0602784A/T40, Deployable Force Protection; PE 0602786A; PE0603313A/G03; and PE 0603125A. Work is performed by Army, Navy, and Air Force labs and centers. ***FY 2011 Accomplishments:*** Identified critical force protection gaps and selected most promising technology enabled solutions to detect, assess, and defend assets and personnel operating at smaller, remote bases including active and passive protection; fabricated sub and full-scale	16.944	27.956	20.716

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603734A: *Military Engineering Advanced Technology*	PROJECT T08: *COMBAT ENG SYSTEMS*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
pre-prototypes for these solutions; assessed performance of selected systems in asymmetric and other relevant environments utilizing red and blue teaming; developed and validated models and software; began evaluation of integration of technologies. ***FY 2012 Plans:*** Identify critical force protection gaps and down select most promising technology enabled solutions to advance active and passive protection, detection and assessment; improve designs to reduce key factors such as size and/or weight, power and energy, manpower, and support requirements and to enhance performance of systems; integrate capabilities based on stakeholder priorities; continue to conduct full-scale demonstrations and user assessments and conduct red and blue team missions in asymmetric and other relevant environments to identify further areas for improving robustness of design and implementation and to increase systems effectiveness. ***FY 2013 Plans:*** Will complete development of low-logistics, rapidly deployable, overhead cover system for select critical asset protection; demonstrate perimeter standoff enforcement capabilities and entry control point technologies; demonstrate reinforcement of existing structures typical of conditions in operating environments; conduct evaluation of deployable radio frequency direction finding system to locate hostile activity; demonstrate integrated architecture for sensor components/systems; demonstrate enhanced detection capabilities for identifying hostiles; continue to conduct full-scale demonstrations and user assessments and conduct red and blue team missions in asymmetric and other relevant environments to identify further areas for improving robustness of design and implementation and to increase systems effectiveness.			
Title: Occupant-Centric Survivability ***Description:*** This effort develops a comprehensive model of improvised explosive device (IED) detonations in soils that accurately predicts the blast pressure and fragmentation of IEDs on ground vehicle systems in a wide range of operational environments. This work supports PEs 0633005/221 and 0622601/C05 in collaboration with the Tank and Automotive Research, Development and Engineering Center. ***FY 2013 Plans:*** Will demonstrate advanced numerical methods for coupling occupant response to shock resulting from improvised explosive device (IED) detonations. This work supports PEs 0633005/221 and 0622601/C05 in collaboration with the Tank and Automotive Research, Development and Engineering Center.	-	-	0.694
Title: Rapid Operational Access and Maneuver Support ***Description:*** This effort develops improved means for achieving Force Projection in coastal, estuary and riverine environments and an integrated sensing and simulation system for predicting physical conditions in these operational environments. ***FY 2013 Plans:***	-	-	3.266

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603734A: *Military Engineering Advanced Technology*	PROJECT T08: *COMBAT ENG SYSTEMS*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Will demonstrate modular, extensible computational toolkit to rapidly assess throughput and mobility of vehicles at austere and remote sites, including along coasts, estuaries, and rivers via reliable simulation of waves, currents, sediment, and other material transport mechanisms affecting movement/throughput; demonstrate sensor utilization and characterization of operational conditions at austere ports and offload sites for determining infrastructure load carrying capability.			
Accomplishments/Planned Programs Subtotals	23.617	36.458	28.458

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army										DATE: February 2012	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603772A: *Advanced Tactical Computer Science and Sensor Technology*							
COST ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**	**FY 2014**	**FY 2015**	**FY 2016**	**FY 2017**	**Cost To Complete**	**Total Cost**
Total Program Element	24.175	30.552	25.226	-	25.226	27.413	34.945	35.225	35.731	Continuing	Continuing
101: *Tactical Command and Control*	14.319	15.265	11.590	-	11.590	13.594	13.750	13.766	13.910	Continuing	Continuing
243: *Sensors and Signals Processing*	9.856	15.287	13.636	-	13.636	13.819	21.195	21.459	21.821	Continuing	Continuing

Note

FY 13 funding realigned to higher priority efforts

A. Mission Description and Budget Item Justification

This program element (PE) matures and demonstrates technologies that allow the Warfighter to effectively collect, analyze, transfer and display situational awareness information in a network-centric battlefield environment. It matures and demonstrates architectures, hardware, software and techniques that enable synchronized Command and Control (C2) during rapid, mobile, dispersed and Joint operations. Project 101 matures and develops software, algorithms, services and devices to more effectively integrate mission command across all echelons and enable more effective utilization of Warfighter resources. Project 243 matures and demonstrates signal processing and information/intelligence fusion software, algorithms, services and systems for Army sensors; radio frequency (RF) systems to track and identify enemy forces and personnel; and multi-sensor control and correlation software and algorithms to improve reconnaissance, surveillance, tracking, and target acquisition.

Work in this PE is complimentary of PE 0602120A (Sensors and Electronic Survivability), PE 0602270A (EW Technology), PE 0602705A (Electronics and Electronic Devices), PE 0602782A (Command, Control, Communications Technology), and PE 0603270A (EW Technology); and fully coordinated with PE 0602783A (Computer and Software Technology) and PE 0603008A (Electronic Warfare Advanced Technology).

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work in this PE is performed by the Army Research, Development, and Engineering Command (RDECOM), Communications-Electronics Research, Development, and Engineering, Center (CERDEC), Aberdeen Proving Ground, MD.

Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Army					DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*			R-1 ITEM NOMENCLATURE PE 0603772A: *Advanced Tactical Computer Science and Sensor Technology*		
B. Program Change Summary ($ in Millions)	**FY 2011**	**FY 2012**	**FY 2013 Base**	**FY 2013 OCO**	**FY 2013 Total**
Previous President's Budget	24.873	30.600	33.563	-	33.563
Current President's Budget	24.175	30.552	25.226	-	25.226
Total Adjustments	-0.698	-0.048	-8.337	-	-8.337
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.395	-			
• Adjustments to Budget Years	-	-	-8.337	-	-8.337
• Other Adjustments 1	-0.303	-0.048	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603772A: *Advanced Tactical Computer Science and Sensor Technology*	PROJECT 101: *Tactical Command and Control*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
101: *Tactical Command and Control*	14.319	15.265	11.590	-	11.590	13.594	13.750	13.766	13.910	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates software, algorithms, services and devices that move and display timely and relevant information across the battlefield to provide commanders at all echelons with situational awareness (SA) that allows them to understand, decide and act faster than their adversaries. This project also matures and demonstrates software, algorithms and devices supporting information storage and retrieval; digital transfer and display of battlefield SA and navigation (nav), position (pos) and location information; synchronization of combined and Joint force operations; software, algorithms and services optimized for Command and Control (C2) On-the-Move (OTM) and C2 of unmanned air and ground robotic systems.

This project supports Army science and technology efforts in the Command Control and Communications portfolio.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Army Research, Development, and Engineering Command, Communications-Electronics Research, Development, and Engineering, Center (CERDEC), Aberdeen Proving Ground, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Integrated Mission Command (MC) (previously titled Integrated Battle Command (BC))	8.644	8.691	8.155
Description: This effort matures and demonstrates technologies that allow forces to effectively collect, analyze, transfer, and display information in a net-centric battlefield environment. In order to manage costs and reduce duplicative efforts the Army has introduced the notion of the Common Operating Environment (COE). The COE is composed of several distinct computing environments (CEs) such as the Mobile (hand held devices) and the Mounted (vehicle based devices) CEs. Efforts in FY12 and FY13 place an emphasis on adopting and supporting the COE CEs. Technology areas include intelligent software agents, server virtualization, knowledge management, and automated query technologies. Work accomplished under PE 0602782A/project 779 compliments this effort.			
FY 2011 Accomplishments: Demonstrated dynamic agent based service orchestration to provide workflow adaptation for unexpected events; matured smart filtering services to enable extraction of structured data (graphics, numeric, and etc.) from free text; finalized and documented all software for transition to PM BC; demonstrated and assessed agent based BC services hosted at multi-echelons in a representative environment; matured additional functionality in data aggregation and alert capabilities and provided lessons			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603772A: *Advanced Tactical Computer Science and Sensor Technology*	PROJECT 101: *Tactical Command and Control*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
learned; enhanced methods and software to improve information sharing and collaboration in network-enabled operations; enhanced configuration of Microsoft Office applications to allow the Warfighter to adapt them in the field to specific mission requirements; developed web-based gallery to support collaboration of Warfighter-developed applications. ***FY 2012 Plans:*** Validate proof-of-concept for mission context data aggregation and alert algorithm for more effective use of available information; further create and demonstrate methods to assess information sharing, decision making and collaboration in network-enabled operations to better understand how to align these technologies with Warfighter needs; demonstrate technologies that enable the software to track progress in meeting mission goals and provide mechanisms that offer the commander a real-time assessment of the mission; demonstrate technologies permitting the Warfighter to customize and/or extend decision-enabling software in response to unique and evolving mission needs; write algorithms to monitor text-based chat conversations, evaluate content meaning, and suggest information from other related chat sessions that may be applicable. ***FY 2013 Plans:*** Will code and demonstrate MC software applications for tasks such as team coordination and situational awareness for dismounted users equipped with hand held devices (a.k.a. Mobile CE) to maximize effective use of available information; code and integrate decision support software capabilities based on information sharing in the Mounted CE to assist in locating and collaborating with friendly forces using tactical communication systems; code MC software capabilities to help with mission planning, execution and tracking unit progress in meeting mission goals within the Command Post CE; code software enabling Soldiers at the company echelon to perform Soldier functions that are typically performed only at battalion and above, such as intelligence and fires; add cognitive enhancements such as question-driven input and pop-up activity-driven suggestions to improve existing MC software systems by automatically assisting users, who may have limited training, to perform at higher levels of efficiency.			
Title: Command and Control (C2) for Unmanned Systems ***Description:*** This effort designs, codes and demonstrates software services that provide coordinated dynamic battle command and tactical control of unmanned systems as well as software tool sets that enable the commander to manage teams of manned and multiple unmanned air and ground platform assets. ***FY 2011 Accomplishments:*** Matured mission planning, execution, and monitoring software services to support collaborative, teamed unmanned ground vehicle/unmanned aerial system (UGV/UAS) operations as well as provide greater battlefield awareness and situational understanding for operations in urban terrain; enhanced software algorithms for UAS/UGV perception and control technologies which facilitate increased autonomy and more complex missions; incorporated models for terrain and weather effects into	3.661	3.516	-

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603772A: *Advanced Tactical Computer Science and Sensor Technology*	PROJECT 101: *Tactical Command and Control*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
planning software to enable more effective planning in complex environments; conducted experiments in modeling and simulation environments to evaluate effectiveness and establish a performance base line. ***FY 2012 Plans:*** Code user interface enhancements to facilitate manned/unmanned interaction, improve ability to monitor multiple unmanned assets, and improved visualization of vehicle status, task progression, and incoming sensor data; continue to evolve mission planning, execution and monitoring software services supporting collaborative UAS/UGV teaming; continue to enhance software algorithms for UAS/UGV perception and control technologies that potentially facilitate increased autonomy and mission complexity; continue modeling and simulation activities to evaluate software effectiveness and expand on performance base line.			
Title: Battle Space Awareness and Positioning ***Description:*** This effort demonstrates position and navigation tools to mitigate the impacts of jamming, terrain features and obstacles such as buildings that limit the performance of Global Positioning System (GPS) receivers to enhance the performance of navigation systems in a GPS denied or degraded environment. Work being accomplished under PE 0602782A/project 779 compliments this effort. ***FY 2011 Accomplishments:*** Matured an integrated pos/nav suite combining advanced small inertial sensors, advanced GPS technology and algorithms and radio based navigation technology to provide pos/location information in all terrains and environments. ***FY 2012 Plans:*** Complete integration of a pos/nav suite for a software defined radio platform (e.g., Joint Tactical Radio System) combining RF-ranging and network-assisted navigation to provide position location information in all terrains and environments as well as under GPS-degraded conditions. ***FY 2013 Plans:*** Will pursue two parallel approaches to integrating novel pos/nav capabilities, using JTRS radios for one approach and Android smartphones for the other, for both approaches, will implement sensor integration algorithms that incorporate navigation enhancements such as RF-ranging and network assisted navigation in combination with selected pos/nav sensor equipment; complete fabrication and integration of brassboard radio/sensor navigation systems for laboratory assessment of system performance.	2.014	3.058	3.435
Accomplishments/Planned Programs Subtotals	14.319	15.265	11.590

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603772A: *Advanced Tactical Computer Science and Sensor Technology*	PROJECT 101: *Tactical Command and Control*

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army			DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603772A: *Advanced Tactical Computer Science and Sensor Technology*	PROJECT 243: *Sensors and Signals Processing*	

COST ($ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
243: *Sensors and Signals Processing*	9.856	15.287	13.636	-	13.636	13.819	21.195	21.459	21.821	Continuing	Continuing

A. Mission Description and Budget Item Justification

This project matures and demonstrates improved radar, sensor fusion, and correlation software, services, devices and systems for wide area reconnaissance, surveillance, tracking and targeting of platforms and individuals in all terrains, including complex and urban environments. Sensor fusion efforts mature and demonstrate software, algorithms and services for sensor management, data correlation, and relationship discovery for a multi-intelligence fusion system. Sensor and simulated sensor candidates may include moving-target-indicator/synthetic aperture radar, electro-optical/infrared (EO/IR), signals intelligence (SIGINT), measurements and signatures intelligence (MASINT), human intelligence (HUMINT) and biometrics.

This project supports Army science and technology efforts in the Command Control and Communications, Ground and Air portfolios.

The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy.

Work in this project is performed by the Army Research, Development, and Engineering Command, Communications - Electronics Research, Development, and Engineering Center (CERDEC), Aberdeen Proving Ground, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Title: Foliage Penetrating (FOPEN) Radar for Unmanned Aerial Systems (UASs)	2.871	-	-
Description: This effort matures and demonstrates a FOPEN radar capability to meet the size, weight, and power (SWaP) requirements for a Class IV UAS. Advancements in both hardware and exploitation processing software enable increased radar performance to include ground and non-metallic building penetration for detection of hidden roadside target/weapons caches. Two demonstrators with spares are being fabricated and flight assessed, the first completed in FY10 and the second in FY11. ***FY 2011 Accomplishments:*** Completed second FOPEN system radar integration on target UAS and conducted UAS flight assessment on second system.			
Title: Measurement and Signature Intelligence Technologies (MASINT) for clandestine tagging, tracking and locating (TTL)	1.894	2.352	2.870
Description: This effort matures and demonstrates MASINT sensors and software techniques capable of detecting, tracking, and/or identifying human activities and/or infrastructures. The emphasis is to identify appropriate technical approaches, demonstrate embedded processing, and mature algorithms for multi-mode fusion of sensor data. Candidate technologies include: fiber optic seismic/magnetic sensors, highly sensitive for detection of walking personnel with/without weapons and/or tunneling detection; air			

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603772A: *Advanced Tactical Computer Science and Sensor Technology*	PROJECT 243: *Sensors and Signals Processing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
deployable (air droppable) networked sensor system for a jungle environment (integration of seismic/acoustic sensor with jungle canopy relay); human infrastructure detection technologies (algorithms, sensors, etc); radio frequency MASINT detector, ultra-light multi-target indicator radar for unattended ground sensors and unmanned air vehicles. Work accomplished under PE 0602120A/ project H16 compliments this effort. ***FY 2011 Accomplishments:*** Demonstrated/assessed brassboard for potential spiral transition to the user community; investigated new TTL technologies to address emerging TTL user requirements. ***FY 2012 Plans:*** Designed and fabricated contactless identification sensors that enable clandestine tagging and observation of targets from a distance, extended operational persistence and range of the sensors and designed and coded forward based fusion and processing software and algorithms. ***FY 2013 Plans:*** Will design and fabricate an extended range facial recognition sensor and optimize code of associated facial-matching algorithms; demonstrate the positive identification of an individual as a person-of-interest and the tracking of that individual throughout a forward operating area using a network of unattended facial recognition sensors communicating with intelligence/biometrics databases over a secure network in near real time.			
Title: Weapon-Locating (Ground) radar technologies ***Description:*** This effort matures and demonstrates medium-range sensor technologies for locating indirect fire weapons and extending traditional counter-fire target acquisition to shooters operating into or from within natural and urban canyons and firing in improvised fashions (tracks rocket, artillery and mortar targets). ***FY 2011 Accomplishments:*** Developed improved clutter mitigation and discrimination algorithms to accommodate increased occurrence of ground clutter expected with additional radar coverage area. ***FY 2012 Plans:*** Complete brassboard weapon-locating radar system hardware; conduct component and system level engineering and performance assessment against rocket, artillery and mortar targets fired at non-traditional trajectories; integrate mature radar and components under the PM Radars Lightweight Counter Mortar Radar (LCMR(V)3) pre-planned product inprovement program and into new radar developments.	2.546	4.435	-
Title: Collaborative ISR Sensors, previously named Multi-Function Networked RADAR Technologies.	-	-	4.701

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603772A: *Advanced Tactical Computer Science and Sensor Technology*	PROJECT 243: *Sensors and Signals Processing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
Description: This effort fabricates multi-function ISR sensors and sensor management systems that act collaboratively to improve their individual performance and increase the effectiveness and action-ability of battlespace awareness/intelligence data in an area of operations. Efforts focus on existing, modified and emerging radar technologies in support of area/base camp protection. This effort implements an open architecture that is extensible to multiple base sizes and environments and allows growth for future ISR sensors. Work being accomplished under PE 62270/906 complements this effort. ***FY 2013 Plans:*** Will code, demonstrate and assess software algorithms that allow existing radar systems to track targets and perform air surveillance simultaneously; integrate software algorithm into counter target acquisition systems (LCMR) to improve the accuracy of target recognition, identification and classification; code software and firmware to correlate data from existing short range (LCMR) and long range (EQ-36) radar systems to more accurately validate and verify threats at increased ranges and combine targeting information into a single display.			
Title: Omni-directional Situational Awareness (SA) (Airborne) radar technologies ***Description:*** This effort matures and demonstrates low power multi-function SA sensors for small unmanned aerial systems (UAS) and other aircraft to improve sensing and detection capabilities in support of wide-area persistent surveillance. ***FY 2011 Accomplishments:*** Matured sensor payload to reduce size weight and power requirements; matured antenna design and processing techniques to support multi-sensor capability. ***FY 2012 Plans:*** Fabricate networking radar-EO/IR sensor pairs using ad-hoc methods; analyze and assess network bandwidth and security requirements for downlink from UAS; further mature antenna design and processing techniques to support multi-sensor capability and cross-cue to narrower fields of view and auto-tracker; modify sensor payload to reduce size, weight and power; harden antenna and electronics design for field environment; design and code application for radar command, control, and data display on handheld device (PDA, smart-phone, or similar).	2.545	3.500	-
Title: Advanced All Source Fusion ***Description:*** This effort develops software technologies for intelligence/battle command (Intel/BC) mission collaboration to provide faster and higher quality decision making support for the Commander and his key staff. Specific efforts focus on integrating intelligence, surveillance and reconnaissance (ISR) planning and execution at the task force/battalion through troop-level, as well as efforts that provide the capability to identify, fuse, and trace/track specific targets in an asymmetric environment. Work accomplished under PE 0602270A/project 906 compliments this effort.	-	5.000	6.065

Exhibit R-2A, RDT&E Project Justification: PB 2013 Army		DATE: February 2012
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603772A: *Advanced Tactical Computer Science and Sensor Technology*	PROJECT 243: *Sensors and Signals Processing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2011	FY 2012	FY 2013
FY 2012 Plans: Analyze, assess and design a common data model that provides integrity for all data types to include data inter-relationships (time, locations, links, etc) that provide source-agnostic extraction and exploitation capabilities; integrate software products for extracting data, identifying, fusing, and tracking of specific entities into the Intelligence Enterprise (DCGS-A, INSCOM, JIEDDO); code entity extractors, relational reasoning engines, and visualization products; integrate human assisted extraction, interactive correlation and data mining techniques to enable the data fusion process and assist intel analysts with activity and relationship discovery; integrate these technologies into DCGS-A Systems Integration Laboratory (SIL) and architecture; integrate biometric data matching and fusion algorithms for use in non-cooperative intelligence collection environment. ***FY 2013 Plans:*** Will compose, code and assess automated exploitation and fusion analysis tools, applications, and services that provide advanced planning, execution and assessment capabilities to support the tactical edge user; code and demonstrate applications and services to generate actionable intelligence in support of simultaneous offense, defense, stability, and civil support missions; define new data fields and associated values necessary to improve action-ability of tactical intelligence products; code and assess new correlation and pattern analysis algorithms that incorporate these new data fields; code and assess complex analysis and prediction software to aid the decision making process.			
Accomplishments/Planned Programs Subtotals	9.856	15.287	13.636

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.